EIA report quality in protected areas in South Africa – a SANParks longitudinal study

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Thank you!

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ABSTRACT

Environmental Impact Assessment (EIA) is a tool used internationally to avoid or mitigate negative environmental impacts that are associated with development projects. EIA is mandatory in South Africa for certain development activities, including projects that have the potential to negatively affect protected areas, which provide for the conservation and management of the country's rich biodiversity. Several categories of protected areas exist, including national parks, which are managed by a leading conservation organisation known as South African National Parks (SANParks).

In order to ensure that the purpose of EIA is achieved, it is necessary to evaluate the effectiveness of the EIA system. Since there are various aspects of EIA effectiveness, there are also various methods to determine the effectiveness of this system, one of these being the quality review of Environmental Impact Reports (EIRs). EIRs are submitted to the authorities who then use the information in the reports to determine whether development projects should be authorised. The authorisation of certain development activities in protected areas (SANParks) are based primarily on the quality of the information in the EIR. However, the report quality of SANParks projects has not yet been determined.

Therefore, an adapted version of the Lee and Colley review package was used to review the quality of a sample of 24 EIRs of SANParks development projects. Overall, 92% of the reports were graded as satisfactory, with the descriptive and presentational parts (Review Areas 1 and 4) of the EIRs more satisfactorily addressed than the more analytical parts (Review Area 2 and 3). These results appear to correspond with international EIR quality review findings.

Additionally, since the South African EIA system has changed over the past 20 years, from the Environment Conservation Act (ECA) 1997 regime to the fourth National Environmental Management Act (NEMA) regime of 2017, it can be expected that EIR quality (and effectiveness) has improved over time. The SANParks EIRs were grouped according to the EIA regime under which the EIA was conducted. Three broad regimes, ECA 1997, NEMA 2006/10 co-regime and NEMA 2014/17 co-regime were used and the report quality of each was determined, in order to conduct a longitudinal study and identify temporal trends. The results revealed that EIR quality has improved from the ECA 1997 regime to the NEMA 2014/17 co-regime. However, areas in need of improvement were still noticeable, such as the duration of different development phases, the significance of impacts in terms of national and international quality standards, and the methods of obtaining quantities of wastes.

The observed high satisfactory ratings and improvement of report quality can likely be attributed to several factors, i.e. biological importance of the areas, higher environmental

literacy of tourists, education and specialist diversity of the park officials, the enhancement of the EIA regulations and the increase of the level of experience of the Environmental Assessment Practitioners.

Keywords: Environmental Impact Assessment (EIA), Environmental Impact Assessment Report, EIA report quality, protected areas, South African National Parks (SANParks).

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LIST OF ACRONYMS AND ABBREVIATIONS

ACRONYM/ ABBREVIATION	DESCRIPTION
ACCN	African Convention on the Conservation of Nature and Natural Resources
BIA	Biodiversity Impact Assessments
CBD	Convention on Biological Diversity
CFR	Cape Floristic Region
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
DEAT DEA	Department of Environmental Affairs and Tourism Department of Environmental Affairs (after 2009)
DME	Department of Minerals and Energy
EA	Environmental Assessment
EAP	Environmental Assessment Practitioners
ECA	Environment Conservation Act
EIA	Environment Impact Assessment
EIR	Environment Impact Report
EIS	Environment Impact Statement
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPR	Environmental Management Programme Report
I&APs	Interested and affected parties
i.t.o	In terms of
IAU	Impact Assessment Unit's
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature
KNP	Kruger National Park
MPA	Maputaland – Pondoland – Albany
MPRDA	Mineral and Petroleum Resources Development Act
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:PAA	National Environmental Management: Protected Areas Act

NEM:WA	National Environmental Management: Waste Act
NEPA	National Environmental Policy Act
RA	Review Area
ROD	Record of Decision
SADC	Southern African Development Community
SAIEA	Southern African Institute for Environmental Assessment
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SEA	Strategic Environmental Assessment
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America

CHAPTER 1: INTRODUCTION AND PROBLEM STATEMENT

1.1 Introduction

The environment is essential to the survival and welfare of current and future generations. However, it is no secret that multiple threats exist that could result in significant environmental impacts, which, in turn, will affect the overall functioning of the environment on an international scale. These impacts include depletion of natural resources, deforestation, land degradation, habitat loss, biodiversity loss, acid rain and many different forms of pollution (Arrow *et al.,* 1995; Steffen *et al.*, 2011; Steffen *et al.,* 2015). Therefore, South Africa, like many countries globally, strives to protect as well as conserve the environment through the use of various tools, including protocols, treaties, strategies and Environmental Management.

Environmental Management and appropriate environmental management tools are implemented to ensure that negative environmental impacts are reduced or avoided. Environmental Management can be defined as the management of human activities that can have a potentially significant effect on the environment, with the aim of ensuring environmental sustainability (Dorney, 1989; Pahl-Wostl, 2007), and can be achieved through the implementation of tools such as Environmental Assessment (EA). According to Wood (2003) and Morgan (2012), EA is a successful environmental tool that promotes environmental considerations during the decision-making process, to avoid or mitigate negative environmental impacts. EA includes the assessment of policies, programmes and plans, which is known as Strategic Environmental Assessment (SEA) and the assessment of spesific development activities, which is known as Environmental Impact Assessment (EIA) (Wood & Jones, 1997; Lee, 2000).

According to Wood (2008) the defining purpose of the EIA process is to analyse the potentially significant environmental effects that could arise if a development occurs, and to inform the decision makers, as well as the public, of these effects. Therefore, EIA's are used internationally during the planning of developments to prevent significant negative impacts on the environment (Lee *et al.,* 1999; Morrison-Saunders *et al.*, 2001; Sandham *et al.,* 2008a; Morgan, 2012). As a result, EIA can be seen as a vital step towards protecting the environment without compromising economic growth (Sandham & Pretorius, 2008).

However, the effectiveness of EIA systems is a concern amongst practitioners (Barker & Wood, 1999; Christensen *et al.*, 2005). EIA effectiveness refers to the degree to which an EIA achieved its purpose, namely environmental management and protection (Morrison – Saunders, 1996; Sadler, 2004; Jay *et al.*, 2007). Aspects of effectiveness, including: the quality of EIA reports, the effectiveness of public participation, procedural efficiency, duration, cost-

effectiveness of the operation, effectiveness as the EIA system, and monitoring and post-auditing (Sadler, 1996; Jay *et al.*, 2007). Different methods are used to determine EIA effectiveness, including the use of a framework, monitoring and auditing, or through reviewing the quality of the Environmental Impact Report (EIR).

According to Sadler (1996) and Weston (2000) continual EIA report quality reviews should be conducted for the EIA system to function effectively, since EIR quality review is performed to ensure that the information provided in the report is credible and accurate to enable better environmental management and sound decision-making (Fuller, 1999; Wood, 2003; DEAT, 2004). The quality of EIA reports can be evaluated using a review package or a review model, such as the Lee and Colley review package. This review package, or an adaption thereof, has been used in several countries, including South Africa, to determine EIR quality (Barker & Wood, 1999; Sandham *&* Pretorius, 2008; Jalava *et al.*, 2010; Barker & Jones, 2013). EIA was initiated in the United States of America (USA) during the 1970's, following the promulgation of the National Environmental Policy Act (NEPA) in 1969 (Peckham, 1997). Since the introduction of the EIA process, it has been implemented in many countries in various forms and on different scales.

1.2 EIA and report quality review in South Africa

After the international introduction of the EIA process in the 1970's, it was conducted on a voluntary basis in South Africa. However, following the promulgation of the first South African EIA regulations in September 1997 in terms of the Environment Conservation Act (ECA), the EIA process became mandatory (Kidd *et al.*, 2018). The 1997 EIA regulations were replaced in 2006 by new EIA regulations published in terms of the National Environmental Management Act (NEMA) (South Africa, 1997; South Africa, 2006). The newly promulgated 2006 EIA regulations attempted to increase the effectiveness of EIA in South Africa. According to Kidd *et al.* (2018) the new regulations were more refined in terms of screening criteria, public participation and timeframes. The South African EIA regulations were further modified by the promulgation of new regulations in 2010, 2014 and finally in 2017 (South Africa, 2010a; South Africa, 2014; South Africa, 2017). Clearly, the EIA process has evolved in South Africa, and there has been a growing interest in determining EIA effectiveness in this country.

The quality of South African EIA reports has been reported in several papers, using the Lee and Colley review package as a basis for quality review. These studies include the determination of EIR quality for the North West Province, for projects with the potential to affect wetlands, renewable energy projects, the mining sector and the explosives manufacturing industry (Sandham *et al*., 2008a; Sandham & Pretorius, 2008; Sandham *et al.*, 2008b; Sandham *et al.*, 2013b; Boshoff, 2013). A study was also conducted to compare the quality of

EIA reports under the 1997 EIA regime and the 2006 EIA regime (Sandham *et al.*, 2013a). More detail on these and other studies is provided in Chapter 2.

1.3 EIR quality of protected areas in South Africa

Apart from a case study performed by Wylie *et al.* (2018) on the quality of environmental impact reporting for proposed tourism-related infrastructure in and around the protected areas of the Mpumalanga and Limpopo provinces of South Africa, and preliminary investigative work in the Kruger National Park (Huysamen, 2017; Scheepers, 2017), no further research on EIA report quality in protected areas, including national parks in South Africa could be found. Protected areas can be defined as any area that is protected by law in order to conserve its biodiversity (South Africa, 2010b). Protected areas are vital for biodiversity conservation, ecological sustainability, land reform and rural livelihoods, socio-economic development and adaption to climate change (South Africa, 2010b). The National Environmental Management: Protected Areas Act (NEM:PAA) provides for numerous categories of protected areas, such as the special nature reserves, protected environments, nature reserves, and national parks (South Africa, 2004).

South Africa's national parks which are widely distributed (Fig. 1.1), are managed by South African National Parks (SANParks), one of the leading conservation organisations in the country,.

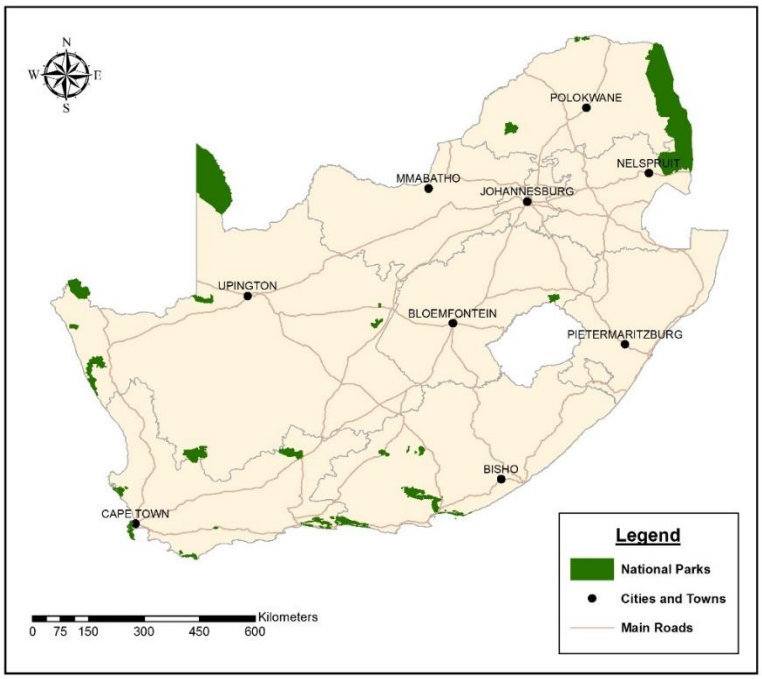

Figure 1.1: Distribution of South Africa's national parks.

SANParks is also a large provider of ecotourism experiences in South Africa (De Witt *et al.*, 2014). SANParks manages 22 national parks with the primary focus of conserving areas that represent the overall biodiversity of the country (SANParks, 2006; Swemmer & Taljaard, 2011;

DEAT, 2018). However, since the current and future existence of SANParks depends heavily on tourism, it is crucial to successfully develop and manage the organisation's tourism services and products (De Witt *et al.*, 2014). Tourism forms past of South Africa's growing economy, therefore the development of tourist attractions is unavoidable. Nonetheless, the need for development in national parks should not result in adverse environmental effects that could threaten conservation efforts. Therefore, protected areas, including national parks, also depend on environmental management tools such as EIA. However, in many of South Africa's protected areas, and especially in its national parks, EIA report quality is yet to be determined. Therefore, the aim of this research is to address this particular gap.

1.4 Aims and objectives

To critically analyse the quality of EIA reports of developments in protected areas in South Africa.

To achieve the research aim, the following research objectives are set:

Objective 1: To evaluate the quality of a sample of EIA reports for protected area (SANParks) projects, using an adapted version of the Lee and Colley review package.

Objective 2: To compare report quality across several EIA regimes longitudinally.

1.5 Structure of the dissertation

This dissertation consists of six chapters, each with its own reference list. Chapter 1 includes an introduction and background to the study, along with the problem statement and the overarching aim and objectives. Chapter 2 provides a critical review of existing literature regarding EIA systems, and of previous research conducted on EIA report quality. Chapter 3 addresses the methodology used, while the quality review of SANParks EIA reports is covered in Chapter 4. In Chapter 5 the EIR quality of the EIA regimes is analysed and discussed. Lastly, a conclusion is provided in Chapter 6.

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CHAPTER 2: LITERATURE REVIEW

In this chapter the development of Environmental Impact Assessment (EIA) and EIA in South Africa is discussed, as well as EIA effectiveness and EIA report quality review on a national and international level. Focus is also placed on biodiversity and protected areas in South Africa.

2.1 Development of EIA

EIA was introduced in the USA in 1969 by means of the National Environmental Policy Act (NEPA) (Wood, 1995; Kidd *et al.*, 2018). According to Jay *et al.* (2007) the NEPA was established by the USA during a time when significant environmental damage caused by human activities was becoming increasingly obvious, and a growing concern of the public as well as political activists. After the introduction of the NEPA, many countries realized that their own regions are also faced with the same environmental problems and concerns (Wood, 2002).

Since then, EIA has spread across the world, receiving legal and institutional force in many countries – some of the early adopters being Australia, Sweden, New Zealand, France and Canada (Barker & Wood, 1999; Benson, 2003; Jay *et al.*, 2007; Morgan, 2012). The adoption of EIA in developing countries was slow at first; however, following the Rio Earth Summit in 1992, increased implementation of the EIA system occurred in nearly all low- and middle income countries (Mokhehle & Diab, 2001; Netherlands Commission for Environmental Assessment, 2015). High-, middle- and low income countries acknowledged the role of EIA as an important policy tool for environmental management at the Summit (Kolhoff *et al.,* 2018). Developing countries were also motivated to implement an EIA system since funding institutions, such as the World Bank, required an EIA as part of the funding approval process, thereby assisting the spread of the EIA system (Bekhechi & Mercier, 2002). By 2011 EIA was universally recognised for its importance in environmental management and was practised in almost 200 countries (Morgan, 2012).

2.2 EIA in South Africa

Voluntary EIAs have been conducted in South Africa since the early 1970s (Sowman *et al.*, 1995). However, EIAs were considered as too limited and separate from the planning process; therefore EIAs were practised as part of Integrated Environmental Management (IEM) (Kidd *et al.,* 2018). IEM aimed to ensure that any environmental issues that arose from a development activity would be considered and addressed during the planning process (Wiseman, 2000; DEAT, 2004a; Kidd & Retief, 2009; Kidd *et al*., 2018).

The IEM procedural document was published in 1989, along with the new Environment Conservation Act, Act no. 73 of 1989 (ECA) (South Africa, 1989). The procedures emphasized the importance of environmental assessment as well as implementation and monitoring (Kidd & Retief, 2009; Kidd *et al*., 2018). The IEM procedure was revised and published in the form of six guideline documents in 1992, with a view to providing more practical guidance (Wood, 1999; DEAT, 1992). According to Wood (1999) and Kidd *et al.* (2018) the EIM guideline documents were used to guide voluntary EIAs in South Africa. However, IEM was also associated with several problems, including the reluctance of land owners to consider alternative sites, the use of a first-world philosophy in a third-world country, and its non-enforceable nature (Wood, 1999). Aiming to address these problems, the country's first EIA regulations were promulgated in 1997, implementing the dormant EIA requirements of the Environment Conservation Act.

2.2.1 First EIA regime – ECA:1997

The Environment Conservation Act (ECA) provided a foundation for the development of an environment management system in South Africa (South Africa, 1989). The ECA established a general structure as well as principles applicable to the management of the activities of a department dealing with the environment (Barnard, 1999). The general environmental policy, determined in terms of section 2 of the Act, established the need for sustainable development, holistic evaluation of projects, public participation, the protection of environmentally sensitive areas during development, the need to internalise external costs, and the requirement of the judicious use of land (South Africa, 1989; Barnard, 1999).

Section 21, 22 and 26 of the ECA provided for the implementation of Environmental Assessment. Section 21 and 22 of the Act introduced an effective control structure for Environmental Assessment, while section 26 dealt with Environmental Impact Reporting (South Africa, 1989). As stated in section 21(1) of the ECA, the Minister of Environmental Affairs and Tourism can identify activities which in his or her opinion may have a substantial detrimental effect on the environment (South Africa, 1989). These activities could include the activities referred to in section 21(2), but it is not limited to only these activities. Section 22 of the ECA states that an activity, listed in terms of section 21, may not be undertaken without a written authorisation. The designated competent authority for EIA report authorisation was generally the provincial environmental department in which the development was proposed. However, the Department of Environmental Affairs and Tourism (DEAT) dealt with the authorisation of certain activities including; proposed government developments crossing provinces and national borders, and proposed developments in national park and their buffer zones. The authorisation can only be obtained after the competent authority considered the

Environmental Impact Report (EIR), which should be in accordance with the regulations provided for in section 26 (South Africa, 1989; Barnard, 1999).

In 1997 these EIA regulations (Regulations 1182, 1183 and 1184) were promulgated in terms of section 21, 22 and 26 of the ECA, making EIA mandatory in South Africa for specific listed activities (South Africa, 1989; South Africa, 1997a; South Africa, 1997b; South Africa, 1997c; Wood 1999). The regulations identified a wide range of activities, divided into three main categories. The first category included activities related to the construction or upgrading of facilities including: public or private resorts, airfields, roads and railways. The second category included activities related to changes in land-use. The last category included activities such as the disposal of waste in terms of section 20 of the Act and the establishment of feedlots for cattle (Barnard, 1999).

The ECA of 1989 was, however, not without shortcomings in terms of EIA. According to Sandham and Pretorius (2008) the EIA system under the ECA strongly emphasised scoping and public participation. The EIA system firstly required a Plan of Study, then a scoping report and an EIA Report. However, the authorisation of an activity occurred primarily on the basis of an extended scoping report as permitted in Regulation no. 6(3) (a) which states that after a scoping report is accepted, the relevant authority may rule that the information provided in the report is sufficient for decision-making and that no further investigation is required (South Africa, 1997a; Van Heerden, 2010). These scoping reports included more information than required in terms of a scoping report, but still less than a full EIA report as required by the 1997 regulations and international best practice. According to Sandham *et al.* (2005) these "beefed-up" scoping reports were used in order to shorten potentially long administrative procedures. This procedure saved time and money, since a development project could only begin once the Record of Decision (ROD) has been issued and after the period of appeal has ended (Kidd & Retief, 2009). This shortened procedure was not only preferred by applicants, but also authorities, meaning that the majority of assessments ended after the scoping phase, with a decision based on the "beefed-up" scoping report.

The ECA EIA system was also characterised by the lack of mandatory post decision monitoring and enforcing compliance, since there were not enough skilled officials to implement this system (Sandham & Pretorius, 2008; Kidd *et al.*, 2018). More shortcomings of the ECA EIA regulations included the absence of thresholds for listed activates, no prescribed time limits within which various steps of the process had to be undertaken, low enablement of strategic decision-making, unnecessary time and monetary costs as well as a lack of consideration of social issues (Barnard, 1999; Wood, 1999; Kruger & Chapman, 2005; Kidd & Retief, 2009; Kidd *et al.*, 2018).

The ECA EIA regulations made no provision for activities related to mining, because the Department of Minerals and Energy (DME), was the competent authority for mining projects rather than the DEAT or provincial environmental departments (South Africa, 1991). The DME provided its own set of legislation in terms of the Minerals Act of 1991, which required that mines develop an Environmental Management Plan (EMP) and submit an Environmental Management Programme Report (EMPR) to the DME (South Africa, 1991). Therefore, mining projects were not only authorised by a different department, but a proper EIA was also not required (Fourie & Brent, 2006). This reflects the historical dominance of the mining sector in the South African economy and the reluctance of the mining industry to adopt more environmentally friendly practices, which resulted in weak EIA practise (Sandham *et al.*, 2008b).

However, in 2002 the Minerals Act was replaced by the Mineral and Petroleum Resources Development Act (MPRDA), Act no. 22 of 2002, with a parallel set of EIA regulations (Regulations 527) specific to the needs of this sector (South Africa, 2002; South Africa, 2004a; Hoffmann, 2007). These regulations were based on NEMA principles and were, in fact, much closer to international best practice than the ECA regulations, and resulted in EIA reports of similar quality to those conducted under ECA (Sandham *et al.*, 2008b). Mining activities were included in the NEMA 2006 and NEMA 2010 regimes, but were only finally incorporated for regulation under the NEMA 2014 regime (see below).

All of these shortcomings affected the effectiveness and quality of South Africa's EIA systems, since, for instance, development activities with potential detrimental environmental effects were not assessed, or the assessment ended up at scoping report level rather than a full EIA. The absence of post-decision monitoring also affected the quality of the country's EIA system seeing as there was no guarantee that the environmental impacts were truly avoided or mitigated.

Shortly after the ECA EIA regulations came into effect the National Environmental Management Act (NEMA), Act no. 73 of 1998 was promulgated. However, it was only during 2006 that EIA started to function under the NEMA.

2.2.2 NEMA

The hierarchy of South African environmental legislation cascades down from the Constitution, which provides the foundation for environmental rights and policy in South Africa (Kidd *et al.*, 2018). The NEMA, Act no. 73 of 1998, was promulgated to give effect to the environmental right included in the Constitution, specifically section 24 (b) which states that (South Africa, 1996:1251):

> "*Everyone has the right –*

a) To an environment that is not harmful to their health or wellbeing; and

b) To have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that:

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

The NEMA made provision to repeal most of the ECA, specifically section 21, 22 and 26 of the ECA as well all regulations under these sections regulating environmental authorisation and EIA's (Barnard, 1999; Kidd *et al.*, 2018). However, this repeal could only take effect after regulations under section 24 of NEMA had been promulgated. Section 24, which is included under Chapter 5 of the NEMA, provides for the implementation of Integrated Environmental Management (IEM) and the general objectives of IEM (South Africa, 1998). Since the first EIA regulations under NEMA was only published in 2006, the ECA regime operated parallel with the NEMA provisions in Chapter 5. According to Kidd *et al.* (2018) during this period, the ECA was used for 'identified activities' and section 24 of NEMA was applied to those activities which could potentially have a significant effect on the environment but were not identified in terms of the ECA. After the promulgation of the 2006 regulations, environmental authorisation and EIA functioned under the requirements of the NEMA.

As a framework law the NEMA creates an enabling environment for the adoption and promulgation of various other environmental legislation, such as the National Environmental Management: Biodiversity Act (NEM:BA) no.10 of 2004, the National Environmental Management: Protected Areas Act (NEM:PAA) no. 57 of 2003 and the National Environmental Management: Waste Act (NEM:WA) no. 59 of 2008 (South Africa, 2004b; South Africa, 2004c; South Africa, 2008; Kidd *et al*., 2018). General provision for environmental assessment is included in legislation other than NEMA, for instance in the NEM:BA. Therefore, the establishment of a general legislative environmental management system was taken a step further with the promulgation of the NEMA (Barnard, 1999).

2.2.2.1 Second EIA regime – NEMA: 2006

The first EIA regulations (Regulations 385, 386 and 387) under the NEMA were published for comment in June 2004, promulgated in April 2006 and came into effect in July 2006 (South Africa, 2006a; South Africa, 2006b; South Africa, 2006c). The Department of Environmental Affairs and Tourism (DEAT) published guideline documents to assist with the interpretation of the 2006 NEMA EIA regulations.

The new regulations aimed to improve the efficiency and the effectiveness of the EIA process by expediting the authorization process through prescribing timeframes for administration actions, report reviewing and decision-making. The regulations also provide thresholds for listed activities, clear instructions in terms of public participation, provisions for appointing suitable independent consultants, and follow up. Mining activities were included in the 2006 NEMA listing notices, but environmental authorisation under NEMA could not be applied until the relevant provisions came into effect (Kidd *et al.*, 2018). The NEMA was amended in 2008, during which it was indicated that NEMA is responsible for the assessment of mining activities.

The 2006 EIA regulations made provisions for two types of assessments i.e. a Basic Assessment and a Full Assessment. Any activity listed in Regulation 386 (Listing Notice 1) required a Basic Assessment. According to the DEAT (2005a) the purpose of the assessment was to provide a mechanism for the thorough but brief assessment of smaller scale activities, which are easy to manage and less likely to have a detrimental impact on the environment. Basic Assessment required public participation, the consideration of all potential impacts associated with a particular activity and the consideration of possible mitigation measures. It can be said that a Basic Assessment report had to contain enough relevant information for the competent authority to approve or deny a proposed development. If the competent authority was unable to make a decision based on the Basic Assessment report, the proposed activity was subjected to the more thorough Full Assessment process. Essentially, the new EIA regulations formalized the “beefed-up” scoping practice as the Basic Assessment process (Sandham *et al.*, 2013a).

The Full Assessment was required for activities in Listing Notice 2 (Regulation 387) and included a Scoping and EIA process. Those activities were more likely to have significant impacts on the environment, which could not be easily predicted or managed. A scoping report required a description of the proposed activity and site, feasible alternatives, details of the public participation process undertaken, the effect of the activity on several aspects of the environment i.e social, biological, economic and cultural, as well as the cumulative impacts. Additionally, a scoping report had to contain a Plan of Study for the EIA, specifically the required specialist reports and the methodology used to assess the potential environmental impacts. The scoping report and the Plan of Study must first be approved by the competent authority before an EIA could be conducted.

The quality of South Africa's EIA system could still be improved, since the 2006 regulations did not properly consider all potentially significant activities or reasonable time frames related to the EIA system. Therefore, even with the changes from the 1997 ECA regulations, fine-tuning was still needed in terms of the 2006 EIA regulations under NEMA (Kidd *et al.*, 2018). However,

the changes made to the EIA regulations do not guarantee that improvements in report quality will occur (Sandham *et al.*, 2013a).

2.2.2.2 Third EIA regime – NEMA: 2010

More detailed, fine-tuned EIA regulations were promulgated in terms of NEMA (Regulations 543, 544, 545, 546 and 547) and came into effect in August 2010 (South Africa, 2010a; South Africa, 2010b; South Africa, 2010c; South Africa, 2010d; South Africa, 2010e). These 2010 regulations were largely similar to the NEMA 2006 regulations, since several relatively small changes were made.

The NEMA 2010 Regulations (South Africa, 2010a) introduced a Listing Notice dedicated to activities planned for predefined sensitive areas, to ensure that impacts associated with these environments were treated with more care and consideration. In Listing Notice 3, the 26 activities listed had lower thresholds, since these development activities were proposed within sensitive areas. The 2010 NEMA listing notices also included certain mining activities which required environmental authorisation, in a further attempt to get mining impacts regulated by NEMA. However, as in 2006, these provisions did not come into effect (Kidd *et al.*, 2018).

Compared to the 2006 regulations several other small changes and adaptions were also made. The main focus of these amendments was to revise the lists of activities which required environmental authorisation prior to commencement. The EIA system was overloaded and strained with many applications related to insignificant activities; the Full Assessment process was unjustifiably required for listed activities for which the environmental impacts were largely known, resulting in unnecessary expenses and time delays, while some critical activities which required Full Assessments were absent (South Africa, 2010a).

Amendments were also made to ensure a more fair public participation process, for example the period from December 15 to January 2, was excluded from deadlines for both decisions and lodging of appeals (South Africa, 2010a). Additionally, the environmental authority was compelled to meet regulatory time frames to reach a decision in a reasonable amount of time. Environmental Management Frameworks (EMF) were also recognized as an environmental instrument with its own set of regulations, Regulation 547 (South Africa, 2010e).

These amendments were intended to improve the effectiveness and the quality of the EIA system, since the process was intended to be less expensive as well as less time-consuming, with optimal public participation. However, weather this intent was realised or not has not yet be researched. Despite these amendments, the EIA regulations required more detail and refinement, resulting in the promulgation of the fourth EIA regime.

2.2.2.3 Fourth EIA regime – NEMA: 2014

The 2014 EIA regulations (Regulations 982, 983, 984, and 985) were promulgated under the NEMA in August 2014 and came into effect in December 2014 (South Africa, 2014a; South Africa, 2014b; South Africa, 2014c; South Africa, 2014d). The regulations provided detail of the application and decision-making process (Kidd *et al.*, 2018). The 2014 EIA regulations also depended on the three listing notices with refined thresholds.

The time frames introduced under the 2010 regulations were further modified under the 2014 regulations, in general as well as in regard to specific steps in the EIA process. The 2014 EIA regulations stated that a Basic Assessment Report must be submitted in 90 or 140 days after an application has been submitted, and the competent authority should reach a decision in 107 days. In terms of the Full Assessment process, a scoping report must be submitted within 44 days of the application, and the competent authority should then accept of refuse the application within 43 days. If the application was approved by the competent authority, an EIR and EMP were to be submitted within 106 days (which extension 156 days), and the proposed development should then be approved or denied by the competent authority in no more than 107 days. The amendments related to time frames were intended to shorten the EIA and appeal process.

Additionally, the 2014 regulations also enabled environmental authorisation applicants to simultaneously receive all the necessary environmental licences, under 'One Environmental System'. Previously, applicants were required to submit licence applications to the relevant environmental departments. The integration of EIA with for example Heritage Assessments, Water Use License applications, and Waste Management License applications simplified as well as shortened the process. This amendment allowed for shared and integrated responsibility between the departments which improved the effectiveness of the EIA system, but the main responsibility remained with the Department of Environmental Affairs (DEA).

Under the 'One Environmental System' it was also possible to clarify the Environmental Impact Assessment of mining activities. The 2014 EIA regulations stated that certain mining activities not only requires environmental authorisation, but that all the NEMA requirements must also be followed. The decision-making authority, however, remains the Minister of Minerals. Therefore, many parties are concerned that the Minister is empowered to scrutinise the mining sectors environmental impacts (Kidd *et al*., 2018).

2.2.2.4 Fifth EIA regime – NEMA: 2017

The NEMA 2014 EIA regulations were slightly changed to be more detailed, resulting in the fifth EIA regime, which was promulgated in April 2017 in terms of the NEMA (Regulations 325, 324, 326 and 327) (South Africa, 2017a; South Africa, 2017b; South Africa, 2017c; South

Africa, 2017d). The latest amendments aim to give further effect to the implementation of the 'One Environmental System'. Additionally, the 2017 regulations attempt to clarify the environmental authorisation and Environmental Management Programmes Reports (EMPRs) for mining.

Several other small amendments were made, including; to give power to the Minister to gazette protocols or minimum information requirements in terms of an application; permitting the Minister to gazette instances were a Basic Assessment process could be required in the place of a Full Assessment process and the inclusion of financial provisions in a closure plan. Several other minor changes were made in terms of Listing Notice 1 and 2 to prevent misunderstanding and confusion. These changes include; activities which can potentially impact watercourses were simplified by referring to more general 'infrastructure' rather than specified categories of infrastructure (South Africa, 2017b) and the increase of the threshold of dredging activities within a watercourse (South Africa, 2017b).

In conclusion, although the NEMA 2006 and NEMA 2010 regulations, and the NEMA 2014 and the NEMA 2017 regulations are largely similar, with only small changes between these regimes, significant changes can be seen from the first to the fifth EIA regime in South Africa. Over time the regulations have clearly become more detailed, inclusive and well-defined, but EIA effectiveness remains a concern amongst practitioners. Therefore, the focus of the next section is on EIA effectiveness.

2.3 EIA effectiveness

The effectiveness of EIA has received significant attention since its origin in the 1970s (Cashmore *et al*., 2010). Pölönen *et al.* (2011) define EIA effectiveness as whether the process is correctly implemented, functioning properly and meeting the purpose for which is was developed, while Jay *et al.* (2007) provide a simplified definition which states that the evaluation of EIA effectiveness is intended to establish to what extent EIA is making a difference. Therefore, determining EIA effectiveness can help determine how much difference EIA is making in terms of environmental protection, management and conservation.

According to Sadler (1996) and Macintosh (2010) the effectiveness of an EIA system is established through four dimensions, namely:

- Procedural – the extent to which the EIA process complies with international principles
- Substantive – the extent to which the result obtained through the EIA process influences the decision-making process

- Normative – the change in values and behaviour brought on by past learning opportunities
- Transactive – balance between economic and environmental consideration.

Considering the four dimensions identified by Sadler (1996) and Macintosh (2010) it is clear that there are different aspects related to the effectiveness of an EIA system, including: fairness of the procedure, time efficiency, the quality of EIA reports, the effectiveness of public participation, cost effectiveness of the operation, monitoring and auditing, the potential to deliver a particular result, and the efficiency of the operation (Sadler, 1996; Rafique & Nixon, 2006; Jay *et al.*, 2007; Retief, 2008).

Wood (1999) developed a set of review criteria that can be implemented to evaluate and compare EIA systems. These review criteria have been used for the review of EIA systems in developed and developing countries (Barker & Wood, 1999; Wood & Coppell, 1999; Badr, 2009; Heinma & Põder, 2010; Toro *et al.*, 2010). Environmental Impact Report (EIR) quality review is listed as an important aspect of EIA system effectiveness. The quality of EIA reports is reviewed to determine whether the information provided in the reports is credible and accurate, in order to enable sound decision-making and to improve environmental management (Fuller, 1999; Wood, 2003; DEAT, 2004a). However, according to Sandham *et al.* (2013a) and Retief (2008) the quality of EIRs does not necessarily guarantee EIA effectiveness, although it improves the likelihood of good decision-making, which in turn can contribute to improved effectiveness.

Numerous studies have been conducted which evaluated the quality of EIRs, in both developed and developing countries (Lee & Dancey, 1993; Pardo, 1997; Steinemann, 2001; Pinho *et al.*, 2007; Sandham & Pretorius, 2008; Sandham *et al.*, 2008a; Badr *et al.*, 2011). In the following section, EIR quality review and quality review packages are discussed, and a summary of previous international and national EIR quality review studies is also provided.

2.4 EIR quality review

The information and data collected during the EIA process is presented in the form of an EIR. This report is used to inform the decision-makers as well as the stakeholders about the environmental impacts of the proposed development activity (Morrison-Saunders *et al.*, 2001; Wood, 2008). Therefore, good quality EIRs are important, since stakeholders and decision-makers will be provided with credible information regarding the environmental issues and concerns related to a development activity. If information contained in a report is inadequate or false, decision-makers can be informed regarding the poor quality of the report and refuse the proposed development (Pinho *et al.*, 2007).

According to Morgan (2012) poor quality information can reflect different problems and issues, such as weak environmental regulations, a low level of commitment, and a lack of training. Therefore, continual EIA report quality review is required for the EIA system to function effectively (Sadler, 1996; Weston, 2000; Toro *et al.,* 2010). To this effect, several quality review packages and models were developed to evaluate the quality of the EIRs.

2.4.1 EIR quality review packages

EIR quality has mainly been determined by using review packages and checklists (Sandham *et al.*, 2013a). These packages consist of specific criteria used for assessing how well assessment and reporting tasks were performed (Sandham *et al.*, 2013a).

Various review packages are available internationally to assess EIR quality, but there has been some criticism regarding the use of these packages. Firstly, the review packages neglect several important aspects of the EIA process, including: the probability of predicted effects, public involvement and the consideration of alternatives (Põder & Lukki, 2011). This results in the overvaluation of reports that inadequately address these aspects, and the undervaluation of reports in which these aspects are adequately addressed (Põder & Lukki, 2011).

Secondly, the number of people involved in the review of an EIR can have an influence on the results. Inter-individual differences (subjectivity) in judgement remains a problem during report review (Põder & Lukki, 2011). These differences in judgement can result due to various factors, including: an individual's cognitive abilities, work experience, educational background, knowledge of the EIA process and emotional profile (Põder & Lukki, 2011; Jalava *et al.*, 2012). Therefore, a group tends to be more objective than a single reviewer, since any significant differences in the assessment can be examined and resolved, which results in a more critical and accurate review as well as less bias (Lee *et al.*, 1999; Peterson, 2010). Thirdly, the transparency of the EIA and the EIR review is also influence by the subjectivity of a reviewer (Wilkins, 2003). Additionally, a group assessment can also increase transparency which can prevent misinterpretation and misunderstanding.

The first review package to be discussed is the Southern African Institute for Environmental Assessment (SAIEA) package (Rossouw *et al.*, 2003). This review package helps reviewers to determine if the report contains the necessary information for decision-making, and communication with the stakeholders (DEAT, 2004a).

The SAIEA review package is divided into the following sections (DEAT, 2004a:11):

1. *"Methodology utilized in compiling the EIA report*
2. *Description of the project*
3. *Assessment of alternatives to the project*

4. *Description of the environment*
5. *Description of impacts*
6. *Consideration of measures to mitigate impacts*
7. *Non-technical summary*
8. *General approach"*

When implementing the SAIEA review package, the reviewer considers which review questions are relevant to the project, and only those questions should be completed. The reviewer then grades each of those questions by establishing whether the information provided in the EIA report is (DEAT, 2004b:11):

- Complete (C): All information required to make a decision is available.
- Acceptable (A): The information provided is incomplete, but the decision-making process can still proceed despite the omissions.
- Inadequate (I): Information presented in the report contains major omissions, without additional information the decision-making process cannot proceed.

Another review package is the Oxford-Brooks Impact Assessment Unit (IAU) Environmental Impact Statement (EIS) review package. This package was developed at the Oxford Brookes University by Glasson and others, and is therefore also known as the Oxford-Brookes review package. It was developed for a research project which focussed on the changing quality of EISs in 1995-1996 (Department of the Environment, 1996). According to Glasson *et al*. (2005) the IAU package is a robust mechanism for systematically reviewing EISs.

The Lee and Colley review package (1992) is another package used to review EIR quality. This review package was developed at the Manchester University in the United Kingdom in 1989 to evaluate the quality of EIS submitted under the 1988 United Kingdom Environmental Assessment Regulations. Since the package was first published in 1990, it has undergone a number of revisions and refinement to become a well-known and widely used quality review package (Lee & Colley, 1992; Lee *et al.*, 1999).

The Lee and Colley review package consists of multiple criteria arranged in a four-tier hierarchical structure. This four-level structure consists of an overall report grade, review areas, categories and sub-categories (see Fig. 3.2 in Chapter 3). The review starts at the lowest level of the structure, namely the sub-categories, moving upwards. This process is followed until the overall report grade of the EIR is determined i.e. the highest level of the hierarchical structure. Assessment symbols are used during the quality assessment, and the results are recorded on a collation sheet.

The authors of the package emphasised that assessment should be indicated not by numbers but rather by alphabetical symbols since symbols cannot be added or subtracted, which can distort results (Simpson, 2001). The use of symbols also discourages reviewers from numerical aggregation to obtain assessments at the higher level of the structure (Lee *et al.*, 1999).

The Lee and Colley review package has been successfully implemented internationally in EIR quality review studies, several of which are discussed in the next section.

2.4.2 EIA report quality internationally

Extensive research has been conducted internationally to evaluate the quality of EIA reports using of the Lee and Colley review package. This package has been implemented in numerous studies, and makes use of an A-F grading, A being the highest grade and F the lowest (see Table 3.2 in Chapter 3). Cashmore *et al.* (2002) assessed the quality of EIRs in Thessaloniki, Greece. Pinho *et al.* (2007) the determination of the quality of EIA reports for small hydropower projects in Portugal. Gray and Edwards-Jones (1999) reviewed the quality of EIRs in the Scottish forest sector. A critical review of EIRs in Sri Lanka with specific reference to ecological impact assessments was performed by Samarakoon and Rowan (2008). The Lee and Colley review package has also been implemented in various other studies (Lee & Colley, 1991; Lee & Colley, 1992; Lee & Brown, 1992; Lee & Dancey, 1993; Vareltzidou, 1996; McGrath & Bond, 1997; Lee *et al.*, 1999; Barker & Wood, 1999; Põder & Lukki, 2011; Kabir & Momtaz, 2012; Barker & Jones, 2013; Mounir, 2015; Gwimbi & Nhamo, 2016; Anifowose *et al.*, 2016; Suwanteep *et al.*, 2017). Four of these studies were randomly selected and are presented in detail.

United Kingdom

Lee and Colley (1992) assessed the quality of 12 EISs for the United Kingdom. The results revealed that the statements were of satisfactory quality. Description of the environment was considered to be a strength in the EIS sample, while weaknesses included the consideration of alternatives and communication of results. Several of the reports were also considered to be just satisfactory, leaving room for quality improvement.

European Union Countries

Barker and Wood (1999) evaluated the system performance in eight European Union countries i.e. Belgium, Denmark, Germany, Greece, Ireland, Portugal, Spain and the United Kingdom. A total of 112 reports was reviewed, in which half of the reviews were related to EIAs completed in 1990-1991 and the other half was completed during 1994-1996. According to Barker and Wood (1999), the overall proportion of satisfactory EIR samples increased from 50% to 71% between the periods from 1990-1991 to 1994-1996. Most of the reports were ‘just satisfactory’, received a C grading.

Bangladesh

Kabir and Momtaz (2012) reviewed the quality of EIRs as well as EIA practice in Bangladesh. The quality of 30 EIRs of development projects from various sectors was reviewed using the Lee and Colley review package. Overall, 66% of the EIRs were of satisfactory quality (A-C) and the remaining 34% were unsatisfactory (D-F). These findings correspond to findings of other similar studies (Lee & Colley, 1992; Barker & Wood, 1999; Cashmore *et al.*, 2002). The most common grade (30%) was C, which means that despite the omissions the report was still satisfactory.

Offshore oil and gas sector

Barker and Jones (2013) reviewed the quality of 35 EIA reports in the United Kingdom offshore oil and gas sector. Only 51% of the reports in the sample were graded as satisfactory (A-C). The remaining reports were graded as unsatisfactory (D-F), but not a single report obtained the lowest grade (F). The most common grade was D (just unsatisfactory). Barker and Jones (2013) emphasised that the failure to obtain a satisfactory grade was due to poor performance in one or both of the two weakest review areas, namely; Review Area 2 (Impact identification and evaluation) and Review Area 3 (Alternatives and mitigation). The performance in the remaining two review areas, Review Area 1 (Description of the project and the environment) and Review Area 4 (Presentation and communication) was much higher. These results are similar to results obtained by other EIR quality review studies.

Several strengths at category level were identified including: presentation, layout of the report, environment description, emphasis, non-technical summary and baseline conditions. Weaknesses at category level included: site description, identification of impacts, impact significance, mitigation measures, prediction of impact magnitude and commitment to mitigation (Barker & Jones, 2013).

2.4.2.1 Discussion of EIA report quality internationally

Results indicated better performance in the descriptive and presentation areas, namely: Review Area 1 (Description of the project and the environment) and Review Area 4 (Presentation and communication). This can be attributed to the fact that several of the tasks included in these review areas are descriptive and presentational, which are generally more familiar to Environmental Assessment Practitioners (EAPs) (Lee *et al.*, 1999). The author emphasised that Review Area 1 tasks where quantified measures are required (waste or baseline conditions), tend to be less satisfactory (Lee *et al.*, 1999).

Results generally show poorer performance in the analytical areas, such as the identification and evaluation of key impacts (Review Area 2), and alternatives and mitigation (Review Area 3). Due to the greater complexity required, the following categories tend to be of less

satisfactory quality: scoping, impact prediction, determination of impact significance, consideration of alternatives, identifying mitigation measures and commitment to mitigation (Lee *et al.*, 1999). Although there are several areas of potential improvement, international report quality is generally of satisfactory quality.

2.4.3 EIA report quality in South Africa

EIA report quality review studies have been conducted in South Africa over the past two decades using the Lee and Colley review package. Boshoff (2013) assessed the EIR quality of renewable energy projects, Sutton-Pryce (2015) reviewed the quality of EIRs for selected development projects in the Mpumalanga province, and the quality of mining EIRs in the Limpopo province was reviewed by Rampersad (2017).

The review package was adapted by Oosthuizen (2009) to evaluate alternatives assessment in mining EIRs, while Alers (2016) used an adapted version to review the quality performance of follow-up in a sample of EIA case studies.

Hallatt *et al.* (2015) adapted this review package to evaluate the quality of biodiversity inputs to EIA in areas with high biodiversity focussing on the Cape Floristic Region, followed by a similar study in the Maputaland-Pondoland-Albany Biodiversity hotspot (Swanepoel, 2016). These two studies are referred to in more detail in Section 2.5.

The results of eight EIA report quality review studies are discussed in more detail below.

Provincial – North West

Sandham and Pretorius (2008) reviewed EIA report quality in the North West province of South Africa. An adapted version of the Lee and Colley review package was used to evaluate the quality of 28 EIA reports in the North West Province. Overall, 86% of the EIRs reviewed were of satisfactory quality. The most common grading was C, showing that most of the reports were of ‘just satisfactory’ quality, followed by ‘generally satisfactory’ quality (B). The description and presentation component received higher quality gradings, while analytical components were of less satisfactory quality.

Mining

Sandham *et al.* (2008b) reviewed the quality of 20 EIRs in the mining sector, approved by the Department of Minerals and Energy (DME), in South Africa. The results revealed that overall, 85% of the sample was of satisfactory quality. Most of the reports were of ‘just satisfactory’ quality (C), followed by ‘generally satisfactory’ (B) report quality. Strengths included presentation, scoping, description of site, layout of the report and baseline conditions, while weaknesses such as prediction of impact magnitude and consideration of alternatives were also present. It is necessary to note that the consideration of site alternatives is unfeasible due

to mineral distribution, but this does not exempt mining related EIRs from providing alternatives in terms of method and technology. Therefore, it is possible to address this weakness and improve EIA report quality in the mining sector.

Wetlands

The quality of EIRs for projects with the potential of affecting wetlands in South Africa was determined by Sandham and colleagues in 2008. The quality of four EIA reports was evaluated. The results revealed that all four of the reports were of satisfactory quality (Sandham *et al.*, 2008a). Three of the reports were 'generally satisfactory' (B), while one of the reports was only 'just satisfactory' (C). Areas of improvement included the identification and evaluation of possible development impacts component of the reports. Impact identification, waste, magnitude and significance of impacts, and site description were areas of weakness. The authors emphasised that issues specific to wetlands were poorly addressed such as the national wetland policy, and the consultation of the national wetland site inventory (Sandham *et al.*, 2008a). However, since these were not yet developed in South Africa at the time, they were regarded as not applicable (Sandham *et al.*, 2008a).

Nkangala district - Housing developments

The quality of 15 EIRs related to housing developments in the Nkangala district of Mpumalanga was assessed by Mbhele (2009). The overall research results indicated that 11 of the selected reports were of satisfactory quality, with five of these reports performing well (A-B). The remaining four reports were rated as 'just unsatisfactory' (D). The results showed that in general the quality of EIRs for housing developments were satisfactory, despite omissions and inadequacies (Mbhele, 2009). The descriptive aspects of the reports were generally of satisfactory quality. However, the same could not be said for the consideration of alternatives and mitigation measures, which was of poor quality (Mbhele, 2009). These results are similar to those of other EIR quality assessments in South Africa. These areas of weakness are a concern for EIA effectiveness, since alternatives and mitigation measures can help minimize environmental impacts that could arise during housing developments in the Nkangala district.

Filling stations

Kruger (2012) evaluated the quality of 20 EIA reports related to the development of filling stations in South Africa, using the Lee and Colley review package. Overall 11 of the report obtained a C grading, while only two obtained a B grading. Therefore, 65% (13) were of satisfactory quality, despite some omissions and/or inadequacies. However, seven of the reports reviewed were graded as D, which means that 35% of the reports were of unsatisfactory quality. Strengths included: the identification of impacts, environmental

description, scoping, and assessment of impact significance, while weaknesses were site description, cumulative impacts and commitment to mitigation measures.

The overall quality of the reports was generally just acceptable or poor. This is concerning since it means that the competent authority received barely adequate information during the decision-making process. According to Kruger (2012) this will result in the approval of unsustainable filling, since detrimental impacts can occur which will affect the biophysical environment as well as the social- and economic environment.

Enhanced regulations

Sandham *et al.* (2013a) determined if enhanced regulations improved EIA report quality by reviewing the quality of EIRs from the first two legislative regimes, i.e. the 1997 and 2006 South African EIA regimes. During this study an adapted version of the Lee and Colley review package was implemented to review the EIR sample. The results revealed that the overall report quality decreased slightly from the 1997 EIA regimes (Sandham *et al.*, 2013a). Areas where quality decreased since 1997 included the description of the development and the environment areas, as well as presentation and communication aspects. However, improvement was also present under the 2006 regime in terms of the alternatives- and mitigation aspects. The identification and evaluation of the key impacts remained the same, but overall the quality decreased more than it improved.

Explosives manufacturing industry

Sandham *et al*. (2013b) evaluated the performance of EIA in the explosives manufacturing industry in South Africa. The quality of four EIRs of large projects with potentially significant adverse impacts was reviewed using the Lee and Colley review package. Three of the four reports were rated as generally satisfactory (B), while the remaining report was rated just satisfactory (C). Strengths included the description of the environment, scoping, waste and residuals and presentation. However, weaker performances were evident at sub-category level, such as; rate of production, raw materials required, record of views of interested and affected parties, and infrastructure required.

Tourism-related infrastructure in protected areas

Wylie *et al*. (2018) evaluated the quality of EIR for proposed tourism-related infrastructure in the protected areas of South Africa. An adapted version of the Lee and Colley review package was used to assess the quality of 13 reports conducted during 2013 under the 2010 NEMA EIA regulations. The overall results indicated that 92% of the reports were generally satisfactory (A-C), obtaining mostly A and B, meaning that the reports were of good quality with minor omissions. A single report obtained an overall grade of D, meaning that the report was unsatisfactory with omissions and/or inadequacies. Compared to the results obtained by

Sandham *et al.* (2013a), it seems that not only has the overall report quality improved from NEMA 2006 (80% A-C) to NEMA 2010 (92% A-C), but the percentage A-B grades has also improved from 7% to 60%.

According to Wylie *et al.* (2018) Review Areas 1 and 2 were addressed in a high-quality manner than Review Areas 3 and 4. Therefore, the results are similar to other EIR quality assessments in South Africa, where the descriptive areas such as description of the development and site performed better than the more analytical areas such as alternatives, impact significance and the feasibility of the project.

2.4.3.1 Discussion of EIA report quality in South Africa

The communication of results, the description of the environment and the development are generally the main strengths of EIA reports in South Africa, while the analytical components i.e. identification and analysis of impacts, alternatives, and magnitudes of impacts as well as addressing significant impacts are EIR weaknesses. South African EIRs are generally of satisfactory quality; however, there are several areas of improvement.

In summary, these studies show that the Lee and Colley review package is well-known and widely used, as well as easily adaptable to determine report quality across difference EIA sectors. A detailed description of this review package is provided in Chapter 3. The quality of EIA reports of protected areas, specifically national parks, has not yet been determined in South Africa.

2.5 Biodiversity and protected areas in South Africa

To recognise the need and purpose of protected areas, it is necessary to first understand the importance of biodiversity and its conservation. Biodiversity can be defined as the number and variety of living organisms on earth as well as the ecosystems, ecological processes and landscapes that these organisms are a part of (South Africa, 1997d). The survival and well-being of humans is directly affected by biodiversity, since mankind's economic and social development is dependent upon biological diversity. Benefits humans derive from biodiversity include: medicine, food, maintenance of hydrological cycles, protection from erosion and pollution, pollination of crops, nutrient cycling, spiritual well-being, as well as adaption against changes in climate and ecosystem processes (Lloret, 2010; Proença & Pereira, 2011; Ens *et al.*, 2016; Schmidt *et al.*, 2016). Therefore, numerous benefits are associated with biodiversity protection and conservation.

However, since loss of biodiversity has been observed in the 20st century, various conventions and protocols have been developed to prevent biodiversity loss, one of the most important being the Convention on Biological Diversity (CBD). The CBD entered into force on 29

December 1993 to preserve biodiversity internationally for present and future generations, through the use of three objectives. Firstly, the conservation of biodiversity, secondly, the sustainable use of the components of biodiversity and lastly, the fair and equitable sharing of the benefits associated with genetic resources (CBD, 1992). The CBD promotes biodiversity conservation globally, to ensure survival as well as the well-being of humans internationally (Balmford *et al.*, 2003; Brooks *et al.*, 2006; Turner *et al.*, 2007; Venter *et al.*, 2016).

In South Africa, the sustainable use and protection of biodiversity is vital, since the livelihood of a large percentage of the country's population depends on access to biological resources. South Africa is the third most biologically diverse country in the world (Klopper *et al.*, 2010; South African National Biodiversity Institute (SANBI), 2013). Clearly, the protection and conservation of this country's rich biodiversity is necessary on a national and international scale. Although South Africa only signed the CBD in November of 1995 (South Africa, 1997d), biodiversity planning and consideration are evident in the country's Constitution and several other environmental acts, including in the National Environmental Management: Biodiversity Act (NEM:BA), and the National Environmental Management: Protected Areas Act (NEM:PAA).

The NEM:BA provides for the conservation as well as management of South Africa's biodiversity. This act also provides for the protection of species as well as ecosystems which warrant national protection (South Africa, 2004b). Although, this act is important for the conservation of biodiversity from here onward focus is placed on the NEM:PAA, which provides for the establishment of protected areas.

The NEM:PAA, which replaced the National Parks Act, no. 57 of 1976, provides for the protection and the conservation of ecological areas that represent the country's biodiversity by developing and managing protected areas (South Africa, 1976; South Africa, 2004c).

The CBD (1992) defines protected areas as geographically defined areas which are selected and managed to achieve specific conservation objectives. The International Union for Conservation of Nature (IUCN) (2008) elaborates further by stating that these geographically defined areas are managed, through legal or other suitable means, with the aim of long term conservation of nature and the associated cultural value and ecosystem services. This Act provides for various categories of protected areas, all of which assist in the protection and conservation of biodiversity and, therefore, the well-being of the nation. National parks are a main category of protected areas under the NEM:PAA.

Additionally, as a signatory party to the CBD, South Africa has also developed a National Biodiversity Strategy and Action Plan (DEAT, 2005b) and a National Biodiversity Framework (South Africa, 2009), which provide for the enhanced incorporation of biodiversity in EIA.

Research has also been conducted to determine the quality of biodiversity input to EIA in areas with high biodiversity value (Hallatt *et al.*, 2015; Swanepoel, 2016).

Hallatt *et al*. (2015) reviewed the quality of a sample of Biodiversity Impact Assessments (BIAs) in the Cape Floristic Region (CFR). BIA, which is an integral component of an EIA system, is the process of conducting an analysis of a development project, -plan, or –policy's possible impact on biodiversity (Brooke, 1998; Atkinson *et al.*, 2000). A review package which is applicable to BIAs, especially within a biodiversity hotspot, was created by using the Lee and Colley review package as a base and incorporating Best Practice Guidelines (Hallatt *et al*., 2015). This package was used to review the quality of 26 BIA reports. The results indicated that 73% of the reports were of satisfactory quality, while 27% were unsatisfactory. Strengths included the adaption of a precautionary approach to impact prediction, and the incorporation of ecosystems processes in assessments and baseline studies (Hallatt *et al*., 2015). Areas of weakness were also present, such as the consideration of alternatives, inadequate gathering of biodiversity baseline data, monitoring programmes and public consultation (Hallatt *et al*., 2015).

Swanepoel (2016) critically evaluated the quality of biodiversity inputs to EIA in areas with high biodiversity, by reviewing the quality of 26 BIAs completed in the Maputaland-Pondoland Albany (MPA) biodiversity hotspot. Since this study was done as a continuation of the study performed by Hallatt *et al.* (2015), the same review package was implemented to determine report quality. The results showed that 81% of the reports were graded as satisfactory, and 19% as unsatisfactory. Hence, the overall report quality of the MPA was slightly higher than that of the CFR. The assessment of the baseline environment and the consideration of ecosystem processes were regarded as strengths, while public consideration, the consideration of alternatives, and the conduction of BIAs in insufficient timeframes and incorrect seasons were identified as weaknesses (Swanepoel, 2016). Therefore, the strengths and weaknesses identified are largely similar to the findings of Hallatt *et al.* (2015).

Next, national parks are defined, and the SANParks organisation is briefly discussed, along with the legislative and other mandates relevant to this organisation and EIAs in terms of SANParks.

2.5.1 National parks in South Africa

South Africa’s National Park Act was promulgated in 1976. This Act was established with the aim of consolidating the laws relating to national parks (South Africa, 1976). The National Park Act, Act no. 57 of 1976, was replaced by the NEM:PAA in 2003. The NEM:PAA, Act no. 57 of 2003 defines a national park as (South Africa, 2004c:2):

"*a) an area which was a park in terms of the National Park Act, 1976 (Act no. 57 of 1976), immediately before the repeal of that Act by section 90(1) of the Act, and includes a park established in terms of an agreement between a local community and the Minister which has been ratified by Parliament, or*

b) an area declared or regarded as having been declared in terms of section 20 as a national park."

2.5.2 SANParks

The history of national parks as well as SANParks is extensive. It all started with the proclamation of a game reserve in 1898 in the Lowveld of South Africa, as an effort to prevent the extinction of several local animal populations by limiting hunting (Joubert, 2007). The boundaries of the government game reserve extended from the Crocodile River in the south, to the Sabie River in the north, and from the Nsikazi River in the west to the border of Mozambique in east (Carruthers, 1995; Joubert, 2007).

Following the Anglo-Boer War, the game reserve was named the Sabie Game Reserve and placed under the management and protection of Major James Stevenson–Hamilton. A second game reserve namely, the Shingwedzi Game Reserve, between the Letaba and Limpopo rivers, was proclaimed in 1903 and also placed under the authority of Major Stevenson–Hamilton (Joubert, 2007). Over time, the boundaries of these two game reserves were altered and expanded. In 1916 the Provincial Secretary of the Transvaal Provincial Council took control of the two game reserves to form the Transvaal Game Reserve (Joubert, 2007).

In May 1926, the Parliament of the Union of South Africa promulgated the National Parks Act, Act no. 56 of 1926. Following the promulgation of this Act, the Reserve was renamed the Kruger National Park (KNP), after President Paul Kruger (Joubert, 2007). The country's first national park, the KNP, was opened to tourists in 1927. According to Stevenson–Hamilton (1936), the KNP is a striking and large permanent sanctuary for wild life. Tourism activity in the KNP increased over time, and today this national park is under the management of South African National Parks (SANParks) and has become world-renowned.

The National Parks Act of South Africa was amended several times since its promulgation in 1926. SANParks was initially established in terms of the now repealed National Park Act, Act no. 57 of 1976, as a Schedule 1 entity (South Africa, 1976). SANParks continues to function under the ambit of the NEM:PAA, Act no. 57 of 2003. The core mandate of this organisation is the conservation and protection of South Africa's biodiversity, landscapes and associated heritage assets for the pride and benefit of the nation, through the use of its system of national parks (SANParks, 2018a; SANParks, 2016). Therefore, this study used the SANParks as a representation of protected areas.

Currently, this organisation manages 22 national parks (three of which fall under the Garden Route National Park) and is recognised internationally as a leader in the conservation as well as management of protected areas (SANParks, 2018b; De Witt *et al.*, 2014). These national parks offer visitors a range of ecotourism activities, including canoeing, bush walks, camping, game viewing and exposure to cultural and historical experiences (SANParks, 2018a). SANParks, and consequently the South Africa economy, depends greatly on tourism. Therefore, the development and management of SANParks tourism products and services are vital. To ensure that conservation is not put at risk during socio-economic growth, various legislative mandates and frameworks are relevant and applicable to SANParks.

2.5.3 Legislative and other mandates associated with SANParks

The SANParks mandate is also underpinned by section 24(b) of the Constitution of the Republic of South Africa (South Africa, 1996). SANParks function under the NEM:PAA, which fall under the auspices of the overarching NEMA. SANParks must adhere to all relevant sections in these acts. Section 24(1)(b) of the NEMA states that any activity with a potential impact on socio-economic conditions, such as the development activities in SANParks, must be assessed prior to implementation (South Africa, 1998). Therefore, an EIA must be conducted for any proposed development projects or activities in SANParks to prevent significant effects on the environment. EIAs assist the organisation in achieving its mandate, by preventing detrimental environmental impacts that could arise if a development occurs.

South Africa is a signatory to various international conventions to help guide national environmental protection policies, programmes and legislation by member states. Therefore, SANParks must adhere to the requirements of several relevant international and national conventions. According to SANParks (2016) some of conventions that are most relevant to the organisation, include:

- Convention on Biological Diversity (CBD)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- African Convention on the Conservation of Nature and Natural Resources (ACCN)
- United Nations Framework Convention on Climate Change (UNFCCC)
- United Nations Convention to Combat Desertification (UNCCD)
- The Ramsar Convention
- World Heritage Convention
- Convention on Migratory Species (CMS) of Wild Animals
- Southern African Development Community (SADC) Protocol on Wildlife Conservation and Law Enforcement

Environmental legislation and the relevant conventions along with EIAs, assist SANParks in achieving their mandate.

With the implementation of EIAs SANParks are able to 1) prevent or mitigate significant environmental impact during development activities, 2) reduce cost associated with post-development environmental clean-up and rehabilitation, since mitigation measures are implemented during development, 3) develop tourism-related infrastructure within the protected areas without negatively affecting the environment, which in turn ensures future eco-tourism, 4) increase tourism in the national parks through development, which will provide funding for future conservation and management, 5) increase public involvement and participation which helps the conservation organisation to obtain the support of the community as well as investors, 6) also use alternative project designs and environmentally sustainable modifications during developments.

The better the effectiveness of EIA, the easier it is for EIA to make a positive difference for SANParks. The assessment and improvement of SANParks EIA report quality will contribute towards improved effectiveness. Therefore, determining the quality of SANParks EIR is likely to increase the benefits associated with the implementation of EIA. In conclusion, satisfactory quality EIA reports can help to ensure that biodiversity is considered and protected in the system of national parks during development.

2.6. Summary and conclusion of literature review

EIA has become a vital tool for sound decision-making during development and environmental management. It has been implemented in developing and developed countries globally, including in South Africa. EIA has a long history in South Africa. Evolving from voluntary assessment in the 1970s, to mandatory assessment under the first 1997 EIA regulations, which has since been amended several times under the NEMA in 2006, 2010, 2014 and 2017. The mandatory use of EIA in South Africa for developments that could have a detrimental effect on the environment has ensured that negative environmental impacts are avoided or mitigated.

However, the quality of EIA remains a concern internationally, including in South Africa. To address concerns regarding EIA effectiveness, various methods can be employed to evaluate the effectiveness of EIA and Environmental Impact Report (EIRs) quality review is one of these methods. Though there are various quality review packages, the Lee and Colley (Lee *et al.*, 1999) review package has become one of the most widely used. A number of EIR quality review studies internationally and locally, which makes use of this review package, were discussed.

Protected areas, such as national parks, depend on the EIA process to help ensure that development does not put conservation efforts at risk. However, no research has been published regarding the quality of EIRs for protected areas, specifically national parks, in South Africa. Therefore, research is required to fill the gap in the research field. The quality of EIRs for protected areas, using the SANParks as representative, was assessed in this dissertation. The methodology and the case studies are described in Chapter 3.

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CHAPTER 3: METHODOLOGY

This chapter provides a description of the study area, the selected case studies and the Lee and Colley (Lee *et al.*, 1999) review package. Firstly, the study area is discussed and illustrated (Fig. 3.1). Secondly, the case studies are described and lastly, the review methodology is explained.

3.1 The study area

The national parks developed and managed by SANParks are distributed across South Africa, conserving millions of hectares that represent some of the country's biodiversity and heritage assets. Since this organization aims to manage a system of sustainable national parks, through innovation and best practice, it has a rich history. Each of the 22 parks has its own history, accommodation, tourist activities and biological or cultural importance.

The parks from new to old are continuously being developed or expanded to promote sustainability and economic growth, and to cope with an increase in tourism demand (Van Rooyen, 2002; Biggs *et al.*, 2014). EIA's are required to ensure that detrimental environmental impacts are identified, and properly mitigated or altogether avoided. Since the main aim of this study is to critically analyse the quality of EIRs of protected areas, specifically SANParks developments, a selection of these EIRs was reviewed.

3.1.1 Report gathering and sample size

Numerous attempts were made to obtain reports from SANParks but limited help was received and only six were forthcoming. Additional EIA reports were obtained through online data gathering. Therefore, the sample size was relatively small with only 24 reports. However, it should be taken into consideration that protected areas, specifically SANParks, are a very specialized field and that development projects and their EIA reports are limited. In order to enlarge the sample size, two reports (number 9 and 14 see Table 3.1) which deal with proposed developments in the buffer zones of national parks were also included (competent authority remains the DEA).

The EIR sample is distributed unevenly across several national parks as well as the five EIA regimes (ECA 1997, NEMA 2006, NEMA 2010, NEMA 2014 and NEMA 2017), which allowed for a longitudinal study. The regime samples are small; six reports under ECA 1997, two reports under NEMA 2006, eight reports under NEMA 2010, five reports under NEMA 2014, and three reports under the NEMA 2017 (Table 3.1). Due to the small regime sample size, no statistical inferences could be made, and therefore, this research used 'replication logic' which relies on context-specific logic (Yin, 2003), rather than 'sampling logic' which depends on a statistical representation of the entire database. The results obtained could be expected to

replicate when using a well-defined sample across similar context (Eisemhardt, 1989; Yin, 2003). Therefore, the EIR sample was regarded as adequate, and likely to provide a reasonably accurate reflection of the EIR quality of the regimes.

However, to address possible bias due to the small samples for the NEMA 2010 regime (2 EIRs) and the NEMA 2017 regime (3 EIRs), and in view of the relatively small changes from the NEMA 2006 to NEMA 2010 regimes and again from the NEMA 2014 to the NEMA 2017 regimes, these regimes were grouped together for the analysis of temporal trends (see Chapter 5). Grouping the similar regimes together delivered two co-regimes with larger samples for the NEMA era, and together with the ECA sample covered a time span of 20 years, i.e. the ECA 1997 regime (6 EIRs), the NEMA 2006/10 co-regime (10 EIRs), and the NEMA 2014/17 co-regime (8 EIRs).

3.1.2 Distribution and description of the EIRs sample

The geographic locations of the all 22 parks are illustrated in Figure 3.1 and the locations of the parks sampled are highlighted with park names in green.

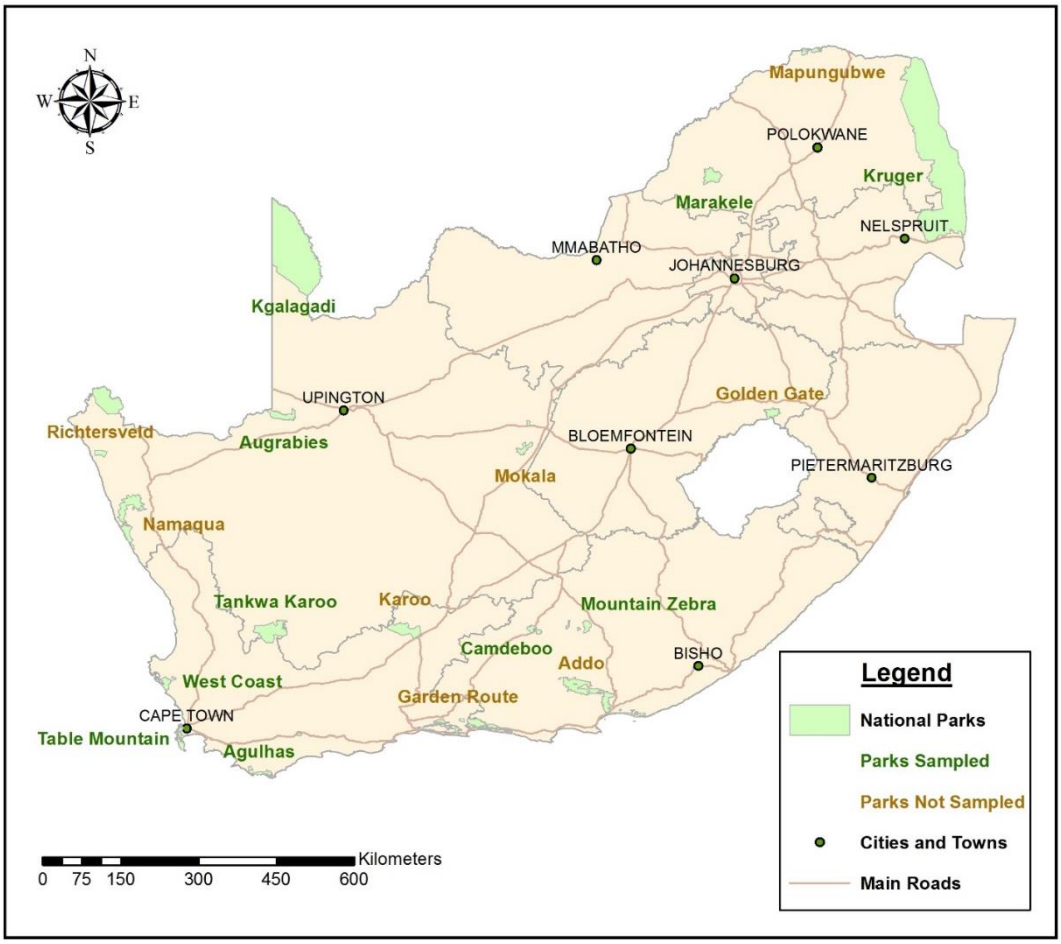

Figure 3.1: Map illustrating the distribution of the national parks.

The selected EIRs of SANParks developments are listed in Table 3.1, each with a brief description, the name of the park, whether the report was approved, and the relevant EIA regime as well as a code, which is also coded in Appendix B, which contains the total set of all review grades.

Table 3.1: Description of the selected SANParks EIRs.

REPORT NUMBER	DESCRIPTION	PARK NAME	EIA REGIME	Report Code
Report 1	Proposed development of an Environmental Experiential Centre at Bordjiesdrif.	Table Mountain National Park	ECA	WC/TM01/04 Approved
Report 2	Proposed upgrading of Buffels Bay Recreational Area.	Table Mountain National Park	ECA	WC/TM02/04 Approved
Report 3	Scoping report for the construction of a new entrance gate and security access point at Orpen gate.	Kruger National Park	ECA	LP/KNP05/06 Approved
Report 4	Scoping report for the Phalaborwa entrance gate.	Kruger National Park	ECA	LP/KNP06/05 Approved
Report 5	The proposed upgrade of the caravan and camp site for Satara Rest Camp.	Kruger National Park	ECA	LP/KNP08/04 Approved
Report 6	Tamboti tents extension project.	Kruger National Park	ECA	LP/KNP10/02 Approved
Report 7	Proposed development of Agulhas Lighthouse Precinct.	Agulhas National Park	NEMA 2006	WC/AG01/09 Approved
Report 8	Proposed development of a hotel at the confluence of the Timfenheni and Crocodile Rivers.	Kruger National Park	NEMA 2006	LP/KNP03/12 Approved
Report 9	Proposed Safari Lodge near Malelane Gate.	Kruger National Park (2km boundary)	NEMA 2010	LP/KNP04/15 Approved
Report 10	Proposed Skukuza Safari Lodge development and associated infrastructure in Skukuza.	Kruger National Park	NEMA 2010	LP/KNP09/15 Approved
Report 11	Proposed upgrades to the Marataba Lodge.	Marakele National Park	NEMA 2010	LP/MA02/14 Approved
Report 12	Proposed construction accommodation units, luxury camping sites, access road, upgrading of services infrastructure and a landing strip at Nossob Camp, a luxury camp site Gharagab as well as a luxury camp site at Craig Lockhart (Mata Mata).	Kgalagadi Transfrontier Park	NEMA 2010	NC/KT01/12 Approved
Report 13	Expansion of Elandsberg Rest Camp and establishment of staff accommodation.	Tankwa Karoo National Park	NEMA 2010	NC/TW01/15 Approved
Report 14	Africa's Energy Footprint Solar power 1 project, Camdeboo Municipality.	Camdeboo National Park (800m from border)	NEMA 2010	NC/CD01/11 Approval Unsure
Report 15	RVM 1 Hydro-electric power (Pty) Ltd Riemvasmaak Hydropower project, Orange River.	Parts of the Augrabies Fall National Park	NEMA 2010	NC/AF01/15 Approved
Report 16	Proposed construction of additional tourism units and associated infrastructure.	Mountain Zebra National Park	NEMA 2010	EC/MZ01/15 Approved
Report 17	Proposed upgrade of the Kraalbaai day visitors' facilities.	West Coast National Park	NEMA 2014	WC/WC01/16 Approval Unsure
Report 18	The Development of a tree-house for tourist accommodation, Marataba Safari Lodge in Marakele.	Marakele National Park	NEMA 2014	LP/MA01/17 Approved
Report 19	Lodge expansion and refurbishment of the Singita Sweni Lodge, in the Singita Private Concession.	Kruger National Park	NEMA 2017	LP/KNP02/16 Approval Unsure
Report 20	Proposed Shangoni gate development.	Kruger National Park	NEMA 2014	LP/KNP07/16 Approved
Report 21	Proposed Dawid Kruiper Rest Camp and picnic sites at the Veertiende and Bedinkt Waterholes.	Kgalagadi Transfrontier Park	NEMA 2014	NC/KT02/17 Approval Unsure
Report 22	Proposed development of the Phalaborwa Wildlife Activity Hub.	Kruger National Park	NEMA 2017	LP/KNP01/18 Approval Unsure
Report 23	Proposed development of new access roads and staff accommodation in the Marataba Section of the Marakele National Park.	Marakele National Park	NEMA 2017	LP/MA04/18 Approval Unsure
Report 24	Development of the Kruger Shalati up-market tourism accommodation on and adjacent to the Selati Railway Bridge at Skukuza.	Kruger National Park	NEMA 2017	LP/KNP11/18 Approval Unsure

3.2 Review methodology

The Lee and Colley review package consists of multiple criteria arranged in a four-level hierarchical structure which consists of an overall report grade, review areas, categories and sub-categories, as illustrated in Figure 3.2 (Lee *et al.*, 1999).

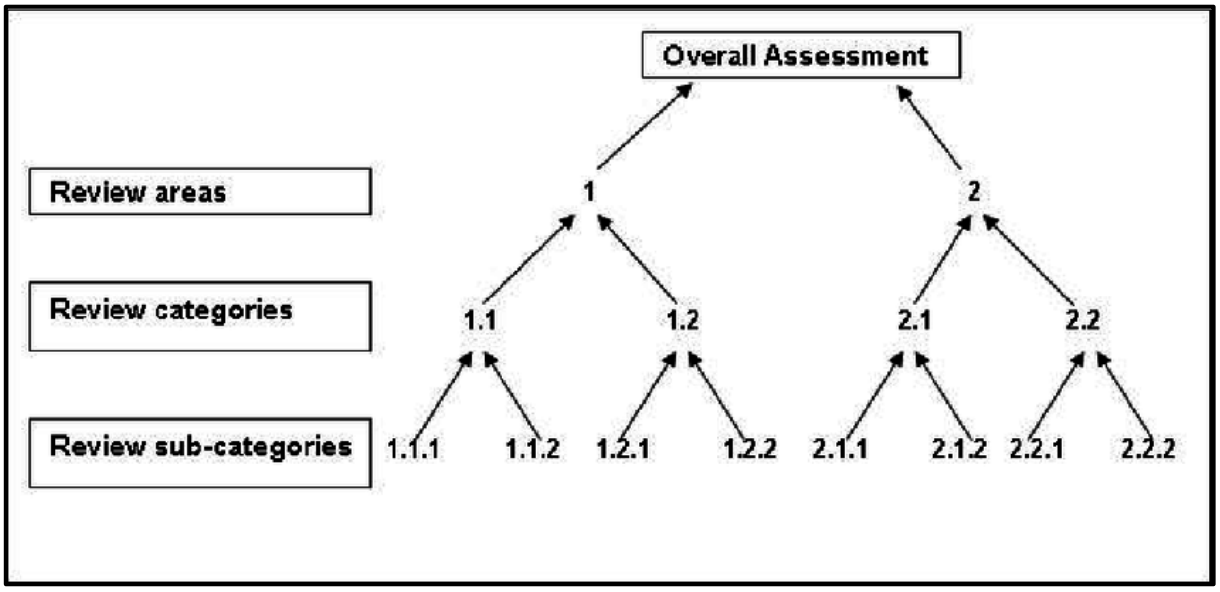

Figure 3.2: Hierarchical structure of the Lee and Colley EIR review package (Lee *et al.*, 1999).

The four review areas, which each has categories and more detailed sub-categories are as followed:

- Review Area 1: Description of the project and the environment
- Review Area 2: Impact identification and evaluation
- Review Area 3: Alternatives and mitigation
- Review Area 4: Presentation and communication

The review of an EIR starts at the lowest level of the structure, namely the sub-categories which consist of simple criteria related to specific tasks and procedures. Following the assessment of the sub-categories, the next level namely, the categories which contain more complex criteria are evaluated. According to Lee *et al.* (1999) the assessment of the review areas is based on the review of the categories while the overall EIR grade is determined by reviewing the review areas. Following the assessment of all four levels, the results are compiled and recorded on a collation sheet.

Grades are awarded ranging from A to F, depending on how well a specific task is judged by the reviewer to have been performed (Lee, 2000; Sandham *et al.*, 2013). Symbols A–C

represents generally satisfactory performance and D–F represents generally unsatisfactory performance. A detailed description of each symbol is provided in Table 3.2.

Table 3.2: List of assessment symbols (Lee *et al*., 1999).

Symbol	Explanation
A	Relevant tasks well performed, no important tasks left incomplete.
B	Generally satisfactory and complete, only minor omissions and inadequacies.
C	Can be considered just satisfactory despite omissions and/or inadequacies.
D	Parts are well attempted but must, as a whole, be considered just unsatisfactory because of omissions or inadequacies.
E	Not satisfactory, significant omissions or inadequacies.
F	Very unsatisfactory, important task(s) poorly done or not attempted.
N/A	Not applicable. The Review topic is not applicable, or it is irrelevant in the context of the statement.

The Lee and Colley review package was adapted by Van Heerden (2010) to create a generic EIR quality review package suitable for the South African EIA system. This package retained all the review areas, categories and assessment symbols from the Lee and Colley review package since it evaluates best practice as well as EIR quality (Lee *et al.*, 1999), It was not deemed necessary to further adapt Van Heerden's (2010) version of the Lee and Colley review package, since it was already suitable for determining EIR quality across various EIA regimes. Additionally, to ensure that the EIA quality results obtained during this study can be readily compared to other sectors such as mining or renewable energy, the review criteria were not tailored specifically for national parks. The adapted review package was used to determine the quality of 24 EIRs of SANParks projects. A brief description of the generic EIR quality review package is provided in Table 3.3 (see Appendix A for full review package).

At the start of the review process, an inter-comparison approach was implemented (Põder & Lukki, 2011), rather than the double-reviewer method recommended in Lee *et al.* (1999). Two reviewers independently reviewed two of the reports, and the findings were recorded on a collation sheet using the assessment symbols in Table 3.2. After completing the EIR review independently, the results were compared, and differences were identified, re-examined, discussed and a consensus was reached. Numerous small differences in grades at sub-category level were noticed, which were eliminated as the review moved up the hierarchy, while minimum differences were present at the level of review areas and none at the overall grade. After becoming familiar with the use of the adapted review package in the first two reports, the remainder of the EIA report sample was then reviewed by only one reviewer. Although group assessment is regarded as more critical than individual assessment when

reviewing EIA report quality (Peterson, 2010), this approach is less time consuming and ensures consistency for further reviews as seen in Canelas *et al.* (2005). Additionally, since this study explores the longitudinal changes in EIR quality for SANParks development projects, any potential bias caused by the inter-comparison approach is unlikely to obscure report quality trends (Sandham *et al*, 2013).

Table 3.3: Summary of the generic review package developed by Van Heerden (2010).

Review Area 1: Description of development environment	**Review Area 2: Impact identification and evaluation**
1.1 Description of the development	**2.1 Definition of impacts**
1.1.1 Purpose and objectives	2.1.1 All possible effects on environment
1.1.2 Design and size	2.1.2 Interaction of effects
1.1.3 Presence and appearance of completed development	2.1.3 Impacts from non-standard operating procedure
1.1.4 Nature of production processes	2.1.4 Impacts from deviation from base-line conditions
1.1.5 Nature and quality of raw materials	
1.1.6 Identification of applicant	**2.2 Identification of impacts**
1.1.7 Details of EAP to carry out assessment	2.2.1 Impacts identification methodology
	2.2.2 Impact identification method used
1.2 Site description	**2.3 Scoping**
1.2.1 Area of development site	2.3.1 Contact general public and special interest groups
1.2.2 Demarcation of land use area	2.3.2 Collect opinions and concerns of I&APs
1.2.3 Duration of different phases	2.3.3 Key impacts
1.2.4 Estimated number of workers and/or visitors	
1.2.5 Means of transporting raw materials, products and quantities	**2.4 Prediction of impact significance**
	2.4.1 Data to estimate magnitude of main impacts
1.3 Waste	2.4.2 Methods used to predict impact magnitude
1.3.1 Types and quantities of wastes	2.4.3 Predictions of impact in measurable quantities
1.3.2 Treatment, disposal and disposal routes	
1.3.3 Methods of obtaining quantity of wastes	**2.5 Assessment of impact significance**
	2.5.1 Significance of impact on affected community and society in general
1.4 Environmental description	2.5.2 Significance i.t.o national and international quality standards
1.4.1 Area to be affected by development	2.5.3 Justification of proposed methods of assessing significance
1.4.2 Effects occurring away from immediate affected environment	
1.5 Baseline conditions	**Review Area 4: Communication of results**
1.5.1 Important components of the affected environment	**4.1 Layout of the report**
1.5.2 Existing data sources	4.1.1 Introduction
1.5.3 Local land use plans, policies consulted	4.1.2 Information logically arranged
	4.1.3 Chapter summaries
	4.1.4 External sources acknowledged
Review Area 3: Alternatives and mitigation	
3.1 Alternatives	**4.2 Presentation**
3.1.1 Description of alternative sites	4.2.1 Presentation of information
3.1.2 Description of alternative processes, design and operating conditions	4.2.2 Technical terms, acronyms, initials defined
3.1.3 For severe adverse impacts rejected alternative identified	4.2.3 Statement presented as an integrated whole
3.1.4 Comparative assessment of all alternatives identified	
	4.3 Emphasis
3.2 Scope and effectiveness of mitigation measures	4.3.1 Emphasis to potentially severe impacts
3.2.1 Consider mitigation of all significant adverse impacts	4.3.2 Statement must be unbiased
3.2.2 Mitigation measures	4.3.3 Opinion as to whether activity should/should not be authorized
3.2.3 Extent of effectiveness of mitigation when implemented	
3.3 Commitment of mitigation	**4.4 Non- technical summary**
3.3.1 Record of commitment to mitigation measures	4.4.1 Non-technical summary of main findings & conclusions
3.3.2 Monitoring arrangements	4.4.2 Summary must cover all main issues

3.3 Conclusion

In conclusion, SANParks manages and develops a system of national parks that contributes to the conservation and protection of South Africa's biodiversity and heritage assets. The expansion and general development of the 22 national parks have required numerous EIA's since 1998. An availability sample of 24 EIRs of SANParks development projects, under the different EIA regimes and across various parks were reviewed using an adapted Lee and Colley review package to determine the quality of these reports (Appendix A and B). Although the sample sizes of the two broad NEMA co-regimes and the ECA regime were small, by using the 'representation logic' of Yin (2003) the samples were regarded as valid representatives of EIR quality. The results and findings of the quality assessment of a sample of EIRs for SANParks developments are presented in Chapter 4.

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CHAPTER 4: PROTECTED AREAS EIR QUALITY RESULTS

In Chapter 4 the quality review results of EIA reports for SANParks projects, representing protected areas, are analysed and discussed to achieve Objective 1.

To analyse the quality of the sample of EIRs the following approach used by McGrath and Bond (1997), Sandham and Pretorius (2008), and Sandham *et al.* (2008a) was implemented. Assessment grades, A (well performed), B (satisfactory), and C (just satisfactory), were grouped together since all of these grades reflect differing levels of 'satisfactory quality'. Satisfactory quality (A-C) refers to a relevant task or report that is complete with minor omissions and/or inadequacies (Table 3.2). However, only A and B grades awarded to a relevant task or report can be regarded as well done.

The critical boundary is that between C and D, since these grades are awarded to tasks that are 'just satisfactory' or 'just not satisfactory' (Lee *et al.*, 1999; Sandham & Pretorius, 2008). Assessment grades D (just not satisfactory), E (not satisfactory), and F (very unsatisfactory), were grouped together to reflect differing levels of 'unsatisfactory quality'. Therefore, D-F (unsatisfactory quality) grades are used to refer to relevant tasks or reports that are incomplete with significant omission and/or inadequacies. In order to identify strengths and weaknesses, the A-B assessment grades and E-F assessment grades were also grouped together.

The overall grades, review areas (RA) and review categories of EIA reports for the 24 SANParks reports (2004-2018), which represent protected areas, were added together and are summarised in Table 4.1. Detailed grades are provided in Appendix (B)

Table 4.1: Summary of results: overall grades, review areas and review categories.

SANParks EIRs [n= 24]					
Summary of all review areas, categories and sub-categories		**% A-C**	**% A-B**	**%D-F**	**% E-F**
Overall grade		92 (22)	83 (20)	8 (2)	0
RA 1	Description of project and environment	96 (23)	88 (21)	4 (1)	0
1.1	Description of the development	96 (23)	79 (19)	4 (1)	0
1.2	Site description	88 (21)	75 (18)	12 (3)	0
1.3	Waste	67 (16)	54 (13)	33 (8)	12 (3)
1.4	Environmental description	100 (24)	92 (22)	0	0
1.5	Baseline conditions	100 (24)	92 (22)	0	0
RA 2	Impact identification and evaluation	88 (21)	58 (14)	12 (3)	0
2.1	Definition of impacts	96 (23)	88 (21)	4 (1)	0
2.2	Identification of impacts	92 (22)	79 (19)	8 (2)	0
2.3	Scoping	96 (23)	96 (23)	4 (1)	0
2.4	Prediction of impact magnitude	79 (19)	33 (8)	20 (5)	8 (2)
2.5	Assessment of impact significance	88 (21)	54 (13)	12 (3)	8 (2)
RA 3	Alternatives and mitigation	96 (23)	75 (18)	4 (1)	4 (1)
3.1	Alternatives	92 (22)	79 (19)	8 (2)	4 (1)
3.2	Scope and effectiveness of mitigation measures	96 (23)	83 (20)	4 (1)	4 (1)
3.3	Commitment of mitigation	96 (23)	71 (17)	4 (1)	4 (1)
RA 4	Communication of results	100 (24)	96 (23)	0	0
4.1	Layout of the report	100 (24)	96 (23)	0	0
4.2	Presentation	100 (24)	96 (23)	0	0
4.3	Emphasis	96 (23)	92 (22)	4 (1)	0
4.4	Non-technical summary	100 (24)	75 (18)	0	0

4.1 Overall quality of the total EIR sample (n=24)

The analysis of the overall quality of the EIRs for SANParks projects (Table 4.1) indicated that 92% (22) of the reports were graded as satisfactory (A-C). Six of the (25%) could be described as 'well performed' (A) (Fig. 4.1). However, the majority of the reports, 14 (58%) were 'generally satisfactory' (B), and two (8%) were graded as 'just satisfactory' (C) despite omissions and/or inadequacies (Fig. 4.1). The two (8%) remaining reports were graded as 'just not satisfactory' (D) due to omissions and/or inadequacies. None of the reports obtained an E (not satisfactory) or F (very unsatisfactory) overall grading.

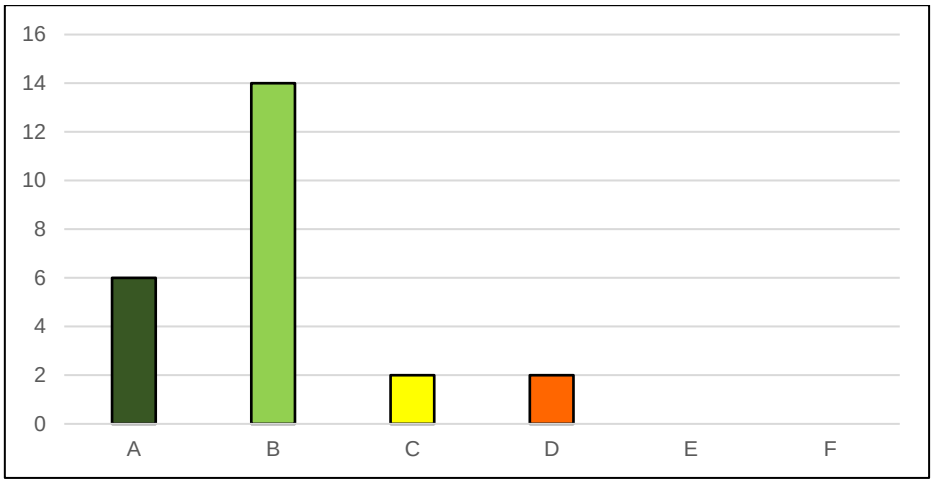

Figure 4.1: Overall grade for the sample of EIR of protected areas (SANParks).

The following section, which deals with the quality of the review areas, categories, and sub-categories, is structured according to decline in satisfactory rating (high to low A-C%).

4.2 Quality of the Review Areas for the total sample

The best performance was achieved by Review Area 4 (Presentation and communication) with all of reports obtaining a C or higher. This was then followed by Review Area 1 (Description of project and environment) and Review Area 3 (Alternatives and mitigation) with 96% satisfactory. However, for Review Area 1, 88% of the reports were graded as A-B, compared to 75% for Review Area 3 (Fig. 4.2).

Last was Review Area 2 (Impact identification and evaluation) which had the lowest frequency of satisfactory grades, with only 88% of the report achieving a C or more (Table 4.1 and Fig. 4.2). Review Area 2 and 3 are generally more complex and a higher level of interpretation is required during the identification of impacts, alternatives and mitigation measures.

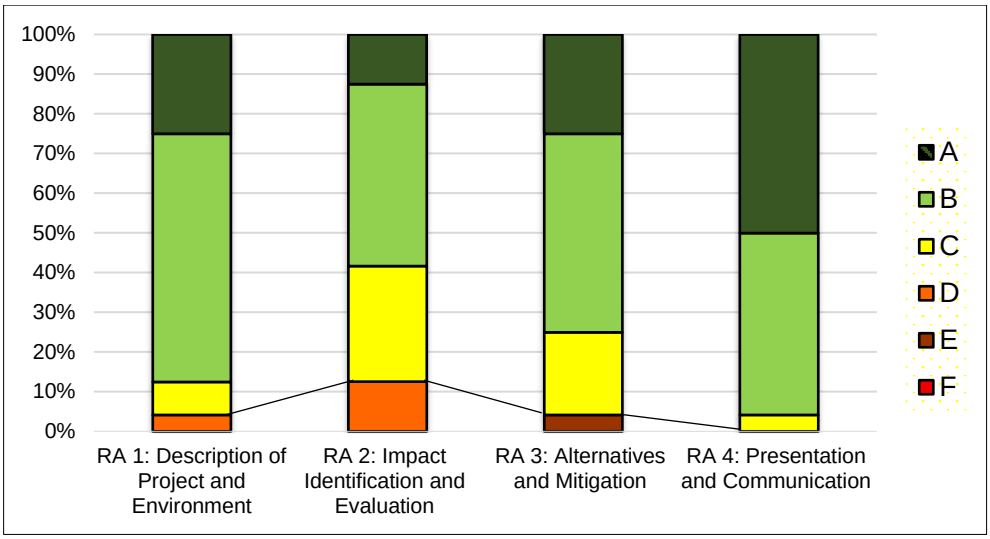

Figure 4.2: Grades for review areas of the sample of EIRs of protected areas (SANParks).

Note: The black line in Fig. 4.2 indicates the critical boundary between 'satisfactory' (A-C) above and 'unsatisfactory' (D-F) below the lone.

4.2.1 Review Area 1: Description of project and environment

This review area evaluates the performance of the EIR with regards to the description of the development, the environment and site in which the proposed development is situated, and the raw material, waste, and baseline conditions associated with the development. The assessment grades obtained by the review categories and sub-categories under Review Area 1 (Table 4.2) are discussed next.

Table 4.2: The analysis of the categories and sub-categories of Review Area 1.

Summary of all review areas, categories and sub-categories		% A-C	% A-B	% D-F	% E-F
1	Description of project and environment	96 (23)	88 (21)	4 (1)	0
1.1	Description of the development	96 (23)	79 (19)	4 (1)	0
1.1.1	Purpose and objectives	96 (23)	79 (19)	4 (1)	0
1.1.2	Design and size	100 (24)	92 (22)	0	0
1.1.3	Presence and appearance of completed development	83 (20)	79 (19)	17 (4)	8 (2)
1.1.4	Nature of production processes	8 (2) N/A (22)	8 (2) N/A (22)	0 N/A (22)	0 N/A (22)
1.1.5	Nature and quantities of raw materials	62 (15)	38 (9)	38 (9)	12 (3)
1.1.6	Identification of applicant	100 (24)	96 (23)	0	0
1.1.7	Details of EAP to carry out assessment	54 (13)	50 (12)	46 (11)	25 (6)
1.2	Site description	88 (21)	75 (18)	12 (3)	0
1.2.1	Area of development site	100 (24)	96 (23)	0	0
1.2.2	Demarcation of land use areas	100 (24)	96 (23)	0	0
1.2.3	Duration of different phases	50 (12)	33 (8)	50 (12)	29 (7)
1.2.4	Number of workers and/or visitors	79 (19)	62.5 (15)	21 (5)	8 (2)
1.2.5	Means of transporting raw materials, products and quantities	88 (21)	58 (14)	12 (3)	0
1.3	Waste	67 (16)	54 (13)	33 (8)	12 (3)
1.3.1	Types and quantities of wastes	75 (18)	67 (16)	25 (6)	0
1.3.2	Treatment, disposal and disposal routes	88 (21)	84 (20)	12 (3)	0
1.3.3	Methods of obtaining quantity of wastes	46 (11)	21 (5)	54 (13)	38 (9)
1.4	Environmental description	100 (24)	92 (22)	0	0
1.4.1	Area to be affected by development	100 (24)	96 (23)	0	0
1.4.2	Effects occurring away from immediate affected environment	96 (23)	84 (20)	4 (1)	0
1.5	Baseline conditions	100 (24)	92 (22)	0	0
1.5.1	Important components of the affected environment	100 (24)	92 (22)	0	0
1.5.2	Existing data sources	100 (24)	88 (21)	0	0
1.5.3	Local land use plans, policies consulted	100 (24)	88 (21)	0	0

The EIRs (96%) were graded as satisfactory for review category 1.1 (Description of the development). All the reports obtained a C or more for sub-categories 1.1.2 (Design and size) and 1.1.6 (Identification of the applicant). The majority of the reports, 96% and 83% respectively, were regarded as satisfactory in terms of the descriptions of the projects with regards to the purpose and objectives (1.1.1), and the presentation and appearance of the completed development (1.1.3). The sub-category 1.1.4 (Nature of production process) was mostly not applicable (N/A) since only two of the reports had relevant production processes. Weaker performance in this review category included the description of the nature and quantities of raw materials (1.1.5) for which only 62% of the reports were graded A-C, while only 54% were rated as satisfactory for the presentation of the details of the Environmental Assessment Practitioner (EAP) who performed the assessment (1.1.7).

The majority (88%) of the reports were rated as satisfactory for site description (1.2). All of the reports obtained a C or more for sub-categories; 1.2.1 (Area of development site) and 1.2.2 (Demarcation of land use areas). Sub-category 1.2.5 (Means of transporting raw materials, products and quantities) was mainly satisfactory (88% A-C), while the estimated number of workers and visitors (1.2.4), and the description of the duration of different phases (1.2.3) were less satisfactory, respectively obtaining 79% and 50% A-C.

The reports achieved a satisfactory rating of 67% for review category 1.3 (Waste), making it the weakest category of Review Area 1. Sub-category 1.3.2 (Treatment, disposal and disposal routes) performed the best in this category (88% A-C), while sub-category 1.3.1 (Types and quantities of waste) followed with a 75% satisfactory rating. Only 46% of the reports were satisfactory (A-C) in terms of sub-category 1.3.3 (Method of obtaining quantities of wastes), hence this is the weakest sub-category in this category.

All of the reports were graded as satisfactory for the environmental description (1.4). This category only has two sub-categories; the description of the area to be affected by the development (1.4.1), and the effects occurring away from the immediate affected environment (1.4.2), for which the reports respectively obtained 100% and 96% A-C.

All of the reports were graded as satisfactory for review category 1.5 (Baselines condition). The EIRs obtained a C or more for all three sub-categories, namely; the description of important components of the affected environment (1.5.1), existing data sources (1.5.2), and local land use plans and policies consulted (1.5.3).

4.2.2 Review Area 2: Impact identification and evaluation

In Review Area 2 the performance of tasks related to the identification and definition of impacts associated with a proposed development, and the significance of these impacts as well as the

public participation process related to the development are assessed. This review area is vital to ensure that all significant impacts are identified and addressed in order to prevent environmental harm. The grades achieved in Review Area 2 are discussed next, focus is placed on the review categories and sub-categories (Table 4.3).

Table 4.3: The analysis of the categories and sub-categories of Review Area 2.

Summary of all review areas, categories and sub-categories	% A-C	% A-B	% D-F	% E-F
2 Impact identification and evaluation	88 (21)	58 (14)	12 (3)	0
2.1 Definition of impacts	96 (23)	88 (21)	4 (1)	0
2.1.1 All possible effects on environment	96 (23)	88 (21)	4 (1)	0
2.1.2 Interaction of effects	92 (22)	88 (21)	8 (2)	4 (1)
2.1.3 Impacts from non-standard operating procedure	88 (21)	46 (11)	12 (3)	4 (1)
2.1.4 Impacts from deviation from base-line conditions	96 (23)	67 (16)	4 (1)	0
2.2 Identification of impacts	92 (22)	79 (19)	8 (2)	0
2.2.1 Impacts identification methodology	96 (23)	92 (22)	4 (1)	0
2.2.2 Impact identification method used	84 (20)	79 (19)	12 (3)	4 (1)
2.3 Scoping	96 (23)	96 (23)	4 (1)	0
2.3.1 Contact general public and special interest groups	96 (23) N/A (1)	96 (23) N/A (1)	0 N/A (1)	0 N/A (1)
2.3.2 Collect opinions and concerns of I&APs	96 (23) N/A (1)	96 (23) N/A (1)	0 N/A (1)	0 N/A (1)
2.3.3 Key impacts	96 (23)	79 (19)	4 (1)	4 (1)
2.4 Prediction of impact magnitude	79 (19)	33 (8)	21 (5)	8 (2)
2.4.1 Data to estimate magnitude of main impacts	84 (20)	42 (10)	17 (4)	8 (2)
2.4.2 Methods used to predict impact magnitude	79 (19)	67 (16)	21 (5)	4 (1)
2.4.3 Predictions of impact in measurable quantities	54 (13)	12 (3)	46 (11)	33 (8)
2.5 Assessment of impact significance	88 (21)	54 (13)	12 (3)	8 (2)
2.5.1 Significance of impact on affected community and society in general	92 (22)	88 (21)	8 (2)	8 (2)
2.5.2 Significance i.t.o national and international quality standards	58 (14)	33 (8)	42 (10)	8 (2)
2.5.3 Justification of proposed methods of assessing significance	84 (20)	50 (12)	17 (4)	4 (1)

The reports (96%) were graded as satisfactory for review category 2.1 (Definition of impacts) The majority of the reports (96%) obtained A-C for sub-categories 2.1.1 (All possible effects on the environment) and 2.1.4 (Impacts from deviation from base-line conditions). Sub-category 2.1.2 (Interaction of effects) was rated as 92% A-C, while 2.1.3 (Impacts from non-standard operating procedure) was graded as satisfactory for 88% of the reports.

Most of the reports (92%) achieved a C or more for review category 2.2 (Identification of impacts). This review category is comprised of two sub-categories; impact identification methodology (2.2.1) and the impact identification method used (2.2.2), which were respectively graded as 96% and 84% A-C.

Review category 2.3 (Scoping) was rated as satisfactory (A-C) in 96% of the reports. The EIRs (96%) were rated as satisfactory for all three sub-categories, namely; contact general public and special interest groups (2.3.1), collect opinions and concerns of interested and affected parties (2.3.2), and key impacts (2.3.3). However, it should be taken into consideration that sub-categories 2.3.1 and 2.3.2 were not applicable (N/A) for 4% of the sample, which affected the satisfactory rating of these two sub-categories.

Only 79% of the EIRs were graded as satisfactory for review category 2.4 (Prediction of impact magnitude), making it the lowest satisfactory rating in terms of the five review categories of Review Area 2. Sub-category 2.4.1 (Data to estimate magnitude of main impacts) performed

the best (84% A-C), followed by sub-category 2.4.2 (Methods used to predict impact magnitude) which was graded as 79% A-C. The predications of impact in measurable quantities (2.4.3) performed significantly weaker since only 54% of the reports achieved a C or more for this sub-category.

The majority (88%) of the reports were rated as satisfactory for the assessment of impact significance (2.5). Sub-category 2.5.1 (Significance of impact on affected community and society in general) had the highest satisfactory rating (92%), followed by 2.5.3 (Justification of proposed methods of assessing significance) which was graded as satisfactory for 84% of the reports. Just more than half (58%) of the reports obtained a C or more for sub-category 2.5.2 (Significance i.t.o of national and international quality standards), which made this sub-category the weakest of review category 2.5.

4.2.3 Review Area 3: Alternatives and mitigation

In this review area the performance of an EIR with regards to the identification of alternatives for a development, as well as the scope and effectiveness of mitigation measures along with the level of commitment to the identified mitigation measures are assessed. Next the grades obtained by the three review categories and the nine sub-categories of Review Area 3 (Table 4.4) is discussed.

Table 4.4: The analysis of the categories and sub-categories of Review Area 3.

Summary of all review areas, categories and sub-categories	% A-C	% A-B	%D-F	% E-F
3 Alternatives and mitigation	96 (23)	75 (18)	4 (1)	4 (1)
3.1 Alternatives	92 (22)	79 (19)	8 (2)	4 (1)
3.1.1 Description of alternative sites	75 (18) N/A (4)	71 (17) N/A (4)	8 (2) N/A (4)	0 N/A (4)
3.1.2 Description of alternative processes, design and operating conditions	92 (22)	67 (16)	8 (2)	0
3.1.3 For severe adverse impacts rejected alternative identified	92 (22)	84 (20)	8 (2)	4 (1)
3.1.4 Comparative assessment of all alternatives identified	88 (21) N/A (1)	71 (17) N/A (1)	8 (2) N/A (1)	4 (1) N/A (1)
3.2 Scope and effectiveness of mitigation measures	96 (23)	84 (20)	4 (1)	4 (1)
3.2.1 Consider mitigation of all significant adverse impacts	96 (23)	84 (20)	4 (1)	4 (1)
3.2.2 Mitigation measures	96 (23)	75 (18)	4 (1)	4 (1)
3.2.3 Extent of effectiveness of mitigation when implemented	96 (23)	84 (20)	4 (1)	4 (1)
3.3 Commitment of mitigation	96 (23)	71 (17)	4 (1)	4 (1)
3.3.1 Record of commitment to mitigation measures	96 (23)	79 (19)	4 (1)	4 (1)
3.3.2 Monitoring arrangements	96 (23)	58 (14)	4 (1)	4 (1)

The majority of the sample (92%) obtained a C or more for review category 3.1 (Alternatives). Two of the sub-categories; the description of alternative processes, design and operating conditions (3.1.2), and the rejection of severe adverse impacts and the reconsideration of alternative identified (3.1.3) were rated as satisfactory in 92% of the reports. Sub-category 3.1.4 (Comparative assessment of all alternatives identified) was graded as 88% satisfactory, with sub-category 3.1.4 being not applicable to one report. The description of alternative sites (3.1.1) had the lowest satisfactory rating (75%), but the grade was somewhat affected since this sub-category was not applicable to four reports of the sample.

In review category 3.2 (Scope and effectiveness of mitigation measures), the majority of the reports (96%) received a C or more. This review category consists of three sub-categories; consideration of mitigation of all significant adverse impacts (3.2.1), mitigation measures (3.2.2), and the extent to which the mitigation measures will be effective when implemented (3.2.3). All three of these sub-categories were rated as satisfactory in 96% of the reports.

Review category 3.3 (Commitment to mitigation) which is comprised of two sub-categories was rated as satisfactory in 96% of the reports. Almost all (96%) of the reports in the sample achieved a C or more for both sub-category 3.3.1 (Record of commitment to mitigation measures) and 3.3.2 (Monitoring arrangements).

4.2.4 Review Area 4: Presentation and communication

In this review area the performance of an EIR in terms of the presentation and communication of the results is assessed. The effective communication of technical information to stakeholders and decision-makers is a vital component of EIR quality, but good performance in this review area will not compensate for poor performance in the remaining review areas (Sandham *et al.*, 2013b). Additionally, if this area performs poorly, it can detract from good information in the other review areas (Sandham *et al.*, 2013b). Review Area 4's category and sub-category grades are discussed next (Table 4.5).

Table 4.5: The analysis of the categories and sub-categories of Review Area 4.

Summary of all review areas, categories and sub-categories	% A-C	% A-B	% D-F	% E-F
4 Presentation and Communication	100 (24)	96 (23)	0	0
4.1 Layout of the report	100 (24)	96 (23)	0	0
4.1.1 Introduction	96 (23)	84 (20)	4 (1)	4 (1)
4.1.2 Information logically arranged	100 (24)	96 (23)	0	0
4.1.3 Chapter summaries	92 (22) N/A (1)	62.5 (15) N/A (1)	4 (1) N/A (1)	4 (1) N/A (1)
4.1.4 External sources acknowledged	88 (21)	54 (13)	12 (3)	0
4.2 Presentation	100 (24)	96 (23)	0	0
4.2.1 Presentation of information	100 (24)	100 (24)	0	0
4.2.2 Technical terms, acronyms, initials defined	96 (23)	88 (21)	4 (1)	0
4.2.3 Statement presented as an integrated whole	100 (24)	88 (21)	0	0
4.3 Emphasis	96 (23)	92 (22)	4 (1)	0
4.3.1 Emphasis to potentially severe impacts	92 (22)	88 (21)	8 (2)	4 (1)
4.3.2 Statement must be unbiased	100 (24)	100 (24)	0	0
4.3.3 Opinion as to whether activity should/should not be authorized	96 (23)	92 (22)	4 (1)	4 (1)
4.4 Non- technical summary	100 (24)	75 (18)	0	0
4.4.1 Non-technical summary of main findings & conclusions	100 (24)	88 (21)	0	0
4.4.2 Summary must cover all main issues	96 (23)	67 (16)	4 (1)	4 (1)

All of the EIRs, obtained a satisfactory grading for the layout of the report (4.1). All of the reports were graded as satisfactory for sub-category 4.1.2 (Information logically arranged), while 96% obtained a A-C grade for sub-category 4.1.1 (Introduction), and 92% of the report were rated as satisfactory for sub-category 4.1.3 (Chapter summaries). Chapter summaries was not applicable to one of the reports in the sample, since the report was very short and compact already. Sub-category 4.1.4 (External sources acknowledged) was slightly less

satisfactory then the other sub-categories in this review category, with 88% of the reports achieving a C or more.

Presentation (4.2) was rated as satisfactory for all the reports. Two of the review sub-categories; 4.2.1 (Presentation of information) and 4.2.3 (Statement presented as an integrated whole) achieved a C or more for all the EIRs. Most (96%) of the reports obtained A-C grades for sub-category 4.2.2 (Technical terms, acronyms and initials defined).

Review category 4.3 (Emphasis) which is comprised of three sub-categories was rated as satisfactory for the majority of the reports (96%). Sub-category 4.3.2 (Statement must be unbiased) was performed the best (100%), followed by 4.3.3 (Opinion as to whether the activity should or should not be authorised) which was graded 96% satisfactory, and lastly 4.3.1 (Emphasis to potentially severe impacts) achieved a 92% satisfactory rating.

In review category 4.4 (Non-technical summary), most of the reports (96%) obtained a C or more. The EIRs addresses the two sub-categories of review category 4.4, i.e. a non-technical summary of the main findings and conclusions (4.4.1), and a summary that covers all the main issues (4.4.2), to a satisfactory degree with respectively 100% and 96% achieving satisfactory grades.

4.3 Key findings

Strengths and weaknesses can be identified by calculating the percentage of A and B grades, and E and F grades respectively in the review categories and sub-categories grades in each review area.

The categories and sub-categories which obtained a proportion of A and B grades over 80% were regarded as strengths. The proportion of E and F grades over 5% were regarded as weaknesses, with 5-24% regarded as moderately weak and over 25% as the weakest (Table 4.6).

Table 4.6: Strengths and weaknesses at category and sub-category level of the protected areas EIRs (value in brackets is % A-B for strength or % E-F for weakness).

Strengths	Weaknesses	
	Moderately Weak	Weakest
1.1.2 Design and size (92%) 1.1.6 Identification of applicant (96%)	1.1.3 Presence and appearance of completed development (8%) 1.1.5 Nature and quantities of raw materials (12%)	1.1.7 Details of EAP to carry out assessment (25%)
1.2.1 Area of development site (96%) 1.2.2 Demarcation of land use areas (96%)	1.2.4 Number of workers and/or visitors (8%)	1.2.3 Duration of different phases (29%)
1.3.2 Treatment, disposal and disposal routes (84%)	**1.3 Waste (12%)**	1.3.3 Methods of obtaining quantity of wastes (38%)
1.4 Environmental description (92%) 1.4.1 Area to be affected by development (96%) 1.4.2 Effects occurring away from immediate affected environment (84%)	-	-
1.5 Baseline conditions (92%) 1.5.1 Important components of the affected environment (92%) 1.5.2 Existing data sources (88%) 1.5.3 Local land use plans, policies consulted (88%)	-	-
2.1 Definition of impacts (88%) 2.1.1 All possible effects on environment (88%) 2.1.2 Interaction of effects (88%)	-	-
2.2.1 Impacts identification methodology (92%)	-	-
2.3 Scoping (96%) 2.3.1 Contact general public and special interest groups (96%) 2.3.2 Collect opinions and concerns of I&APs (96%)	-	-
-	**2.4 Prediction of impact magnitude (8%)** 2.4.1 Data to estimate magnitude of main impacts (85)	2.4.3 Predictions of impact in measurable quantities (33%)
2.5.1 Significance of impact on affected community and society in general (88%)	**2.5 Assessment of impact significance (8%)** 2.5.1 Significance of impact on affected community and society in general (8%) 2.5.2 Significance i.t.o national and international quality standards (8%)	-
3.1.3 For severe adverse impacts rejected alternative identified (84%)	-	-
3.2 Scope and effectiveness of mitigation measures (84%) 3.2.1 Consider mitigation of all significant adverse impacts (84%) 3.2.3 Extent of effectiveness of mitigation when implemented (84%)	-	-
4.1 Layout of the report (96%) 4.1.1 Introduction (84%) 4.1.2 Information logically arranged (96%)	-	-
4.2 Presentation (96%) 4.2.1 Presentation of information (100%) 4.2.2 Technical terms, acronyms, initials defined (88%) 4.2.3 Statement presented as an integrated whole (88%)	-	-
4.3 Emphasis (92%) 4.3.1 Emphasis to potentially severe impacts (88%) 4.3.2 Statement must be unbiased (100%) 4.3.3 Opinion as to whether activity should/ should not be authorized (92%)	-	-
4.4.1 Non-technical summary of main findings & conclusions (88%)	-	-

Table 4.6 shows that the sample of protected area (SANParks) EIRs had more strengths than weaknesses. The majority of the categories and sub-categories identified as strengths were found in Review Area 1 and 4. However, Review Area 1 also hosted several moderately weak and weakest categories and sub-categories. It is evident that there are a few areas of strength in Review Area 3 and no areas of weakness. Review Area 2 hosted several strengths as well as weaknesses.

The majority of the reports (96%) obtained only A and B grades for scoping (2.3), layout of the report (4.1) and presentation (4.2), which makes these three categories the best performed and greatest strengths. At sub-category level, presentation of information (4.2.1) and statement must be unbiased (4.3.2) were regarded as the best performed.

Waste (1.3) was regarded as the worst performed category, while methods of obtaining quantity of wastes (1.3.3) was the worst performed sub-category. Other sub-categories of 'weakest' performance included: the predictions of impacts in measurable quantities, duration of different phases, and the details of EAP to carry out assessment. However, the 25% D-F obtained by sub-category 1.1.7 (Details of EAP to carry out assessment) can be ascribed to the fact that the ECA 1997 regime (six reports in the total sample) did not require the expertise and the declaration of independence of the EAP. Hence the information was not included in these six reports (25%), but since the Lee and Colley review package reviews performance against best practice as well as evaluate the actual EIA system, areas of weakness such as sub-category 1.1.7, in an EIA system are also identified.

4.4 Discussion

The findings revealed the EIRs of protected areas were mostly of satisfactory quality (92%), with strengths and weaknesses as shown in Section 4.3. The majority of the reports (83%) were graded as generally satisfactory (B), and only two (8%) were regarded as unsatisfactory (D). Therefore, it can be assumed that the decision-making process for protected area (SANParks) development projects were mainly based on information that is complete and accurate, with only a few omissions and/or inadequacies.

Review Area 4 (Presentation and communication) was the best performed review area, followed by Review Area 1 (Description of project and environment) and Review Area 3 (Alternatives and mitigation). Although Review Area 1 and 3 each obtained a satisfactory rating of 96%, Review Area 1 was regarded as slightly better performed since this review area obtained a higher A-B% than Review Area 3. In this sample Review Area 2 performed the worst, but still obtained a satisfactory rating of 88%.

The findings differed slightly from Wylie *et al*. (2018) who evaluated the quality of EIRs for tourism-related infrastructure in or near protected areas in the Limpopo and Mpumalanga provinces of South Africa. Wylie *et al.* (2018) found that Review Area 1 and 2 performed better than Review Area 3 and 4.

However, the quality results of the SANParks EIRs are similar to those from other South African studies on EIA quality (Sandham & Pretorius, 2008; Sandham *et al.*, 2008a; Sandham *et al.*, 2008b; Sandham *et al.*, 2010; Sandham *et al.*, 2013a; Sandham *et al.*, 2013b) as well as

internationally (Barker & Wood, 1999; Badr *et al.*, 2004; Badr *et al.*, 2011; Kabir & Momtaz, 2012; Anifowose *et al.*, 2016) with lower grades in Review Area 2 and 3 (analytical areas) compared to higher grades in Review Area 1 and 4 (descriptive and presentational areas). This has been attributed to the fact that the descriptive and presentational areas are less complex, and also require less skill than the analytical areas (Lee *et al.*, 1999).

Additionally, various strengths and weaknesses were identified at category and sub-category level (Section 4.3). This study identified categories and sub-categories with a proportion of E-F grades over 5% as weaknesses, with ≥ 5-24% being regarded as moderately weak and ≥ 25% as the weakest, while a proportion of A-B grades ≥ 80% were regarded as strengths.

In several previous South African studies, categories and sub-categories with more than 50% A-B grades were regarded as strengths, and 50% E-F grades as weaknesses (Sandham & Pretorius, 2008; Sandham *et al.*, 2008b; Mbhele, 2009; Van Heerden, 2010; Sandham *et al.*, 2013a; Sandham *et al.*, 2013b). However, the majority of these studies identified no weaknesses (E-F grades over 50%), therefore, areas of poor performance were identified. Several of the strengths and weaknesses found during the evaluation of the SANParks EIR quality, were also present in these studies. (At sub-category level, several strengths and weaknesses which also resemble the findings of this study were observed, most of which fall under the categories listed).

Strengths at category level that correspond with those of other studies included:

- Environmental description (1.4) – Sandham *et al.* (2013a)
- Description of the baseline conditions (1.5) – Sandham *et al.* (2008b), Sandham *et al.* (2013a)
- Scoping (2.3) – Sandham *et al.* (2008b), Sandham *et al.* (2013a)
- Scope and effectiveness of mitigation measures (3.2) – Sandham *et al.* (2013a)
- Layout of report (4.1) – Sandham and Pretorius (2008)
- Presentation (4.2) – Sandham *et al.* (2008b), Sandham and Pretorius (2008), Sandham *et al.* (2013a)
- Emphasis (4.3) – Sandham and Pretorius (2008), Sandham *et al.* (2013a)

Weaknesses (poor performance) at category level that correspond with those of other studies included:

- Waste (1.3) – Sandham and Pretorius (2008), Sandham *et al.* (2008a), Sandham *et al.* (2013b)
- Prediction of impact magnitude (2.4) - Sandham *et al.* (2008b), Sandham and Pretorius (2008), Sandham *et al.* (2013a), Sandham *et al.* (2013b)

- Assessment of impact significance (2.5) – Sandham and Pretorius (2008), Sandham *et al.* (2008a), Mbhele (2009)

Despite the areas of similarity, overall fewer areas of weakness were identified during this study, while simultaneously more strengths were listed, which could indicate an increase in quality. Additionally, since a stricter proportion of A-B and E-F grades were used during this study, it could also support the assumption that an increase in quality has occurred.

4.5 Conclusion

The EIA reports for SANParks projects were evaluated using the Lee and Colley review package. The high frequency of satisfactory grades at the two highest levels of the hierarchy (overall grade and review areas), as well as the strengths and weaknesses identified at the lower levels (categories and sub-categories), suggest that improvement in quality has occurred.

To further investigate the possibility that an improvement in quality has occurred over time, the EIR quality of the ECA 1997 regime and the two co-regimes, NEMA 2006/10 and NEMA 2014/17 were analysed in Chapter 5.

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CHAPTER 5: EIA REGIMES QUALITY RESULTS

In the previous chapter, Objective 1 was achieved through the analysis and discussion of the SANParks EIR quality review results obtained by using an adapted Lee and Colley review package. The reports were mostly of satisfactory quality (92%), and Review Area 4 was the best performed review area, followed by Review Area 1 and Review Area 3, and lastly Review Area 2. These results were for the sample of SANParks EIRs as a whole.

Chapter 5 attempts to achieve Objective 2, which is to compare report quality across various EIA regimes longitudinally. The SANParks EIRs sample (24) was comprised of six reports conducted under the ECA 1997 regime, two reports under the NEMA 2006 regime, eight reports under the NEMA 2010 regime, five reports under the NEMA 2014 regime, and three reports under the NEMA 2017 regimes (Table 5.1).

These small samples could result in possible bias, therefore in view of the similarity between the 2006-2010 regimes and the 2014-2017 regimes it was decided to group them into co-regimes, i.e. the NEMA 2006/10 co-regime and the NEMA 2014/17 co-regime.

Table 5.1 shows that the ECA 1997 regime sample was comprised of six EIA reports, and after the grouping together of the similar regimes the NEMA 2006/10 co-regime sample had a total of ten reports, and the NEMA 2014/17 co-regime sample had eight reports. However, the three regime samples remained small and it was again necessary to use 'replication logic' (Yin, 2003), since no statistical inferences could be made. (Note that for discussion purposes when referring to the ECA 1997 regime, the NEMA 2006/10 co-regime and the NEMA 2014/17 co-regime, together the term 'regimes' are used since ECA 1997 is not a co-regime, but when referring only to the NEMA samples the term 'co-regimes' are used).

Table 5.1: Number of EIRs in each EIA regime before and after grouping together, the NEMA 2006-2010 reports and the NEMA 2014-17 reports.

	Before Grouping					**After Grouping**		
	ECA 1997	NEMA 2006	NEMA 2010	NEMA 2014	NEMA 2017	ECA 1997	NEMA 2006/10	NEMA 2014/17
Number of EIRs	6	2	8	5	3	6	2+8=10	5+3=8

Similar to the method used in Chapter 4, the overall grades, review areas and review categories of the EIRs were added and summarised for each of the three EIA regimes (see Appendix B for full set of results). In order to analyse the longitudinal changes in EIR quality across the three regimes, the discussion deals firstly with the overall quality of each regime (Fig. 5.1), then the quality of the review areas (Fig. 5.2 - 5.5) and lastly the key findings.

5.1 Overall quality of EIR for each regime

In the ECA 1997 regime, four (66%) of the reports were graded as satisfactory (A-C) compared to all of the EIRs of the other regimes (Fig. 5.1 and Appendix B).

Four of the six ECA 1997 reports obtained a B grading (generally satisfactory) and the remaining two were graded as 'just unsatisfactory' (D). In the NEMA 2006/10 sample, three reports were 'well performed' (A), four were 'generally satisfactory' and two were graded as 'just satisfactory'(C). In the NEMA 2014/17 sample, three reports were graded as 'well performed' (A) and the remaining five were graded as 'generally satisfactory' (B).

In comparison to ECA 1997 regime, the NEMA co-regimes (2006/10 and 2014/17), achieved a higher proportion of satisfactory grades, as well as an increase in A's and B's (Fig. 5.1). Therefore, an increase in overall report quality is noticeable from the ECA regime to the NEMA regimes. Comparing the NEMA co-regimes, an increase in overall report quality is also visible between the NEMA 2006/10 co-regime and the NEMA 2014/17 co-regime, since the NEMA 2006/10 co-regime obtained 2 C grades, while the NEMA 2014/17 co-regime only achieved A and B grades (Fig. 5.1).

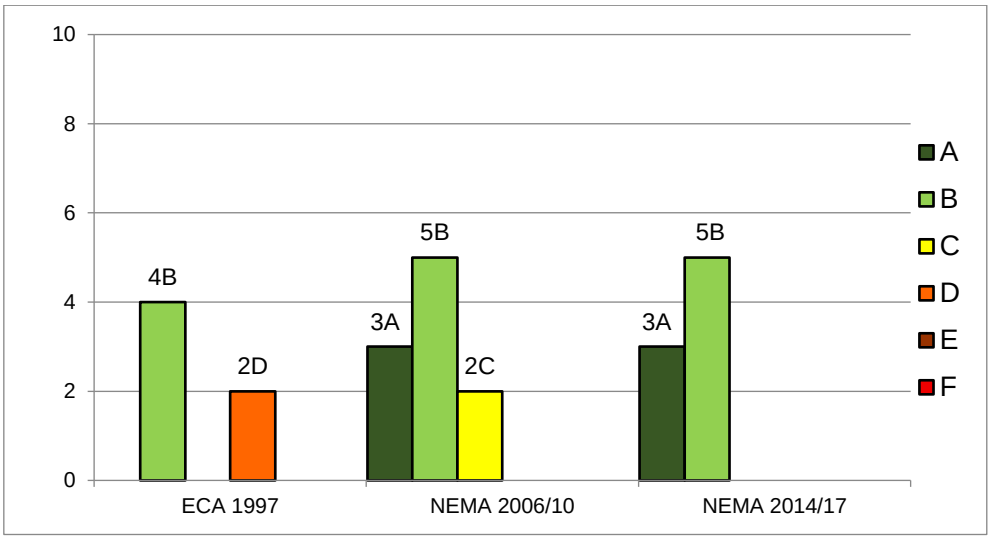

Figure 5.1: Overall report grades for the ECA 1997 regime and the two NEMA co-regimes.

A more detailed description of the change in performance follows below, using the review area (RA), category and sub-category grades. To investigate the longitudinal changes in the quality across the regimes, the quality of each review area and its categories are analysed (Section 5.2). However, to investigate the longitudinal changes in the strengths and weaknesses of the ECA 1997 regime and the two co-regimes, categories, and sub-categories are also analysed (Section 5.3).

5.2 Quality of the Review Areas of each regime

The regimes are compared across all review areas in succession. Figure 5.2 shows that five of the ECA 1997 EIRs were graded as satisfactory (2As, 1B, 2Cs) for Review Area 1 (Description of project and environment). The NEMA 2006/10 and NEMA 2014/17 EIRs achieved only satisfactory grades for this review area (Fig. 5.2) with 3 As and 7 Bs, and 1 A and 7 Bs respectively. An increase in the quality of Review Area 1 from ECA 1997 regime to the NEMA co-regimes is clearly evident.

Review Area 2 (Impact identification and evaluation) obtained the lowest frequency of satisfactory grades (Fig. 5.3). The findings in Chapter 4 for the sample as a whole was that Review Area 2 performed the weakest of all the review areas, and it is clear that this area is also the weakest for each of the three regimes. Four of the six the ECA 1997 reports were graded as satisfactory (2B, 2C) in Review Area 2. Nine of the ten NEMA 2006/10 reports obtained a C or more (1A, 5B, 3C), while all eight of the NEMA 2014/17 reports were of satisfactory quality (2A, 4B, 2C). Longitudinally a gradual increase in quality is noticeable in Review Area 2.

Five of the ECA 1997 reports were regarded as satisfactory (4B, 1C) for Review Area 3 (Alternatives and mitigation) and one unsatisfactory (E). All the reports in the NEMA 2006/10 and the NEMA 2014/17 co-regimes were graded as satisfactory, obtaining 3 As, 4 Bs, and 3 Cs, and 3 As, 4 Bs and 1C respectively (Fig. 5.4). Therefore, the quality of this review area has also improved from the ECA 1997 regime through the earlier NEMA co-regime to the later NEMA co-regime.

Review Area 4 performed the best, with all the reports in each regime obtaining a C or more (Fig. 5.5). Additionally, compared to the remaining review areas, this review area has the highest frequency of A grades.

Each of the three regimes performed the best in Review Area 4, followed by Review Area 1 and 3, and lastly Review Area 2. In conclusion, in the ECA 1997, the NEMA 2006/10 and the NEMA 2014/17 samples the descriptive tasks (Review Area 1 and 4) performed better than the more analytical tasks (Review Area 2 and 3), confirming findings elsewhere in South Africa and internationally (Sandham & Pretorius, 2008; Sandham *et al.*, 2010; Pölönen *et al*., 2011; Barker & Jones, 2013).

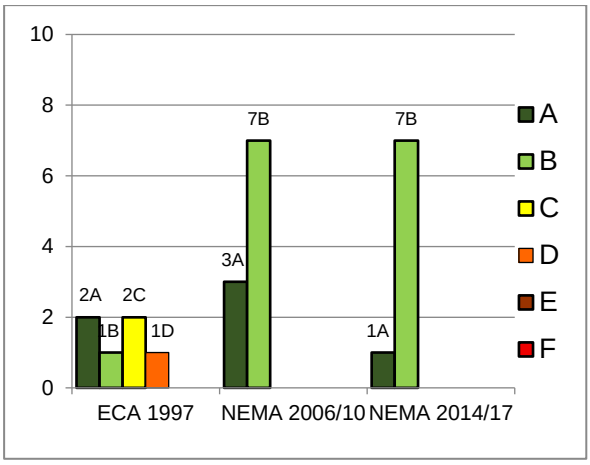

Figure 5.2: Quality of RA 1 across regimes.

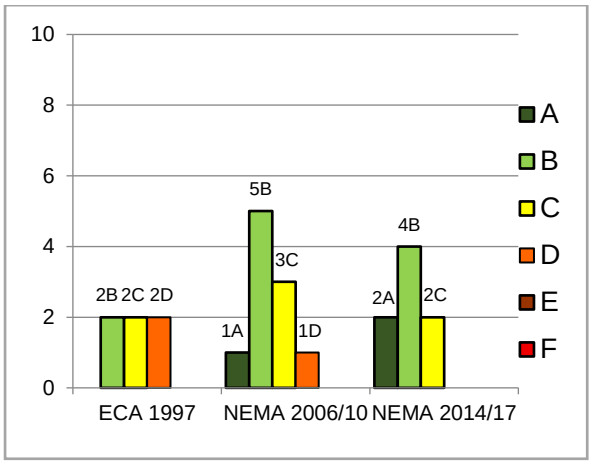

Figure 5.3: Quality of RA 2 across regimes.

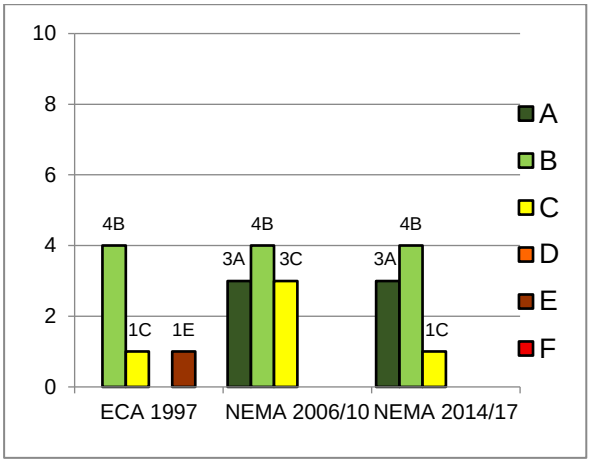

Figure 5.4: Quality of RA 3 across regimes.

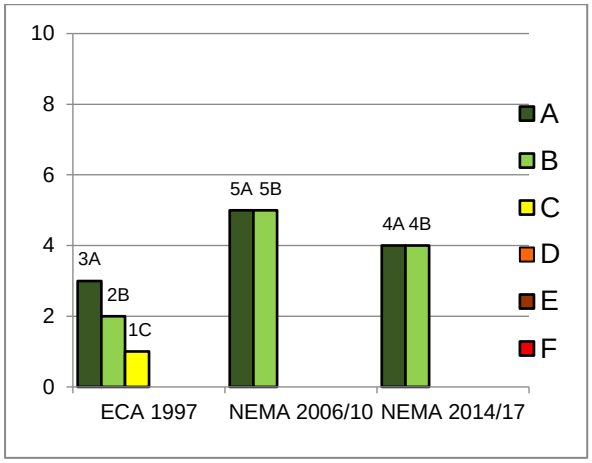

Figure 5.5: Quality of RA 4 across regimes.

5.2.1 Review Area 1: Description of project and environment

The discussion now moves from the longitudinal comparison of review areas across the ECA 1997 regime and the NEMA co-regimes, to a more detailed comparison of Review Area 1. Firstly, the results (A-C%) obtained by each of the three regimes at category level are discussed, followed by a temporal comparison of the category results across the three regimes to identify longitudinal trends (trends related to A-B% changes are discussed in Section 5.3).

This discussion is supported by Table 5.2, which was constructed by grouping together the grades of categories and sub-categories under Review Area 1, according to satisfactory (A-C%), well performed (A-B%), unsatisfactory (D-F%) and poor performance (E-F%) for each of the three regimes.

Table 5.2: The grades for the categories and sub-categories of Review Area 1.

Regime	ECA 1997 EIRs [n=6]				NEMA 2006/10 EIRs [n=10]				NEMA 2014/17 EIRs [n=8]			
Summary of all review areas, categories and sub-categories	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**
Overall Score	4 (66)	4 (66)	2 (33)	0	10 (100)	8 (80)	0	0	8 (100)	8 (100)	0	0
1 Description of project and environment	5 (83)	3 (50)	1 (16)	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
1.1 Description of the development	5 (83)	2 (33)	1 (16)	0	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
1.1.1 Purpose and objectives	6 (100)	5 (83)	0	0	10 (100)	8 (80)	0	0	8 (100)	8 (100)	0	0
1.1.2 Design and size	6 (100)	5 (83)	0	0	10 (100)	10 (100)	0	0	8 (100)	7 (87)	0	0
1.1.3 Presence and appearance of completed development	4 (66)	4 (66)	2 (33)	1 (16)	10 (100)	10 (100)	0	0	6 (75)	5 (62)	2 (25)	0
1.1.4 Nature of production processes	N/A	N/A	N/A	N/A	N/A (2)	N/A (2)	N/A (0)	N/A (0)	N/A	N/A	N/A	N/A
1.1.5 Nature and quantities of raw materials	3 (50)	3 (50)	3 (50)	0	6 (60)	3 (30)	4 (40)	2 (20)	6 (75)	3 (37)	2 (25)	1 (12)
1.1.6 Identification of applicant	6 (100)	6 (100)	0	0	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
1.1.7 Details of EAP to carry out assessment	0	0	6 (100)	4 (66)	6 (60)	5 (50)	4 (40)	1 (10)	7 (87)	7 (87)	1 (12)	1 (12)
1.2 Site description	4 (66)	4 (66)	2 (33)	0	9 (90)	8 (80)	1 (10)	0	8 (100)	6 (75)	0	0
1.2.1 Area of development site	6 (100)	6 (100)	0	0	10 (100)	10 (100)	0	0	8 (100)	7 (87)	0	0
1.2.2 Demarcation of land use areas	6 (100)	5 (83)	0	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
1.2.3 Duration of different phases	4 (66)	3 (50)	2 (33)	2 (33)	5 (50)	3 (30)	5 (50)	3 (30)	3 (37)	2 (25)	5 (62)	2 (25)
1.2.4 Number of workers and/or visitors	3 (50)	1 (16)	3 (50)	2 (33)	9 (90)	8 (80)	1 (10)	0	7 (87)	6 (75)	1 (12)	0
1.2.5 Means of transporting raw materials, products and quantities	5 (83)	3 (50)	1 (16)	0	8 (80)	7 (70)	2 (20)	0	8 (100)	4 (50)	0	0
1.3 Waste	3 (50)	2 (33)	3 (50)	2 (33)	8 (80)	8 (80)	2 (20)	0	5 (62)	3 (37)	3 (37)	1 (12)
1.3.1 Types and quantities of wastes	3 (50)	2 (33)	3 (50)	0	9 (90)	9 (90)	1 (10)	0	6 (75)	5 (62)	2 (25)	0
1.3.2 Treatment, disposal and disposal routes	4 (66)	4 (66)	2 (33)	0	10 (100)	10 (100)	0	0	7 (87)	6 (75)	1 (12)	0
1.3.3 Methods of obtaining quantity of wastes	2 (33)	1 (16)	4 (66)	3 (50)	7 (70)	4 (40)	3 (30)	2 (20)	2 (25)	0	6 (75)	4 (50)
1.4 Environmental description	6 (100)	5 (83)	0	0	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
1.4.1 Area to be affected by development	6 (100)	5 (83)	0	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
1.4.2 Effects occurring away from immediate affected environment	5 (83)	4 (66)	1 (16)		10 (100)	8 (80)	0	0	8 (100)	8 (100)	0	0
1.5 Baseline conditions	6 (100)	4 (66)	0	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
1.5.1 Important components of the affected environment	6 (100)	4 (66)	0	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
1.5.2 Existing data sources	6 (100)	4 (66)	0	0	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
1.5.3 Local land use plans, policies consulted	6 (100)	5 (83)	0	0	10 (100)	9 (90)	0	0	8 (100)	7 (87)	0	0

ECA 1997 regime

Five (83%) of the reports were graded as satisfactory for review category 1.1 (Description of the development), while four (66%) reports were of satisfactory quality for review category 1.2 (Site description). Waste (1.3) was the least satisfactory category of this review area, since only three (50%) of the reports were graded as satisfactory (A-C). All the reports reviewed contained satisfactory descriptions of the environmental (1.4) and of the baseline conditions (1.5), and no weak grades were allocated with regards to these review categories.

NEMA 2006/10 co-regime

All ten (100%) of the reports were graded as satisfactory for the description of the development (1.1), while nine (90%) of the reports were rated as satisfactory for the site description (1.2). Category 1.3 (Waste) had the lowest proportion of satisfactory grades, with eight (80%) of the reports obtaining a C or more. All the reports were rated as satisfactory for the remaining two categories, namely environmental description (1.4) and baseline conditions (1.5).

NEMA 2014/17 co-regime

Four of the five categories in this review area were rated as satisfactory for all the reports namely: the description of the development (1.1), site description (1.2), environmental description (1.4), and baseline conditions (1.5). The remaining category, waste (1.3), obtained a much lower satisfactory rating (62%), since only five of the reports received satisfactory grades.

Longitudinal trends for Review Area 1

The description of the development (1.1) has improved since only five (83%) of the ECA 1997 reports were rated as satisfactory, while all of the NEMA 2006/10 and the NEMA 2014/17 reports were of satisfactory quality. The site description (1.2) satisfactory rating has increased since only four of the ECA 1997 reports were of satisfactory quality, while all the NEMA 2014/2017 reports were regarded as satisfactory. Category 1.3 (Waste) was the worst performed category in terms of the EIRs of the ECA 1997 regime and the NEMA co-regimes. All the reports in the three regimes were rated as satisfactory for the environmental description (1.4) and baseline conditions (1.5).

5.2.2 Review Area 2: Impact identification and evaluation

A more detailed comparison of the quality of Review Area 2 across the three regimes follows. Focus is first placed on the category grades obtained by the reports of each co-regime, then on the longitudinal trends across the three regimes.

The category and sub-category grades of the three regimes were grouped together and compiled in Table 5.3 according to four groups, namely: satisfactory (A-C%), well performed (A-B%), unsatisfactory (D-F%) and poor performance (E-F%).

Table 5.3: The grades of the categories and sub-categories of Review Area 2.

Regime	ECA 1997 EIRs [n=6]				NEMA 2006/10 EIRs [n=10]				NEMA 2014/17 EIRs [n=8]			
Summary of all review areas, categories and sub-categories	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**
2 Impact identification and evaluation	4 (66)	2 (33)	2 (33)	0	9 (90)	6 (60)	1 (10)	0	8 (100)	6 (75)	0	0
2.1 Definition of impacts	5 (83)	4 (66)	1 (16)	0	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
2.1.1 All possible effects on environment	6 (100)	4 (66)	0	0	9 (90)	9 (90)	1 (10)	0	8 (100)	8 (100)	0	0
2.1.2 Interaction of effects	4 (66)	4 (66)	2 (33)	1 (16)	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
2.1.3 Impacts from non-standard operating procedure	5 (83)	1 (16)	1 (16)	1 (16)	9 (90)	4 (40)	1 (10)	0	7 (87)	6 (75)	1 (12)	0
2.1.4 Impacts from deviation from base-line conditions	5 (83)	3 (50)	1 (16)	0	10 (100)	7 (70)	0	0	8 (100)	6 (75)	0	0
2.2 Identification of impacts	5 (83)	4 (66)	1 (16)	0	9 (90)	8 (80)	1 (10)	0	8 (100)	7 (87)	0	0
2.2.1 Impacts identification methodology	6 (100)	6 (100)	0	0	9 (90)	9 (90)	1 (10)	0	8 (100)	7 (87)	0	0
2.2.2 Impact identification method used	5 (83)	4 (66)	1 (16)	1 (16)	8 (80)	8 (80)	2 (20)	0	7 (87)	7 (87)	1 (12)	0
2.3 Scoping	5 (83)	5 (83)	1 (16)	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
2.3.1 Contact general public and special interest groups	5 (83) N/A (1)	5 (83) N/A (1)	0 N/A (1)	0 N/A (1)	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
2.3.2 Collect opinions and concerns of I&APs	5 (83) N/A (1)	5 (83) N/A (1)	0 N/A (1)	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
2.3.3 Key impacts	5 (83)	3 (50)	1 (16)	1 (16)	10 (100)	9 (90)	0	0	8 (100)	7 (87)	0	0
2.4 Prediction of impact magnitude	4 (66)	1 (16)	2 (33)	1 (16)	8 (80)	3 (30)	2 (20)	1 (10)	7 (87)	4 (50)	1 (12)	0
2.4.1 Data to estimate magnitude of main impacts	4 (66)	1 (16)	2 (33)	1 (16)	8 (80)	5 (50)	2 (20)	1 (10)	8 (100)	4 (50)	0	0
2.4.2 Methods used to predict impact magnitude	4 (66)	3 (50)	2 (33)	0	9 (90)	7 (70)	1 (10)	1 (10)	6 (75)	6 (75)	2 (25)	0
2.4.3 Predictions of impact in measurable quantities	3 (50)	16 (1)	3 (50)	3 (50)	4 (40)	0	6 (60)	4 (40)	6 (75)	2 (25)	2 (25)	1 (12)
2.5 Assessment of impact significance	5 (83)	2 (33)	1 (16)	1 (16)	8 (80)	6 (60)	2 (20)	1(10)	8 (100)	5 (62)	0	0
2.5.1 Significance of impact on affected community and society in general	5 (83)	4 (66)	1 (16)	1 (16)	9 (90)	9 (90)	1 (10)	1 (10)	8 (100)	8 (100)	0	0
2.5.2 Significance i.t.o of national and international quality standards	4 (66)	3 (50)	2 (33)	1 (16)	5 (50)	3 (30)	5 (50)	1 (10)	5 (62)	2 (25)	3 (37)	0
2.5.3 Justification of proposed methods of assessing significance	4 (66)	1 (16)	2 (33)	0	8 (80)	5 (50)	2 (20)	1 (10)	8 (100)	6 (75)	0	0

ECA 1997 regime

Definition of impacts (2.1), the identification of impacts (2.2), and assessment of impact significance (2.5) were graded as 83% satisfactory, since five of the reports received a C or more.

Five (83%) of the reports were rated as satisfactory for category 2.3 (Scoping), and the remaining report (number 6 – Tamboti) was graded as 'Not applicable' (N/A) since it was exempted from the public participation process. Prediction of impact magnitude (2.4) was the weakest category in this review area, with only four reports (66%) obtaining a A-C grading.

NEMA 2006/10 co-regime

The definition of impacts (2.1) and scoping (2.3) were both rated as satisfactory in all of the reports. Nine (90%) of the reports achieved a C or more for the identification of impacts (2.2), while eight (80%) reports were of satisfactory quality for the prediction of impact magnitude (2.4), and the assessment of impact significance (2.5).

NEMA 2014/17 co-regime

The definition of impacts (2.1), the identification of impacts (2.2), scoping (2.3), and the assessment of impact significance (2.5) were of satisfactory (A-C) quality for each report. Only seven (87%) of the reports obtaining a C or more for the prediction of impact magnitude (2.4).

Longitudinal trends for Review Area 2

Two of the five categories in this review area, i.e. the definition of impact (2.1) and scoping (2.3) were mostly satisfactory for the ECA 1997 reports, while all of the reports were of satisfactory quality for the NEMA 2006/10 and NEMA 2014/17 co-regimes, which indicated a temporal change in the satisfactory rating of these two categories. The ECA 1997 and the NEMA 2006/10 reports were mostly satisfactory for the identification of impacts (2.2), and the assessment of impact significance (2.5), while all the NEMA 2014/17 reports were satisfactory, suggesting that the latest NEMA co-regime EIRs were of higher quality with regards to tasks relating to category 2.2 and 2.5.

The prediction of impact magnitude (2.4) performed the poorest across all three regimes. However, from ECA 1997 and NEMA 2014/17 an increase in satisfactory grades are also noticeable.

5.2.3 Review Area 3: Alternatives and mitigation

As with the Review Area 1 and 2, the quality results for Review Area 3 are provided (Table 5.4). The results obtained by three regimes at category level are discussed in detail, along with the longitudinal trends at category level across the three regimes.

Table 5.4: The grades of the categories and sub-categories of Review Area 3.

Regime	ECA 1997 EIRs [n=6]				NEMA 2006/10 EIRs [n=10]				NEMA 2014/17 EIRs [n=8]			
Summary of all review areas, categories and sub-categories	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**
3 Alternatives and mitigation	5 (83)	4 (66)	1 (16)	1 (16)	10 (100)	7 (70)	0	0	8 (100)	7 (87)	0	0
3.1 Alternatives	5 (83)	4 (66)	1 (16)	0	10 (100)	8 (80)	0	0	7 (87)	7 (87)	1 (12)	1 (12)
3.1.1 Description of alternative sites	4 (66) N/A (2)	4 (66) N/A (2)	0 N/A (2)	0 N/A (2)	8 (80) N/A (1)	8 (80) N/A (1)	1 (10) N/A (1)	0 N/A (1)	6 (75) N/A (1)	6 (75) N/A (1)	1 (12) N/A (1)	0 N/A (1)
3.1.2 Description of alternative processes, design and operating conditions	5 (83)	3 (50)	1 (16)	0	10 (100)	7 (70)	0	0	7 (87)	6 (75)	1 (12)	0
3.1.3 For severe adverse impacts rejected alternative identified	5 (83)	3 (50)	1 (16)	0	10 (100)	10 (100)	0	0	7 (87)	7 (87)	1 (12)	1 (12)
3.1.4 Comparative assessment of all alternatives identifies	4 (66) N/A (1)	3 (50) N/A (1)	1 (16) N/A (1)	0 N/A (1)	10 (100)	7 (70)	0	0	7 (87)	7 (87)	1 (12)	1 (12)
3.2 Scope and effectiveness of mitigation measures	5 (83)	4 (66)	1 (16)	1 (16)	10 (100)	8 (80)	0	0	8 (100)	8 (100)	0	0
3.2.1 Consider mitigation of all significant adverse impacts	5 (83)	4 (66)	1 (16)	1 (16)	10 (100)	8 (80)	0	0	8 (100)	8 (100)	0	0
3.2.2 Mitigation measures	5 (83)	3 (50)	1 (16)	1 (16)	10 (100)	8 (80)	0	0	8 (100)	7 (87)	0	0
3.2.3 Extent of effectiveness of mitigation when implemented	5 (83)	3 (50)	1 (16)	1 (16)	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
3.3 Commitment of mitigation	5 (83)	4 (66)	1 (16)	1 (16)	10 (100)	6 (60)	0	0	8 (100)	7 (87)	0	0
3.3.1 Record of commitment to mitigation measures	5 (83)	4 (66)	1 (16)	1 (16)	10 (100)	7 (70)	0	0	8 (100)	8 (100)	0	0
3.3.2 Monitoring arrangements	5 (83)	3 (50)	1 (16)	1 (16)	10 (100)	5 (50)	0	0	8 (100)	6 (75)	0	0

ECA 1997 regime

Five (83%) of the reports were rated as satisfactory for all three categories in this review area, namely: alternatives (3.1), the scope and effectiveness of mitigation measures (3.2), and the commitment to mitigation (3.3).

NEMA 2006/10 co-regime

All the reports obtained a C or more for alternatives (3.1), the scope and effectiveness of mitigation measures (3.2), and the commitment to mitigation (3.3).

NEMA 2014/17 co-regime

All the reports were graded as satisfactory (A-C) for the three categories in this review area.

Longitudinal trends for Review Area 3

The ECA 1997 reports were mostly satisfactory, but the NEMA 2006/10 and the NEMA 2014/17 reports achieved higher satisfactory ratings for all three of the categories in this review area.

5.2.4 Review Area 4: Presentation and communication

To provide a more detailed comparison of Review Area 4, the category level grades obtained by each regime for this review area, and the longitudinal trends identified when comparing the category result across the three regimes are discussed next. This discussion is supported by Table 5.5.

Table 5.5: The grades of the categories and sub-categories of Review Area 4.

Regime	ECA 1997 EIRs [n=6]				NEMA 2006/10 EIRs [n=10]				NEMA 2014/17 EIRs [n=8]			
Summary of all review areas, categories and sub-categories	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**	**A-C (%)**	**A-B (%)**	**D-F (%)**	**E-F (%)**
4 Presentation and Communication	6 (100)	5 (83)	0	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
4.1 Layout of the report	6 (100)	6 (100)	0	0	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
4.1.1 Introduction	6 (100)	5 (83)	0	0	9 (90)	8 (80)	1 (10)	1 (10)	8 (100)	7 (87)	0	0
4.1.2 Information logically arranged	6 (100)	6 (100)	0	0	10 (100)	10 (100)	0	0	8 (100)	7 (87)	0	0
4.1.3 Chapter summaries	4 (66) N/A (1)	4 (66) N/A (1)	1 (16) N/A (1)	1 (16) N/A (1)	10 (100)	6 (60)	0	0	8 (100)	5 (62)	0	0
4.1.4 External sources acknowledged	5 (83)	4 (66)	1 (16)	0	9 (90)	5 (50)	1 (10)	0	7 (87)	4 (50)	1 (12)	0
4.2 Presentation	6 (100)	6 (100)	0	0	10 (100)	10 (100)	0	0	8 (100)	7 (87)	0	0
4.2.1 Presentation of information	6 (100)	6 (100)	0	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
4.2.2 Technical terms, acronyms, initials defined	6 (100)	6 (100)	0	0	10 (100)	8 (80)	0	0	7 (87)	7 (87)	1 (12)	0
4.2.3 Statement presented as an integrated whole	6 (100)	4 (66)	0	0	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
4.3 Emphasis	5 (83)	4 (66)	1 (16)	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
4.3.1 Emphasis to potentially severe impacts	4 (66)	4 (66)	2 (33)	1 (16)	10 (100)	9 (90)	0	0	8 (100)	8 (100)	0	0
4.3.2 Statement must be unbiased	6 (100)	6 (100)	0	0	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
4.3.3 Opinion as to whether activity should/should not be authorized	5 (83)	4 (66)	1 (16)	1 (16)	10 (100)	10 (100)	0	0	8 (100)	8 (100)	0	0
4.4 Non- technical summary	6 (100)	4 (66)	0	0	10 (100)	8 (80)	0	0	8 (100)	6 (75)	0	0
4.4.1 Non-technical summary of main findings & conclusions	6 (100)	6 (100)	0	0	10 (100)	9 (90)	0	0	8 (100)	6 (75)	0	0
4.4.2 Summary must cover all main issues	5 (83)	4 (66)	1 (16)	1 (16)	10 (100)	7 (70)	0	0	8 (100)	5 (62)	0	0

ECA 1997 regime

Three of the four categories in this review area were graded as satisfactory, namely: the layout of the report (4.1), the presentation (4.2), and non-technical summary (4.4). Only five (83%) of the EIRs were regarded as satisfactory (A-C) for category 4.3 (Emphasis) and the remaining EIR was graded as 'just unsatisfactory' (D).

NEMA 2006/10 co-regime

The NEMA 2006/10 reports all received a C or more for the layout of the report (4.1), the presentation (4.2), emphasis (4.3), and non-technical summary (4.4).

NEMA 2014/17 co-regime

Categories dealing with the layout of report (4.1), presentation (4.2), emphasis (4.3), and non-technical summary (4.4) obtained a C or higher for each of the eight reports (100%).

Longitudinal trends for Review Area 4

All of the reports of the three regimes were regarded as satisfactory (A-C) for layout of the report (4.1), the presentation (4.2), and non-technical summary (4.4). This indicates that the tasks related to these categories have been properly performed in the first regime reports (ECA 1997) and are still being performed well in the latest co-regime reports (NEMA 2014/17). Although no temporal change has occurred with regards to the satisfactory ratings obtained by the three regimes EIRs for these three categories, a slight increase in satisfactory grades (A-C) is noticeable from ECA 1997 to NEMA 2006/10 in terms of category 4.3 (Emphasis).

5.3 Key findings

A similar approach to that in Section 4.3 was implemented to identify the strengths and weaknesses for ECA 1997, NEMA 2006/10 and NEMA 2014/17. Firstly, the percentage A and B grades were calculated as a measure of strength, and the percentage of E and F grades for weakness (Sandham & Pretorius, 2008; Sandham *et al.*, 2013a; Sandham *et al.*, 2013b; Cashmore *et al.*, 2002; Barker & Jones, 2013). The categories and sub-categories which achieved a proportion of A and B grades over 80% were regarded as strengths, while a percentage of E and F grades higher than 5% were regarded as moderately weak and higher than 25% as the weakest.

To provide a longitudinal comparison of the strengths and weaknesses of the three regimes, it is necessary to include grades at the sub-category level, since these grades often tend to be 'balanced out' at category and review area level. Hence, the strengths and weaknesses at category as well as sub-category level for each review area across the three regimes (see Table 5.2-5.5) were identified using the proposed A-B% and E-F%, and the results are summarized in Table 5.6-5.9. Next a discussion of the strengths and weaknesses in each review area according to each of the three regimes is provided, followed by a comparison of these strengths and weaknesses to identify possible temporal trends.

5.3.1 Review Area 1: Strengths and weaknesses

The discussion deals firstly with the strengths and weaknesses of each regime in terms of Review Area 1, then the comparison of these strengths and weaknesses across the three regimes. This discussion is supported by Table 5.6, which lists the identified strengths and weaknesses in the EIRs of each EIA regime according to each category and its sub-categories.

Table 5.6: Strengths and weaknesses in the EIRs of each EIA regime in Review Area 1 (value in brackets is %A-B for strength or %E-F for weakness).

		ECA 1997 regime	NEMA 2006/10 co-regime	NEMA 2014/17 co-regime
Strengths		1.1.1 Purpose and objectives (83%) 1.1.2 Design and size (83%) 1.1.6 Identification of applicant (100%)	**1.1 Description of the development (90%)** 1.1.1 Purpose and objectives (80%) 1.1.2 Design and size (100%) 1.1.3 Presence and appearance of completed development (100%) 1.1.6 Identification of applicant (90%)	**1.1 Description of the development (100%)** 1.1.1 Purpose and objectives (100%) 1.1.2 Design and size (87%) 1.1.6 Identification of applicant (100%) 1.1.7 Details of EAP to carry out assessment (87%)
		1.2.1 Area of development site (100%) 1.2.2 Demarcation of land use areas (83%)	**1.2 Site description (80%)** 1.2.1 Area of development site (100%) 1.2.2 Demarcation of land use areas (100%) 1.2.4 Number of workers and/or visitors (80%)	1..2.1 Area of development site (87%) 1.2.2 Demarcation of land use areas (100%)
		-	**1.3 Waste (80%)** 1.3.1 Types and quantities of wastes (90%) 1.3.2 Treatment, disposal and disposal routes (100%)	-
		1.4 Environmental description (83%) 1.4.1 Area to be affected by development (83%)	**1.4 Environmental description (90%)** 1.4.1 Area to be affected by development (100%) 1.4.2 Effects occurring away from immediate affected environment (80%)	**1.4 Environmental description (100%)** 1.4.1 Area to be affected by development (100%) 1.4.2 Effects occurring away from immediate affected environment (100%)
		1.5.3 Local land use plans, policies consulted (83%)	**1.5 Baseline conditions (100%)** 1.5.1 Important components of the affected environment (100%) 1.5.2 Existing data sources (90%) 1.5.3 Local land use plans, policies consulted (90%)	**1.5 Baseline conditions (100%)** 1.5.1 Important components of the affected environment (100%) 1.5.2 Existing data sources (100%) 1.5.3 Local land use plans, policies consulted (87%)
Weaknesses	Moderately Weak	1.1.3 Presence and appearance of completed development (16%)	1.1.5 Nature and quantities of raw materials (20%) 1.1.7 Details of EAP to carry out assessment (10%)	1.1.5 Nature and quantities of raw materials (12%) 1.1.7 Details of EAP to carry out assessment (12%)
		-	1.3.3 Method of obtaining quantity of wastes (20%)	**1.3 Waste (12%)**
	Weakest	1.1.7 Details of EAP to carry out assessment (66%)	-	-
		1.2.3 Duration of different phases (33%) 1.2.4 Number of workers and/or visitors (33%)	1.2.3 Duration of different phases (30%)	1.2.3 Duration of different phases (25%)
		1.3 Waste (33%) 1.3.3 Method of obtaining quantity of wastes (50%)	-	1.3.3 Method of obtaining quantity of wastes (50%)

ECA 1997 regime

The ECA 1997 regime reports had some areas of strength in Review Area 1. Two of the sub-categories, the identification of applicant (1.1.6) and the description of the area of the development site (1.2.1) were also regarded as best-performance (100% A-B). However, most of the weakest performed tasks were also located in this review area, including the details of the EAP to carry out the assessment (1.1.7), the duration of different phases (1.2.3), the number of workers and/or visitors (1.2.4), waste (1.3), and the methods of obtaining quantities of wastes (1.3.3).

NEMA 2006/10 co-regime

It is evident from the distribution of A-B grades that there are more areas of strength than weakness in this review area. One category and several sub-categories of best-performance (100% A-B) were also present (Table 5.6).

In the EIRs of this co-regime, three sub-categories of moderate weakness were identified. Additionally, this review area also hosts one of the two 'weakest' (≥ 25% E-F%) sub-categories in this co-regime, i.e. the duration of different phases (1.2.3).

NEMA 2014/17 co-regime

Several categories and sub-categories of strengths, with relatively few areas of weakness are present in the NEMA 2014/17 reports. It is interesting to note that Review Area 1 contained the most areas of best-performance (100% A-B), as well as weakness in this sample. Areas of weakness included three moderate weaknesses, i.e. the nature of production processes (1.1.5), details of the EAP to carry out the assessment (1.1.7), and waste (1.3), and two areas of the weakest performances, i.e. the duration of different phases and the methods of obtaining quantities of waste (1.3.3).

Comparison of the strengths and weaknesses of the three regimes - RA 1

The ECA 1997 regime had some areas of strengths (8), while the NEMA 2014/17 co-regime had a few more (14), but overall the NEMA 2006/10 co-regime had the most areas of strengths (19). The NEMA 2006/10 EIRs also had the fewest areas of weakness, while the ECA 1997 EIRs had the most.

The 'weakest' areas identified in the ECA 1997 reports showed improvement, since these areas were regarded as moderately weak or not as weaknesses (0 E-F%) in the NEMA 2006/10 and NEMA 2014/17 reports, except for sub-category 1.3.3 (Table 5.5). Additionally, sub-category 1.2.3 (Duration of different phases) was an area of 'weakest' performance for all three regimes, indicating that the duration of the different phases requires more consideration. In conclusion, all three regimes had several strengths as well as weaknesses in Review Area 1, but the NEMA 2006/10 reports performed the tasks in this review area the 'best'.

5.3.2 Review Area 2: Strengths and weaknesses

The strengths and weaknesses of each regime in Review Area 2 (Impact identification and evaluation) are first discussed with the help of Table 5.7, then the strengths and weaknesses are compared across the three regimes.

Table 5.7: Strengths and weaknesses in the EIRs of each EIA regime in Review Area 2 (value in brackets is %A-B for strength or %E-F for weakness).

		ECA 1997 regime	NEMA 2006/10 co-regime	NEMA 2014/17 co-regime
Strengths		-	**2.1 Definition of impacts (90%)** 2.1.1 All possible effects on environment (90%) 2.1.2 Interaction of effects (90%)	**2.1 Definition of impacts (100%)** 2.1.1 All possible effects on environment (100%) 2.1.2 Interaction of effects (100%)
		2.2.1 Impacts identification methodology (100%)	**2.2 Identification of impacts (80%)** 2.2.1 Impacts identification methodology (90%) 2.2.2 Impact identification method used (80%)	**2.2 Identification of impacts (87%)** 2.2.1 Impacts identification methodology (87%) 2.2.2 Impact identification method used (87%)
		2.3 Scoping (83%) 2.3.1 Contact general public and special interest groups (83%) 2.3.2 Collect opinions and concerns of I&APs (83%)	**2.3 Scoping (100%)** 2.3.1 Contact general public and special interest groups (100%) 2.3.2 Collect opinions and concerns of I&APs (100%) 2.3.3 Key impacts (90%)	**2.3 Scoping (100%)** 2.3.1 Contact general public and special interest groups (100%) 2.3.2 Collect opinions and concerns of I&APs (100%) 2.3.3 Key impacts (87%)
		-	2.5.1 Significance of impact on affected community and society in general (90%)	2.5.1 Significance of impact on affected community and society in general (100%)
Weaknesses	Moderately Weak	2.1.2 Interaction of effects (16%) 2.1.3 Impacts from non-standard operating procedure (16%)	-	-
		2.2.2 Impact identification method used (16%)	-	-
		2.3.3 Key impacts (16%)	-	-
		2.4 Prediction of impact magnitude (16%) 2.4.1 Data to estimate magnitude of main impacts (16%)	**2.4 Prediction of impact magnitude (10%)** 2.4.1 Data to estimate magnitude of main impacts (10%) 2.4.2 Methods used to predict impact magnitude (10%)	2.4.3 Predictions of impact in measurable quantities (12%)
		2.5 Assessment of impact significance (16%) 2.5.1 Significance of impact on affected community and society in general (16%) 2.5.2 Significance i.t.o of national and international quality standards (16%)	**2.5 Assessment of impact significance (10%)** 2.5.1 Significance of impact on affected community and society in general (10%) 2.5.2 Significance i.t.o of national and international quality standards (10%)	-
	Weakest	2.4.3 Predictions of impact in measurable quantities (50%)	2.4.3 Predictions of impact in measurable quantities (40%)	-

ECA 1997 regime

In Review Area 2, a few areas of strengths were present, but ultimately more areas of moderate weakness were observed (Table 5.7). Only one sub-category was described as 'weakest' (≥ 25% E-F), i.e. the predictions of impact in measurable quantities (2.4.3).

NEMA 2006/10 co-regime

Several categories and sub-categories were described as strengths, with most of these obtaining 90% A-B. A few areas of moderate weakness were also noticed, but only one area was regarded as 'weakest', i.e. the predictions of impact in measurable quantities (2.4.3).

NEMA 2014/17 co-regime

Review Area 2 had numerous categories and sub-categories that were regarded as strengths (Table 5.5), and several of these were described as best performed (100% A-B). Only one sub-category of moderate weakness was present, namely the predictions of impact in measurable quantities (2.4.3).

Comparison of the strengths and weaknesses of the three regimes - RA 2

In Review Area 2, the ECA 1997 regime had the fewest strengths and the most weaknesses when compared to the two co-regimes. The NEMA 2006/10 co-regime obtained the same

areas of strength as the NEMA 2014/17 co-regime, however, the latest NEMA co-regime obtained more categories and sub-categories of best performance as well as fewer areas of weakness.

5.3.3 Review Area 3: Strengths and weaknesses

A discussion dealing with the strengths and weaknesses of each of the three regimes for Review Area 3, and the comparison of these strengths and weaknesses, follows. This discussion is supported by Table 5.8, which lists the strengths and weaknesses in Review Area 3 of each regime sample

Table 5.8: Strengths and weaknesses in the EIRs of each EIA regime in Review Area 3 (value in brackets is %A-B for strength or %E-F for weakness).

Note: no categories or sub-categories were graded as ≥ 25% E-F (weakest).

		ECA 1997 regime	NEMA 2006/10 co-regime	NEMA 2014/17 co-regime
Strengths		-	**3.1 Alternatives (80%)** 3.1.1. Description of alternative sites (80%) 3.1.3 For severe adverse impacts rejected alternatives identified (100%)	**3.1 Alternatives (87%)** 3.1.3 For severe adverse impacts rejected alternatives identified (87%) 3.1.4 Comparative assessment of all alternatives identified (87%)
		-	**3.2 Scope and effectiveness of mitigation measures (80%)** 3.2.1 Consider mitigation of all significant adverse impacts (80%) 3.2.2 Mitigation measures (80%) 3.2.3 Extent of effectiveness of mitigation when implemented (90%)	**3.2 Scope and effectiveness of mitigation measures (100%)** 3.2.1 Consider mitigation of all significant adverse impacts (100%) 3.2.2 Mitigation measures (87%) 3.2.3 Extent of effectiveness of mitigation when implemented (100%)
		-	-	**3.3 Commitment of mitigation (87%)** 3.3.1 Record of commitment to mitigation measures (100%)
Weaknesses	**Moderately Weak**	-	-	**3.1 Alternatives (12%)** 3.1.3 For severe adverse impacts rejected alternatives identified (12%) 3.1.4 Comparative assessment of all alternatives identified (12%)
		3.2 Scope and effectiveness of mitigation measures (16%) 3.2.1 Consider mitigation of all significant adverse impacts (16%) 3.2.2 Mitigation measures (16%) 3.2.3 Extent of effectiveness of mitigation when implemented (16%)	-	-
		3.3 Commitment of mitigation (16%) 3.3.1 Record of commitment to mitigation measures (16%) 3.3.2 Monitoring arrangements (16%)	-	-

ECA 1997 regime

In Review Area 3 the categories and sub-categories related to the scope and effectiveness of the mitigation measures and the commitment to mitigation, were regarded as moderately weak (Table 5.8). Additionally, no strengths or weakest categories or sub-categories were present in this review area.

NEMA 2006/10 co-regime

This co-regime has several areas of strength in Review Area 3, but only one sub-category was described as best performed (100% A-B), i.e. for severe adverse impacts rejected alternatives identified should be reconsidered (3.1.3). Additionally, no areas of moderate weakness were present in this review area.

NEMA 2014/17 co-regime

Review Area 3 was mostly comprised of areas of strength, with four areas of best performance (100% A-B). Three areas of moderate weakness were identified, i.e. alternatives (3.1), for severe adverse impacts rejected alternatives identified should be reconsidered (3.1.3), and the comparative assessment of all alternatives identified (3.1.4), all of which were also regarded as strengths.

Comparison of the strengths and weaknesses of the three regimes - RA 3

The ECA 1997 reports had no categories or sub-categories which were regarded as strengths, but the NEMA 2006/10 reports had seven, and the NEMA 2014/17 reports had nine. Additionally, the NEMA 2006/10 reports had no areas of weakness, while the NEMA 2014/17 had three areas of moderate weakness.

5.3.4 Review Area 4: Strengths and weaknesses

A discussion dealing with the strengths and weaknesses of each regime in Review Area 4 (Presentation and communication), and the comparison of these strengths and weaknesses across the three regimes follows. This discussion is supported by Table 5.9.

Table 5.9: Strengths and weaknesses in the EIRs of each EIA regime in Review Area 4 (value in brackets is %A-B for strength or %E-F for weakness).

Note: no categories or sub-categories were graded as ≥ 25% E-F (weakest).

		ECA 1997 regime	NEMA 2006/10 co-regime	NEMA 2014/17 co-regime
Strengths		**4.1 Layout of the report (100%)** 4.1.1 Introduction (83%) 4.1.2 Information logically arranged (100%)	**4.1 Layout of the report (90%)** 4.1.1 Introduction (80%) 4.1.2 Information logically arranged (100%)	**4.1 Layout of the report (100%)** 4.1.1 Introduction (87%) 4.1.2 Information logically arranged (87%)
		4.2 Presentation (100%) 4.2.1 Presentation of information (100%) 4.2.2 Technical terms, acronyms, initials defined (100%)	**4.2 Presentation (100%)** 4.2.1 Presentation of information (100%) 4.2.2 Technical terms, acronyms, initials defined (80%) 4.2.3 Statement presented as an integrated whole (90%)	**4.2 Presentation (87%)** 4.2.1 Presentation of information (100%) 4.2.2 Technical terms, acronyms, initials defined (87%) 4.2.3 Statement presented as an integrated whole (100%)
		4.3.2 Statement must be unbiased (100%)	**4.3 Emphasis (100%)** 4.3.1 Emphasis to potentially severe impacts (90%) 4.3.2 Statement must be unbiased (100%) 4.3.3 Opinion as to whether activity should/should not be authorized (100%)	**4.3 Emphasis (100%)** 4.3.1 Emphasis to potentially severe impacts (100%) 4.3.2 Statement must be unbiased (100%) 4.3.3 Opinion as to whether activity should/should not be authorized (100%)
		4.4.1 Non-technical summary of main findings & conclusions (100%)	**4.4 Non- technical summary (80%)** 4.4.1 Non-technical summary of main findings & conclusions (90%)	-
Weaknesses	**Moderately Weak**	4.1.3 Chapter summaries (16%)	4.1.1 Introduction (10%)	-
		4.3.1 Emphasis to potentially severe impacts (16%) 4.3.3 Opinion as to whether activity should/should not be authorized (16%)	-	-
		4.4.2 Summary must cover all main issues (16%)		-

ECA 1997 regime

Review Area 4 was the best performed area in terms of the ECA 1997 reports. This review area hosts several categories and sub-categories of best performance (100% A-B), i.e. layout of the report (4.1), information logically arranged (4.1.2), and presentation (4.2).

Table 5.9 shows that four areas were moderately weak (≥ 5-24% E-F), but no areas were described as weakest (≥ 25% E-F).

NEMA 2006/10 co-regime

In Review Area 4, the majority of the categories and sub-categories were described as strengths (Table 5.9). This co-regime only obtained one area of moderate weakness in this review area, namely sub-category 1.1.4 (Introduction). No areas of weakest performance were present.

NEMA 2014/17 co-regime

Numerous categories and sub-categories of strength were identified in Review Area 4, several of which were regarded as best performed (100% A-B). The EIRs of this co-regime had no areas of weakness in terms of Review Area 4.

Comparison of the strengths and weaknesses of the three regimes - RA 4

In Review Area 4, the ECA 1997 regime had eight strengths, the NEMA 2006/10 co-regime had 13 strengths, and the NEMA 2014/17 co-regime had 11 strengths. The ECA 1997 reports obtained the fewest strengths and the most weaknesses (4), since the NEMA 2006/10 co-regime had only one and the NEMA 2014/17 co-regime had none. Clearly, the NEMA 2006/10 and the NEMA 2014/17 co-regimes performed better than the ECA 1997 regime in this review area.

5.3.5 Conclusion of strengths and weaknesses

It is evident when focussing on the strengths and weaknesses of each review area of the three regimes' reports that longitudinal changes in quality have occurred. Amongst the three regimes, ECA 1997 generally had fewer areas of strength and more areas of weakness than NEMA 2006/10 and NEMA 2014/17.

A clear increase in strengths and weaknesses is present between the ECA 1997 regime and the NEMA 2006/10 co-regime, but the same cannot be said between the NEMA 2006/10 co-regime and the NEMA 2014/17 co-regime. In the NEMA 2006/10 and the NEMA 2014/17 co-regimes an increase in A-B grades, and a decrease in E-F grades is noticeable. The NEMA 2006/10 co-regime obtained more strengths across the four review areas (49), than the NEMA 2014/17 co-regime which only obtained 45 strengths. The NEMA 2006/10 reports also had more weaknesses (12), than the NEMA 2014/17 reports (9). Therefore, an increase in strengths and weaknesses is visible in terms of NEMA 2006/10. Additionally, although no increase in strengths occurred from NEMA 2006/10 to NEMA 2014/17 the areas of strength were mostly 'maintained' while the areas of weakness were reduced.

In summary the key findings are:

- 92% of the reports were of satisfactory quality.
- The ECA 1997 regime had the lowest satisfactory rating (66%A-C), while all of the NEMA regimes were rated as satisfactory.
- The descriptive and presentational tasks (Review Area 1 and 4) were generally better performed than the more analytical tasks (Review Area 2 and 3).
- More areas of strength, and fewer areas of weakness were observed.
- An improvement in quality has occurred from the ECA 1997 to NEMA 2017.

Following from the last key finding about the improvement of quality, the next section focuses on temporal change.

5.4 Discussion of temporal change

The discussion now moves from the key findings across the three EIA regimes, to a detailed discussion of the temporal change across the three regimes. This discussion deals firstly with the temporal change in the overall report quality across the three regimes, then the temporal change in review area quality across the regimes, followed by the longitudinal improvements and decrease of quality at category and sub-category level.

When comparing satisfactory grades (A-C) at the lower (category and sub-category) levels of the hierarchy across the regimes, areas of improvement or decrease in quality can be observed. Improvements or decreases at category and sub-category level were identified by using the percentage of satisfactory grades (A-C%) across all three of the regimes. The relevant categories and sub-categories, those which showed either an increase or decrease in satisfactory grades, were compiled in Table 5.10.

5.4.1 Overall Report quality – Temporal change

The results indicated that four (66%) of the ECA 1997 reports were graded as satisfactory (A-C), while all of the NEMA 2006/10 and NEMA 2014/17 reports were regarded as satisfactory. Additionally, only four (66%) of the ECA 1997 reports obtained a A-B grading, compared to eight (80%) of the NEMA 2006/10 reports and eight (100%) of the NEMA 2014/17 reports (Fig. 5.1).

5.4.2 Review Area quality – Temporal change

A steady increase in the percentage of A-B grades in Review Area 2 and Review Area 3, and the categories of these review areas is also noticeable over time (Table 5.2 and 5.3). The quality of these two review areas has improved across the three regime samples. The improvement of Review Areas 2 and 3 are crucial since these technical areas are regarded as more difficult than the descriptive areas. It has been previously acknowledged that these two

areas should be of a higher priority and carry more weight than Review Area 1 and 4, since they are more significant in influencing EIA effectiveness (Retief, 2005; Sandham & Pretorius, 2008). Increased quality of these two review areas are most likely the result of an increase in skill and experience amongst practitioners.

5.4.3 Category and sub-category level – Temporal change

Four temporal trends could be identified in Table 5.10, two of which indicate an improvement, while the remaining two trends indicated a decrease in quality. The first trend shows consistent increase in quality from the ECA 1997 regime through NEMA 2006/10 to the NEMA 2014/17 co-regime (indicated in green).

The second trend shows a net increase from ECA 1997 to NEMA 2014/17 (indicated in yellow). An initial rise in quality from ECA 1997 to NEMA 2006/10, followed by a decrease in quality from NEMA 2006/10 to NEMA 2014/17 can occur. Yellow can also indicate a decrease in quality from ECA 1997 to NEMA 2006/10, followed by an increase in quality from NEMA 2006/10 to NEMA 2014/17.

The third trend shows an initial improvement in A-C% grades from ECA 1997 to NEMA 2006/10, followed by a net decrease in quality from ECA 1997 to NEMA 2014/17 (indicated in orange). The fourth trend is indicated in red, and shows a steady decrease in quality from the ECA 1997 regime to the NEMA 2014/17.

Table 5.10: Four colour coded temporal trends indicating improvement or decrease in quality at category and sub-category level across the three regimes.

Key: Green – Steady improvement; Yellow – Net improvement
Orange – Net decrease; Red – Steady decrease

Regime	ECA 1997 EIRs	NEMA 2006/ 10 EIRs	NEMA 2014/ 17 EIRs	Regime	ECA 1997 EIRs	NEMA 2006/ 10 EIRs	NEMA 2014/ 17 EIRs
Summary of all review areas, categories and sub-categories	**A-C (%)**	**A-C (%)**	**A-C (%)**	**Summary of all review areas, categories and sub-categories**	**A-C (%)**	**A-C (%)**	**A-C (%)**
1.1 Description of the development	83	100	100	**2.4 Prediction of impact magnitude**	66	80	87
1.1.3 Presence and appearance of completed development	66	100	75	2.4.1 Data to estimate magnitude of main impacts	66	80	100
1.1.4 Nature of production processes	N/A	N/A	N/A	2.4.2 Methods used to predict impact magnitude	66	90	75
1.1.5 Nature and quantities of raw materials	50	60	75	2.4.3 Predictions of impact in measurable quantities	50	40	75
1.1.7 Details of EAP to carry out assessment	0	60	87	**2.5 Assessment of impact significance**	83	80	100
1.2 Site description	66	90	100	2.5.1 Significance of impact on affected community and society in general	83	90	100
1.2.3 Duration of different phases	66	50	37	2.5.2 Significance i.t.o of national and international quality standards	66	50	62
1.2.4 Number of workers and/or visitors	50	90	87	2.5.3 Justification of proposed methods of assessing significance	66	80	100
1.2.5 Means of transporting raw materials, products and quantities	83	80	100	**3.1 Alternatives**	83	100	87
1.3 Waste	50	80	62	3.1.1 Description of alternative sites	66 N/A (2)	80 N/A (1)	75 N/A (1)
1.3.1 Types and quantities of wastes	50	90	75	3.1.2 Description of alternative processes, design and operating conditions	83	100	87
1.3.2 Treatment, disposal and disposal routes	66	100	87	3.1.3 For severe adverse impacts rejected alternative identified	83	100	87
1.3.3 Methods of obtaining quantity of wastes	33	70	25	3.1.4 Comparative assessment of all alternatives identifies	66 N/A (1)	100	87
1.4.2 Effects occurring away from immediate affected environment	83	100	100	**3.2 Scope and effectiveness of mitigation measures**	83	100	100
				3.2.1 Consider mitigation of all significant adverse impacts	83	100	100
2.1 Definition of impacts	83	100	100	3.2.2 Mitigation measures	83	100	100
2.1.1 All possible effects on environment	100	90	100	3.2.3 Extent of effectiveness of mitigation when implemented	83	100	100
2.1.2 Interaction of effects	66	100	100	**3.3 Commitment of mitigation**	83	100	100
2.1.3 Impacts from non-standard operating procedure	83	90	87	3.3.1 Record of commitment to mitigation measures	83	100	100
2.1.4 Impacts from deviation from base-line conditions	83	100	100	3.3.2 Monitoring arrangements	83	100	100
2.2 Identification of impacts	83	90	100	4.1.1 Introduction	100	90	100
2.2.1 Impacts identification methodology	100	90	100	4.1.3 Chapter summaries	66 N/A (1)	100	100
2.2.2 Impact identification method used	83	80	87	4.1.4 External sources acknowledged	83	90	87
2.3 Scoping	83	100	100	4.2.2 Technical terms, acronyms, initials defined	100	100	87
2.3.1 Contact general public and special interest groups	83 N/A (1)	100	100	**4.3 Emphasis**	83	100	100
2.3.2 Collect opinions and concerns of I&APs	83 N/A (1)	100	100	4.3.1 Emphasis to potentially severe impacts	66	100	100
2.3.3 Key impacts	83	100	100	4.3.3 Opinion as to whether activity should/should not be authorized	83	100	100
				4.4.2 Summary must cover all main issues	83	100	100

Table 5.10 shows that the majority of the categories and sub-categories have improved (Green or Yellow). Steady improvement (Green) at category and sub-category level is the most common, specifically in terms of the tasks related to the scope and effectiveness of the identified mitigation measures, the identification of impacts, scoping, and emphasis. These improvements are encouraging since the majority of these areas fall under Review Area 2 and 3, which are more complex and generally perform poorer in comparison to Review Area 1 and 4. The categories and sub-categories which showed fluctuating improvement from the ECA 1997 reports to the NEMA 2014/7 reports (Table 5.10 – Yellow), were mostly related to the waste, and the prediction and assessment of impact significance. Future research will reveal whether the decrease from NEMA 2006/10 to NEMA 2014/17 is not the beginning of a trend.

Only two sub-categories (1.3.3 and 2.5.2) displayed the third temporal trend (Orange), which shows initial improvement but a net decrease in satisfactory grades over time. The fourth

temporal trend indicating a steady decrease in quality from ECA 1997 to NEMA 2014/17 also appeared only twice (sub-category 1.2.3 and 4.2.2) in Table 5.10.

The sub-categories which were 'not applicable' (N/A) in some reports are listed in Table 5.10, but it should be taken into consideration that the N/A reports influenced the 'temporal trend' because it reduced the number of reports with satisfactory grades. Contact with the general public and special interest groups (2.3.1) and the collection of the opinions and concerns of I&APs (2.3.2) are good examples of this influence, since the satisfactory rating for the ECA 1997 reports increased from 83% A-C to 100% for the NEMA EIRs. However, considering that Report 6 (Tamboti) was exempted from the public participation process, it caused a decrease in the satisfactory rating of these two sub-categories (N/A).

Using Table 5.10 and the four temporal trends identified, it is clear that improvement in satisfactory (A-C%) at category and sub-category level has indeed occurred across the three regimes, with limited decrease.

5.5 Conclusion

The improvement of EIR quality, and through that the effectiveness of the EIA process, is necessary since this process is required to reduce or avoid negative environmental impacts during development. The improvement of the EIR quality (effectiveness) of SANParks developments is vital, since the EIA process is implemented to assist in the prevention of adverse environmental effects during development, which ensures that conservation efforts are not threatened while promoting tourism development.

However, before this study the quality of EIA reports of SANParks had not yet been comprehensively investigated, except for preliminary work in the Kruger National Park (Huysamen, 2017; Scheepers, 2017), and therefore it could not be determined if improvement in EIR quality has occurred. By evaluating the quality of a sample of EIRs for SANParks developments, this study has now shown that the reports which influenced the decision-making process were of satisfactory quality. This evaluation also assisted in the determination of areas of strength and weakness (Section 4.3). The results revealed that the SANParks EIR quality, which was 92% satisfactory, is generally higher than EIR quality of other sectors, such as mining (85% A-C) and housing development (73% A-C) (Sandham *et al*., 2008; Mbhele, 2009). This can be ascribed to the fact that these studies evaluated the quality of reports conducted under the MPRDA and ECA regimes. The lower satisfactory grading is also reflected in the ECA 1997 results of this study. Two more recent studies, one evaluating the quality of EIRs for renewable energy projects (Boshoff, 2013), and the other the quality of EIRs of mining projects in the Limpopo province (Rampersad, 2017) found that the reports were mostly of satisfactory quality (70% A-C). These two studies both evaluated the quality of reports

conducted under the NEMA 2010 and MPRDA regimes, contradicting the quality improvement observed during this study. On the other hand, Wylie *et al.* (2018) also reviewed the quality of EIRs conducted under the NEMA 2010 regime, and found that the EIRs of tourism-related infrastructure in or near protected areas were 92% satisfactory with a higher frequency of A and B grades. These results are similar to the findings of this study, since a high satisfactory rating, as well as a high A-B% is noticeable.

In order to investigate the temporal changes, EIR quality across the five EIA regimes the samples for NEMA 2006 and 2010, and for 2014 and 2017 were grouped together and referred to as co-regimes (see Section 3.1.2 and Chapter 5 for justification). The findings revealed that despite some areas of decrease, improvement in the quality of EIRs is clearly visible over the course of the three EIA regimes. These results are in contrast to Sandham *et al.* (2013a) who found a slight decrease in quality, however, some areas of improvement (description of wastes, commitment to mitigation measures, and non-technical summary) were also observed.

Additionally, several other authors found that the overall quality of EIA reports, and therefore also EIA effectiveness, generally improve with time (Glasson *et al.*, 1997; Barker & Wood, 1999; Wende, 2002; Badr *et al.*, 2004; Canelas *et al.*, 2005; Arts *et al.*, 2012; Landim & Sánchez, 2012).

The high frequency of satisfactory and well done grades in SANParks reports, as well as the improvement in quality across the three regimes are most likely the result of the fact that each proposed project has the potential to severely affect a highly biologically diverse area, so care is taken to ensure that the information included in the report is in accordance with the EIA regulations, while also being accurate and complete. Additionally, the fact that the organisation is internationally known and acknowledged for its conservation efforts as well as eco-tourism increases the likelihood of this organisation to take additional steps to adhere to EIA regulations and prevent negative environmental impacts. Considering that environmental degradation, as well as negative publicity, can potentially affect tourism activities which will result in financial loss. In conclusion, although the quality of a sample of protected area (SANParks) EIRs shows improvement from South Africa's first EIA regime (ECA 1997) to the NEMA 2014/17 co-regime, more improvement is still possible and desirable. In the next chapter a conclusion of this dissertation is provided.

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CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

This chapter provides a conclusion of this dissertation. Firstly, the background information of this study is briefly discussed. Secondly, a brief summary of the findings is provided, structured according the objectives of this study. Lastly, the new findings are contextualised in terms of the EIR quality of SANParks and the longitudinal changes in quality, and recommendations are provided.

6.1 Background information

Environmental Impact Assessment (EIA) is one of the many tools used internationally to protect and conserve the environment from significant environmental impacts such as deforestation, biodiversity loss, pollution and land degradation. The EIA process is implemented to analyse the potentially detrimental environmental impacts associated with a proposed development, and to inform the decision-makers and other stakeholders of possible environmental threats (Wood, 2008). The EIA process promotes development, without significantly affecting the functioning and sustainability of the environment.

However, the effectiveness of EIA has been a concern amongst practitioners for many years (Barker & Wood, 1999; Christensen *et al.*, 2005), since it directly affects the extent of environmental management and protection achieved by this process. Various aspects of effectiveness have been researched internationally, including EIA report quality review. The review of EIR quality, which is done through the use of a review package, is performed to assess if the information included in the report is accurate and complete, to promote better environmental management and decision-making (Fuller, 1999; Wood, 2003; DEAT, 2004).

In South Africa, EIA has been conducted on a voluntary basis since the 1970's and became mandatory for certain activities in 1997. The EIA process has changed noticeably over the past 20 years, from the Environment Conservation Act (ECA) regime through to the fourth National Environmental Management Act (NEMA) regime of 2017. Several studies have been conducted to investigate the quality of EIRs for different sectors and provinces, using the Lee and Colley review package (Lee *et al.*, 1999). However, a limited amount of research has been done with regard to the quality of EIRs for protected areas (which are biologically and economically important), as well as the temporal change in report quality across the various regimes. Therefore, the aim of this study was to critically analyse the quality of EIA reports of developments in protected areas, using SANParks as a representative in South Africa. This aim was reached by setting two objectives (as described in Chapter 1):

1. To evaluate the quality of a sample of EIA reports for protected areas (SANParks) projects, using an adapted version of the Lee and Colley review package.

2. To compare report quality across several EIA regimes longitudinally.

The second chapter of this dissertation included a critical review of existing literature regarding the international development of EIA, as well as the development of EIA in South Africa from before the ECA 1997 regime to the NEMA 2017 regime, as well as EIA effectiveness, and finally biodiversity and protected areas in South Africa. This was done in order to gain a better understanding of the development of EIA and the South African EIA system, including its effectiveness, as a whole, as well as to highlight the importance of EIA in such a biodiversity rich country as South Africa.

Chapter 3 provided a description of the selected study area (SANParks), the data gathering process and the EIRs obtained, as well as a detailed description of the Lee and Colley review package used to assess EIR quality in the following chapters.

6.2 Objective 1: EIA report quality of SANParks

In Chapter 4, Objective 1 was addressed by analysing and discussing the quality of a sample of EIRs for SANParks developments. A total sample of 24 reports was evaluated using an adapted Lee and Colley review package. It was determined that 92% of the reports were of satisfactory quality (A-C), of which the majority were graded as generally satisfactory quality (B). (A -F scale, A-C highest to lowest level of satisfactory, and D-F being just unsatisfactory to very poor or absent – see Chapter 3). The more descriptive tasks (Review Area 1 and 4) achieved higher grades than the more analytical tasks (Review Area 2 and 3). These findings are similar to those of previous EIR quality studies, both national and internationally (Sandham & Pretorius, 2008; Sandham *et al.*, 2010; Badr *et al.*, 2004; Anifowose *et al.*, 2016).

At category and sub-category level various strengths (A-B) and weaknesses (E-F) of the EIRs were also identified, several of which were also noticed in other studies (Sandham *et al.*, 2008; Sandham & Pretorius, 2008; Mbhele, 2009; Sandham *et al.*, 2013a; Sandham *et al.*, 2013b). Identified strengths included environmental description (1.4), scoping (2.3) and layout of report (4.1), while weaknesses included waste (1.3) and the assessment of impact significance (2.5). In conclusion, it was determined that the reports were not only of satisfactory quality (achieving Objective 1), but more strengths than weaknesses were identified. This can be due to the fact that more care is most likely taken during EIA in protected areas, considering that these areas are biologically and economically important. Additionally, the high number of satisfactory EIRs suggest that the decision-making process for protected areas (SANParks) development projects were mostly based on credible and accurate information, with minor omissions and/or inadequacies, and that an improvement in report quality has occurred.

6.3 Objective 2: EIR quality longitudinally

In Chapter 5, Objective 2 was addressed by comparing the report quality of SANParks projects across various EIA regimes longitudinally, to investigate the extent of temporal changes in report quality. The small samples sizes for some regimes, and the similarities between the 2006-2010 NEMA regimes, and between the 2014-2017 NEMA regimes suggested the grouping together of these regimes, creating two broad NEMA co-regimes which aided in avoiding possible bias due to the small sample size. The ECA 1997 regime, and the two co-regimes (NEMA 2006/10; NEMA 2014/17) with sample size of respectively 6, 10 and 8, allowed for the analysis of temporal trends across a time span of 20 years.

The overall report quality was as follows: four (4B) of the six ECA 1997 reports, all ten (3 A, 4B, 3C) of the NEMA 2006/10 reports, and all eight (3A, 5B) of the NEMA 2014/17 reports were of satisfactory quality (A-C). Review Area 1 and 4 were performed better than Review Area 2 and 3. At category and sub-category level several areas of strength and weakness were identified, as well as improvements and certain decreases in quality, which followed different temporal trends. These findings revealed that report quality has improved at all four levels of the hierarchy, across the three regimes (achieving Objective 2), but that greater improvement remains possible.

6.4 Contextualisation of new findings

Firstly, the new findings in terms of the EIR quality of SANParks are contextualised, followed by the new findings of the longitudinal change in EIR quality across the three regimes.

6.4.1 Findings: EIR quality of SANParks

Biodiversity provides society with different ecosystem services, on which mankind depends to survive. Nonetheless, biodiversity loss occurs at a rapid rate, because of numerous impacts caused by anthropogenic activities. The protection and conservation of biodiversity is necessary for the survival as well as the well-being of humans. South Africa, which has a rich biodiversity, has various categories of protected areas, such as national parks, to conserve its biological diversity and prevent biodiversity loss. However, conservation is a difficult process which requires extensive financing. As a result, limited conservation resources lead to compromises between biodiversity protection and development, particularly relating to tourism.

SANParks which manages the country's national parks depends largely on tourism activities to assist in financing their conservation efforts. The need for tourism development, however, should not compromise conservation efforts. Therefore, SANParks depend on environmental management tools, such as Biodiversity Impact Assessment (BIA) and EIA to ensure that biodiversity is integrated and considered during development, planning and activities. These

tools have to be correctly and properly implemented, in order to conserve the environment. By using review packages, such as the Lee and Colley review package, the quality (effectiveness) of these tools can be assessed.

Hallatt *et al.* (2015) investigated the quality of the BIAs in the Cape Floristic Region (CFR), by using an adapted Lee and Colley review package and found that overall 73% of the reports were satisfactory. A similar study was performed by Swanepoel (2016) in the Maputaland-Pondoland-Albany (MPA) hotspot, during which it was determined that 81% of the reports were of satisfactory quality (A-C). Although several national parks are located within these two biodiversity hotspots, i.e the CFR and the MPA, the quality of the EIAs of these parks have not yet been assessed. Hence, uncertainty exists as to whether these EIAs are of satisfactory quality.

The evaluation of SANParks EIA report quality revealed a relatively high satisfactory rating of 92% A-C grades. This high satisfactory rating can most likely be ascribed to several factors, including:

- The biological importance of these areas, which requires additional care.
- The large number of people involved during developments in a national park.
- SANParks are internationally known as a leading conservation organisation, and therefore cannot afford negative publicity as a result of poor management during development.
- The national department generally has more experienced officials, and it is therefore likely that the reports submitted are of a higher standard (satisfactory quality).
- Many interested and affected parties (I&APs) involved in the public participation process are generally highly educated.
- Many of the park officials are not only highly educated but also from different specialist study fields.
- The organisation is financially dependent on eco-tourism, which in turn depends on environmental sustainability.
- SANParks' primary aim is to protect the environment; therefore, developments in any national park are intrinsically in greater harmony with the EIA process, unlike various other sectors such as mining or urban development.

Although the EIR is only a single step in the EIA process, and the quality review of EIRs is only one aspect of EIA effectiveness, the use of satisfactory quality reports still benefits SANParks.

These EIRs help SANParks to:

- Prevent or mitigate significant environmental impacts during development projects.
- Use alternative designs during development which are environmentally sustainable.
- Reduce the cost of rehabilitation and environmental clean-up after development.
- Increase tourism-related activities and accommodation, while preventing negative environmental impacts.
- Increase public involvement and participation.

It is recommended that further studies be conducted on the EIR quality of SANParks, using all EIRs from each of the 22 parks. The quality of the BIA reports of these national parks should also be evaluated to determine if the reports are of satisfactory quality. Additionally, future research should also investigate the perception of park officials regarding EIA and how this process can be improved from a national parks perspective.

6.4.2 Findings: Longitudinal change in EIR quality across the three regimes

Sandham *et al.* (2013a) evaluated the quality of a sample of EIRs conducted under the ECA 1997 regime and the NEMA 2006 regime, across a range of sectors, to determine if enhanced EIA regulations improve EIR quality. Their results revealed that a decrease in EIR quality occurred between the ECA 1997 regime and the NEMA 2006 regime, although areas of improvement were also visible. Since that study compared the quality of EIRs across the first two regimes, only three temporal trends were observed (decrease, improvement, and no change in quality). A further longitudinal study has not yet been conducted, and therefore it could not be determined if the enhanced EIA regulations resulted in a net improvement in report quality. Therefore, it was suggested that further longitudinal studies are required to determine if enhanced EIA regulations improve EIR quality.

The EIA regulations have been amended three times since then, i.e. NEMA 2010, NEMA 2014 and NEMA 2017. Revisiting the question posed by Sandham *et al.* (2013a) it appears from research reported in this study that improvement in quality has occurred in protected areas, after the implementation of the new regulations. While this improvement could be attributed to the enhancement in EIA regulations, it also likely due to an increase in the collective experience and expertise of the Environmental Assessment Practitioner (EAP) community.

It is recommended that further longitudinal studies should be conducted using larger sample sizes, to allow for the comparison of EIR quality across all five EIA regimes (ECA 1997, NEMA 2006, NEMA 2010, NEMA 2014, NEMA 2017), to further explore patterns of quality change. Additionally, future longitudinal research should also be conducted in other sectors such as mining, agriculture and renewable energy.

6.5 Concluding statement

In conclusion, this study highlights the importance of EIA and its effectiveness, specifically EIA report quality review, for protected area (SANParks) development projects. In South Africa, SANParks is a leading conservation organisation and a provider of eco-tourism, and therefore EIR quality review is important to ensure that conservation efforts are not negatively affected during development. The findings revealed that the SANParks EIRs were of satisfactory quality, with numerous areas of strength as well as areas showing improvement over time (ECA 1997 to NEMA 2017). However, report quality for protected areas (SANParks) can still be improved. Future research is also required to fill the identified gaps in the research field.

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APPENDIX A: The adapted Lee and Colley review package used for the evaluation of EIR quality of SANParks project

This package was adapter by Van Heerden (2010).

SA guidelines added/altered are in italic.

1. DESCRIPTION OF THE DEVELOPMENT, LOCAL ENVIRONMENT AND BASELINE CONDITIONS.

1.1 Description of the development: the purpose(s) of the development should be described as should the physical characteristics, scale and design. Quantities of materials needed during construction and operation should be included, and where appropriate, a description of the production processes.

1.1.1 The purpose(s) and objectives of the development should be explained, *as well as the need and desirability.*

1.1.2 The design and size of the development should be described. Diagrams, plans or maps will be necessary for this purpose.

1.1.3 There should be some indication of the physical presence and appearance of the completed development within the receiving environment.

1.1.4 Where appropriate, the nature of the production processes intended to be employed in the completed development should be described and the expected rate of production.

1.1.5 The nature and quantities of raw materials needed during both the construction and operational phases should be described.

1.1.6 *Identification of applicant, including na me, address and contact numbers.*

1.1.7 *Details of EAP to carry out environmental impact assessment, including declaration of independence and expertise of EAP.*

1.2 Site description: On site land requirements of development and duration of each land use

1.2.1 The land area taken up by the development site should be defined and its location clearly shown on a map.

1.2.2 The uses to which this land will be put should be described and the different land use areas demarcated.

1.2.3 The estimated duration of the construction phase, operational phase and, where appropriate, decommissioning phase should be given.

1.2.4 The numbers of workers and/or visitors entering the development site during both construction and operation should be estimated. Their access to the site and likely means of transport should be given.

1.2.5 The means of transporting raw materials and products to and from the site and the approximate quantities involved should be described.

1.3 Wastes: Estimated types and quantities of wastes which might be produced and proposed disposal routes to the environment described

[Wastes include all residual process materials, effluents and emissions, waste energy, waste heat, noise etc]

1.3.1 The types and quantities of waste matter, energy and other residual materials, and the rate at which these will be produced should be estimated.

1.3.2 The ways in which it is proposed to handle and/or treat these wastes and residual should be indicated, together with the routes by which they will eventually be disposed of to the environment.

1.3.3 The methods by which the quantities of residuals and wastes were obtained should be indicated. If there is uncertainty this should be acknowledged, and ranges of confidence limits given where possible.

1.4 Environment description: Area and location likely to be affected by development proposal

1.4.1 The environment expected to be affected by the development should be indicated with the aid of a suitable map of the area.

1.4.2 The affected environment should be defined broadly enough to include any potentially significant effects occurring away from the immediate construction site. These may be caused by the dispersion of pollutants, infrastructural requirements of the project, traffic, etc.

1.5 Baseline conditions: Description of effected environment as it is currently, and as it could be expected to develop if project were not to be proceed

1.5.1 The important components of the affected environments should be identified and described. The methods and investigations undertaken for this purpose should be disclosed and should be appropriate to the size and complexity of the assessment task. Uncertainty should be indicated.

1.5.2 Existing data sources should have been searched and where relevant utilized, including local authority records and studies carried out by, or on behalf of, conservation agencies and/or special interest groups.

1.5.3 Local land use plans and policies should be consulted, and other data collected as necessary to assist in the determination of the “baseline” conditions, i.e. the probable future state of the

environment, in the absence of the project, taking into account natural fluctuations and human activities.

2. IDENTIFICATION AND EVALUATION OF KEY IMPACTS

2.1 Definition of impacts: Potential impacts of development on the environment should be investigated and described. Impacts should be broadly defined to cover all potential effects on the environment and should be determined as the predicted deviation from the baseline state.

2.1.1 A description of the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project should be given.

2.1.2 The above types of effect should be investigated and described with particular regard to identifying effects on or affecting human beings, flora and fauna, soil, water, air, climate, landscape, material assets, cultural heritage (including architectural and archaeological heritage) and the interactions between them.

2.1.3 Consideration should not be limited to events which will occur under design operating conditions. Where appropriate, impacts which might arise from non-standard conditions or due to accidents should be described.

2.1.4 The impacts should be determined as the deviation from baseline conditions, i.e. the difference between the conditions which would obtain if the development were not to proceed and those predicted to prevail as a consequence of it.

2.2 Identification of impacts: Methods used for identification of all significant impacts

2.2.1 Impacts should be identified using a systematic methodology such as project specific checklists, matrices, panels of experts, consultations, etc. Supplementary methods (e.g. cause-effect or network analyses) may be needed to identify secondary impacts.

2.2.2 A brief description of the impact identification methods should be given as should the rational for using them.

2.3 Scoping: Key impacts should be identified, taking into account the views of interested parties, and main investigation centred on these.

2.3.1 There should be a genuine attempt to contact the general public and special interest groups to appraise them of the project and its implications, *including a description of the advertisement, notification in the relevant provincial gazette, newspaper (local, regional, national) on site advertisement, advertisement of public meeting and notification of availability of EIR.*

2.3.2 Arrangements should be made to collect the opinions and concerns of relevant public agencies, special interest groups and general public. Public meetings, seminars, discussing groups, etc. may be arranged to facilitate this. *Steps undertaken must be in accordance with plan of study*.

Included must be a list of registered I&AP's, summary of comments received, summary of issues raised, date of receipt of comments, response of EAP and copies of any representations, objections and comments received from registered I&APs.

2.3.3 Key impacts should be identified and selected for more intense investigation. Impact areas not selected for thorough study should be identified and the reasons why they require less detailed investigation be given.

2.4 Prediction of impact magnitude: Likely impacts should be described in exact terms where possible

2.4.1 The data used to estimate the magnitude of the main impacts should be sufficient for the task and should be clearly described or their sources clearly identified. Any gaps in the required data should be indicated and the means used to deal with them in the assessment be explained.

2.4.2 The methods used to predict impact magnitude should be described and be appropriate to the size and importance of the projected impacts.

2.4.3 Where possible should predictions of impacts be expressed in measurable quantities with ranges and/or appropriate confidence limits. Qualitative descriptions, where these are used, should be fully defined.

2.5 Assessment of impact significance: Estimation of expected significance of impacts for society. The sources of quality standards, together with the rationale, assumptions and value judgements used in assessing significance should be described.

2.5.1 The significance to the affected community and society in general should be described and clearly distinguished from impact magnitude. Where mitigation measures are proposed *an indication must be given of the degree to which the impact can be mitigated, reversed or to which the impact may cause irreplaceable loss of resources.* The significance of any impact remaining after mitigation should also be described.

2.5.2 The significance of an impact should be assessed taking into account appropriate national and international quality standards where available. Account should also be taken of the magnitude, location and duration of the impact in conjunction with national and local societal values.

2.5.3 The choice of standards, assumptions and value systems used to assess significance should be justified and any contrary opinions should be summarized.

3. ALTERNATIVES AND MITIGATION

3.1 Alternatives: Feasible alternatives should be considered. These should be outlined, the environmental implications of each presented and the reasons for their rejection briefly discussed, particularly where the preferred project is likely to have significant adverse environmental impacts.

3.1.1 Alternative sites should be considered where these are practicable and available to the developer. The main environmental advantages and disadvantages of these should be discussed and the reasons for the final choice given.

3.1.2 where available, alternative processes, designs and operating conditions should be considered and the environmental implications of these investigated and reported where the proposed project is likely to have significant adverse environmental impacts.

3.1.3 If unexpectedly severe adverse impacts are identified during the course of the investigation, which are difficult to mitigate, alternatives rejected in the earlier planning phases should be re-appraised.

3.2 Scope and effectiveness of mitigation measures: All significant adverse impacts should be considered for mitigation. Evidence should be presented to show that proposed mitigation measures will be effective when implemented.

3.2.1 The mitigation of all significant adverse impacts should be considered and where practicable, specific mitigation measures should be put forward. Any residual or unmitigated impacts should be indicated and justified.

3.2.2 Mitigation methods considered should include modification of the project, compensation and the provision of alternative facilities as well as pollution control.

3.2.3 It should be clear to what extent the mitigation methods will be effective when implemented. Where the effectiveness is uncertain or depends on assumptions about operating procedures, climatic conditions, etc. data should be introduced to justify the acceptance of these assumptions.

3.3 Commitment to mitigation: Developers should be committed to and capable of carrying out the mitigation measures and should present plans of how they proposed to do so.

3.3.1 There should be a clear record of the commitment of the developer to the mitigation measures presented in the EIR. Details of how the mitigation measure will be implemented and function over the time span for which they are necessary should be given. *The draft EMP must comply with regulations and must include specific information required by the competent authority.*

3.3.2 Monitoring arrangements should be proposed to check the environmental impacts resulting from the implementation of the project and their conformity with the predictions within the EIR. Provision should be made to adjust mitigation measures where unexpected adverse impacts occur. The scale of the monitoring arrangements should correspond to the likely scale and significance of deviations from expected impacts.

4. COMMUNICATION OF RESULTS

4.1 Layout of the report: the layout should enable the reader to find and assimilate data easily and quickly. External data sources should be acknowledged.

4.1.1 There should be an introduction briefly describing the project, the aims of the environmental assessment and how the aims are to be achieved.

4.1.2 Information should be logically arranged in sections or chapters and the whereabouts of important data be signalled in a table of contents or index.

4.1.3 Unless the chapters are very short, there should be chapter summaries outlining the main findings of each phase of the investigation.

4.1.4 Where data, conclusions or quality standards from external sources are introduced, the original source should be acknowledged at that point in the text. A full reference should be included either with the acknowledgement, at the bottom of the page or in a list of references.

4.2 Presentation: Presentation of the information should be accessible to the non-specialist

4.2.1 Information should be comprehensible to the non-specialist. Tables, graphs and other devices should be used as appropriate. Unnecessarily technical or obscure language should be avoided.

4.2.2 Technical terms, acronyms and initials should be defined, either when first introduced into the text or in a glossary. Important data should be presented and discussed in the main text.

4.2.3 The EIR should be presented as an integrated whole. Summaries of data presented in separately bound appendices should be introduced in the main body of the text.

4.3 Emphasis: Information should be represented without bias and receive the emphasis appropriate to its importance in the context of the assessment.

4.3.1 Emphasis should be given to potentially severe adverse, as well as potentially substantial favourable environmental impacts.

4.3.2 The report should be unbiased. It should not lobby for any particular point of view. Adverse impacts should not be disguised by euphemisms or platitudes.

4.3.3 *Opinion as to whether the activity should/should not be authorized.*

4.4 Non-technical summary: Clearly written non-technical summary of main findings

4.4.1 There should be a non-technical summary of the main findings and conclusion of the study. Technical terms, lists of data and detailed explanations of scientific reasoning should be avoided.

4.4.2 The summary should cover all main issues discussed, a brief description of the project and the environment, an account of the main mitigation measures to be undertaken, and any significant residual impacts. A brief explanation of the methods by which these data were obtained and an indication of the confidence which can be place in them should be included.

APPENDIX B: Raw data of the EIR sample

Key: Code – (Province/Park + Number of report from that park/Year)

Satisfactory grades: Dark green – well performed (A)/ Light green – generally satisfactory (B)/ Yellow – just satisfactory (C)

Unsatisfactory grades: Orange – just unsatisfactory (D)/ Brown – not satisfactory (E)/ Red – very unsatisfactory(F)

Regime		ECA 1997						NEMA 2006		NEMA 2010								NEMA 2014					NEMA 2017		
								NEMA 2006/10 co-regime										NEMA 2014/17 co-regime							
Code		WC/TM01/04	WC/TM02/04	LP/KNP05/06	LP/KNP06/05	LP/KNP08/04	LP/KNP10/02	WC/AG01/09	LP/KNP03/12	LP/KNP04/15	LP/KNP09/15	LP/MA02/14	NC/KT01/12	NC/TW01/15	NC/CD01/15	NC/AF01/15	EC/MZ01/15	WC/WC01/16	LP/MA01/17	LP/KNP02/16	LP/KNP07/16	NC/KT02/17	LP/KNP01/18	LP/MA04/18	LP/KN11/18
Overall Grade		D	D	B	B	B	B	C	C	A	B	B	A	B	B	A	B	A	B	B	B	A	A	B	B
1	**Description of project and environment**	C	D	A	B	A	C	B	B	A	B	B	A	B	B	A	B	B	B	B	B	A	B	B	B
1.1	Description of the development	C	D	B	A	C	C	C	B	A	B	A	B	B	B	B	B	B	B	B	B	A	A	B	B
1.1.1	Purpose and objectives	A	C	B	A	A	A	C	A	B	B	B	A	C	B	A	A	A	B	B	A	A	B	A	B
1.1.2	Design and size	A	B	A	A	A	C	A	A	A	A	A	A	B	B	A	A	C	A	A	B	A	A	B	A
1.1.3	Presence and appearance of completed development	F	E	A	B	B	B	A	A	A	A	A	A	A	B	B	B	C	A	A	D	A	A	B	D
1.1.4	Nature of production processes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	B	B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.1.5	Nature and quantities of raw materials	D	D	B	B	B	D	E	D	B	A	C	C	E	C	A	D	B	D	C	C	B	C	F	B
1.1.6	Identification of applicant	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A	A	B	A
1.1.7	Details of EAP to carry out assessment	F	F	D	F	F	D	F	D	A	B	A	C	A	D	D	A	A	A	A	A	A	A	A	F
1.2	Site description	B	D	A	B	A	D	B	B	A	B	B	B	D	B	A	C	C	B	B	B	B	B	C	A
1.2.1	Area of development site	B	B	A	A	B	B	A	A	A	A	A	A	A	B	A	A	C	A	A	A	A	A	B	A
1.2.2	Demarcation of land use areas	B	C	A	A	A	B	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A
1.2.3	Duration of different phases	C	F	A	B	A	E	D	C	A	F	D	C	F	A	B	F	D	A	F	C	D	D	F	A
1.2.4	Estimated number of workers and/or visitors	C	F	B	F	C	D	C	A	A	A	A	A	D	B	A	A	C	B	A	B	B	B	D	A
1.2.5	Means of transporting raw materials, products and quantities	B	C	C	B	A	D	B	B	C	A	B	B	D	B	B	D	B	C	B	C	B	C	C	B
1.3	Waste	E	E	B	D	A	C	D	D	B	B	B	A	B	B	B	B	B	C	B	C	B	D	D	E
1.3.1	Types and quantities of wastes	D	D	A	D	A	C	A	D	B	A	A	A	A	B	B	A	B	B	A	B	B	C	D	D
1.3.2	Treatment, disposal and disposal routes	D	D	B	B	A	B	B	B	A	B	B	B	A	A	B	B	A	A	A	B	A	B	C	D
1.3.3	Methods of obtaining quantity of wastes	F	F	C	D	B	E	F	E	B	B	C	A	C	D	C	B	D	D	C	E	C	F	F	F
1.4	Environmental description	C	B	A	A	A	B	A	C	A	A	B	A	A	B	A	A	B	A	A	A	A	A	B	A
1.4.1	Area to be affected by development	C	B	A	A	A	B	A	B	A	A	B	A	A	B	A	A	B	A	A	B	A	A	A	A
1.4.2	Effects occurring away from immediate affected environment	D	C	A	A	B	B	A	C	A	B	B	A	B	C	B	A	B	A	A	A	B	A	B	B
1.5	Baseline conditions	B	C	A	A	A	C	A	B	A	A	A	A	B	B	A	A	B	A	A	B	A	B	B	B
1.5.1	Important components of the affected environment	B	C	B	B	B	C	B	B	B	A	B	A	B	B	A	B	B	A	B	A	A	B	B	B
1.5.2	Existing data sources	A	C	A	A	A	C	A	C	A	A	A	B	B	B	A	A	A	B	A	B	A	B	B	B
1.5.3	Local land use plans, policies consulted	B	B	A	A	A	C	A	B	A	A	A	A	B	C	B	A	B	B	A	B	B	B	C	A
2	**Impact identification and evaluation**	D	D	B	C	B	C	D	C	B	B	B	B	C	C	A	B	A	C	B	C	B	A	B	B
2.1	Definition of impacts	C	D	B	B	B	B	C	B	B	B	B	B	B	B	A	B	B	B	B	B	B	A	B	B
2.1.1	All possible effects on environment	C	C	B	B	B	B	D	B	A	B	B	A	A	A	A	A	A	B	A	B	B	A	A	A
2.1.2	Interaction of effects	F	D	A	A	A	B	C	A	A	B	B	A	A	B	A	A	A	A	A	A	B	A	A	A
2.1.3	Impacts from non-standard operating procedure	C	F	C	C	C	B	C	B	C	C	C	B	C	B	A	D	B	D	B	C	B	B	B	B
2.1.4	Impacts from deviation from base-line conditions	B	C	A	D	B	C	B	B	C	B	C	B	B	B	B	C	C	B	B	A	B	B	C	B

2.2	Identification of impacts	B	C	A	D	B	B	D	B	A	A	B	A	A	C	A	A	A	B	A	C	B	A	A	A
2.2.1	Impacts identification methodology	A	B	A	B	A	A	D	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A
2.2.2	Impact identification method used	B	C	A	F	B	B	D	B	A	B	B	A	A	D	A	A	A	B	A	D	B	A	A	A
2.3	Scoping	D	B	B	B	A	B	A	A	A	A	A	A	A	B	A	A	A	B	A	B	A	A	A	A
2.3.1	Contact general public and special interest groups	A	B	A	A	A	N/A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2.3.2	Collect opinions and concerns of I&APs	A	B	B	A	A	N/A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A	B
2.3.3	Key impacts	F	B	B	C	C	B	B	B	A	B	B	A	B	C	B	B	A	B	B	C	B	A	B	A
2.4	Prediction of impact magnitude	C	E	B	C	C	D	F	C	C	C	B	B	D	C	B	C	B	D	C	C	B	B	C	B
2.4.1	Data to estimate magnitude of main impacts	A	D	C	E	C	C	F	C	C	C	B	A	D	B	A	B	A	B	C	C	B	C	C	B
2.4.2	Methods used to predict impact magnitude	A	C	A	D	B	D	F	B	A	C	B	A	A	C	B	B	A	D	B	D	A	A	B	A
2.4.3	Predictions of impact in measurable quantities	F	F	B	C	C	E	F	E	D	C	C	C	F	E	C	D	D	E	C	C	B	B	C	C
2.5	Assessment of impact significance	E	C	B	C	B	C	D	E	B	B	B	B	C	C	B	B	A	C	C	C	B	A	B	B
2.5.1	Significance of impact on affected community and society in general	E	C	B	B	B	B	B	F	A	B	A	A	A	B	A	A	B	A	B	B	A	A	A	A
2.5.2	Significance i.t.o of national and international quality standards	F	D	A	B	B	C	D	F	D	A	B	C	D	D	A	C	A	D	D	D	C	A	C	C
2.5.3	Justification of proposed methods of assessing significance	D	C	B	D	C	C	F	D	A	C	B	A	B	C	C	B	A	B	C	C	B	A	B	A
3	**Alternatives and mitigation**	**E**	**C**	**B**	**B**	**B**	**B**	**C**	**C**	**A**	**B**	**C**	**A**	**B**	**B**	**A**	**B**	**A**	**B**	**B**	**B**	**A**	**A**	**C**	**B**
3.1	Alternatives	B	D	B	C	B	A	C	A	A	A	C	A	B	B	B	B	A	A	B	B	A	A	E	B
3.1.1	Description of alternative sites	A	N/A	B	C	N/A	A	B	A	A	B	N/A	A	A	D	B	A	N/A	A	A	A	A	A	D	B
3.1.2	Description of alternative processes, design and operating conditions	C	D	B	C	A	A	C	A	B	A	C	A	B	A	A	C	A	B	B	B	A	A	D	C
3.1.3	For severe adverse impacts rejected alternative identified	B	D	A	C	B	C	B	B	A	A	B	B	B	B	B	A	A	A	B	B	B	A	F	B
3.1.4	Comparative assessment of all alternatives identified	B	D	B	C	B	N/A	C	A	A	B	C	A	A	C	B	B	B	A	B	B	A	A	F	B
3.2	Scope and effectiveness of mitigation measures	F	C	B	B	B	B	A	C	B	B	C	A	A	A	A	B	A	B	B	B	A	A	B	A
3.2.1	Consider mitigation of all significant adverse impacts	F	C	B	B	A	A	A	C	A	B	C	A	A	B	A	A	A	A	B	B	B	A	A	A
3.2.2	Mitigation measures	F	C	C	B	B	A	B	C	B	B	C	A	A	A	B	B	B	B	B	A	A	B	C	B
3.2.3	Extent of effectiveness of mitigation when implemented	F	C	B	A	B	C	A	B	B	A	B	A	A	A	A	C	A	B	A	B	A	A	B	A
3.3	Commitment of mitigation	F	B	B	B	C	B	C	C	A	B	C	B	B	C	A	A	B	B	A	B	B	A	C	B
3.3.1	Record of commitment to mitigation measures	F	B	B	B	C	B	C	B	A	B	C	B	B	C	A	B	B	B	A	A	A	A	B	B
3.3.2	Monitoring arrangements	F	C	B	B	C	B	C	C	B	B	C	B	C	C	A	A	C	B	A	B	B	B	C	B
4	**Presentation and Communication**	**C**	**B**	**A**	**B**	**A**	**A**	**B**	**B**	**A**	**A**	**B**	**A**	**B**	**B**	**A**	**A**	**A**	**B**	**B**	**A**	**A**	**A**	**B**	**B**
4.1	Layout of the report	A	B	A	B	A	B	C	B	B	A	B	A	A	B	A	B	B	B	B	A	B	A	B	B
4.1.1	Introduction	B	C	A	A	B	A	E	A	A	A	C	B	A	B	A	A	A	A	B	C	A	B	B	B
4.1.2	Information logically arranged	A	B	A	B	A	B	A	A	B	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A
4.1.3	Chapter summaries	A	A	A	F	A	N/A	A	A	B	C	A	A	C	B	C	C	A	C	B	B	C	A	C	B
4.1.4	External sources acknowledged	B	D	B	A	A	C	B	D	C	A	C	A	A	C	A	C	D	B	C	A	C	B	C	A
4.2	Presentation	B	B	A	A	A	A	B	A	A	A	A	B	A	B	A	A	A	A	C	A	A	A	A	A
4.2.1	Presentation of information	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A
4.2.2	Technical terms, acronyms, initials defined	A	B	A	A	A	A	A	A	A	A	B	C	A	C	B	B	A	A	D	A	A	A	A	A
4.2.3	Statement presented as an integrated whole	C	C	A	B	B	B	C	B	A	A	A	A	A	A	A	A	A	B	B	A	A	B	B	A
4.3	Emphasis	D	B	A	C	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
4.3.1	Emphasis to potentially severe impacts	E	D	A	B	B	A	B	C	A	A	A	A	A	B	A	A	B	A	A	A	A	A	B	A
4.3.2	Statement must be unbiased	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
4.3.3	Opinion as to whether activity should/should not be authorized	C	A	A	F	A	B	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A
4.4	Non- technical summary	C	C	A	A	A	A	B	C	A	B	B	A	C	A	A	A	A	B	C	B	A	A	B	C
4.4.1	Non-technical summary of main findings & conclusions	A	B	A	A	A	A	A	B	A	B	B	B	C	A	A	A	A	A	C	B	A	A	A	C
4.4.2.	Summary must cover all main issues	E	C	A	B	B	A	C	C	B	A	B	A	C	B	A	B	A	B	C	B	A	B	C	C