

The quality and effectiveness of Environmental Management Frameworks (EMF) in South Africa

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LIST OF ABBREVIATIONS

AMD	→	Acid Mine Drainage
CBA	→	Cost Benefit Analysis
CEA	→	Cumulative Effects Assessment
DACE	→	Department of Agriculture Conservation and the Environment
DEA	→	Department of Environmental Affairs
DEAT	→	Department of Environmental Affairs and Tourism (<i>old department</i>)
DM	→	District Municipality
DMR	→	Department of Mineral Resources
DPKSLM	→	Dr Pixley ka Seme Local Municipality
DSoE	→	Desired State of the Environment
DST	→	Decision Support Tool
EA	→	Environment Assessment
EFA	→	Environmental Feasibility Assessment
EIA	→	Environmental Impact Assessment
EMF	→	Environmental Management Framework
EMP	→	Environmental Management Plan
ERA	→	Environmental Risk Assessment
ESM	→	Environmental Sensitivity Map
GDARD	→	Gauteng Department of Agriculture and Rural Development
GIS	→	Geographic Information System
GR	→	Garden Route
IDP	→	Integrated Development Plan
IEM	→	Integrated Environmental Management
KPA	→	Key Performance Areas
KPI	→	Key Performance Indicators
LCA	→	Life Cycle Assessment
LM	→	Local Municipality
MEC	→	Member of the Executive Council
MLM	→	Madibeng Local Municipality
MPA	→	Magaliesberg Protection Association
MPE	→	Magaliesberg Protected Environment
NEMA	→	National Environmental Management Act
NWDACE	→	North West Department of Conservation
PKSLM	→	Pixley ka Seme Local Municipality
RSA	→	Republic of South Africa
SA	→	Sustainability Assessment
SDF	→	Spatial Development Framework
SEA	→	Strategic Environmental Assessment
S.E.F.	→	Strategic Environmental Focus

SIA	→	Social Impact Assessment
SPLUMA	→	Spatial Planning and Land Use Management Act
ToR	→	Terms of Reference
WDM	→	Waterberg District Municipality
WRDM	→	West Rand District Municipality
UNESCO	→	United Nations Educational, Scientific and Cultural Organization

ABSTRACT

We live in an era of increasing global environmental and sustainability challenges. One way of dealing with these challenges has been the development and application of strategic level environmental management tools, such as Environmental Management Frameworks (EMFs), which is a uniquely South African tool applied since the early 2000's. However, our understanding of the quality and effectiveness of EMF is lacking. Therefore, the aim of this research is to evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice. This is achieved through an evaluation research approach applying mixed methods, which include both a survey and multiple case study reviews. The survey results show that to date 65 EMFs have been conducted at various different scales and contexts. The case study review revealed that both EMF quality and effectiveness performed poorly. The main areas where EMF quality could improve relate to the planning and scoping of EMF projects, the involvement of stakeholders in the EMF development process, the management of spatial data used in EMF analysis, the use of scientifically sound spatial analysis techniques and the drafting of clear management guidelines. In terms of effectiveness it was found that EMFs could improve on the manner in which implementation is planned for and the building of capacity amongst stakeholders responsible for implementing and using the EMF. Based on the quality and effectiveness results a conceptual framework is proposed to improve EMF practice, after which recommendations are made for further research.

Key words: Environmental management frameworks, strategic environmental management, evaluation, quality, effectiveness.

OPSOMMING

Ons leef in 'n era wat gekenmerk word deur toenemende globale omgewings en volhoubaarheid uitdagings. Een manier om hierdie uitdagings te hanteer, is deur die ontwikkeling en toepassing van omgewingsbestuursmeganismes op strategiese vlak. Een so 'n meganisme is die plaaslik ontwikkelde omgewingsbestuursraamwerk (OBR) wat sedert die 2000's in Suid-Afrika toegepas word. Die gehalte en doeltreffendheid van OBR ontwikkeling en toepassing in Suid-Afrika is egter nie bekend nie. Hierdie navorsing het daarom die gehalte en doeltreffendheid van OBR in Suid-Afrika geëvalueer in 'n poging om OBR praktyk te verbeter. Die eersgenoemde is uitgevoer d.m.v. 'n evaluasienavorsing benadering wat gebruik maak van gemengde-metodes wat beide opnames en multi-gevallestudie evaluasie insluit. Die opname resultate het getoon dat daar reeds 65 OBR op verskillende skale en binne verskillende kontekste ontwikkel is. Beide OBR gehalte en doeltreffendheid het swak prestasie getoon. Die belangrikste gebiede waar OBR gehalte kan verbeter het betrekking op die beplanning en bestekopname van OBR projekte, die betrokkenheid van belanghebbendes in die OBR ontwikkelingsproses, die bestuur van ruimtelike data wat gebruik word in OBR analise, die gebruik van wetenskaplik geskikte ruimtelike analitiese tegnieke en die opstel van duidelike bestuursriglyne. Ten opsigte van doeltreffendheid is bevind dat OBR kan verbeter op die wyse waarop beplan word vir die implementering en die bou van kapasiteit onder belanghebbendes verantwoordelik vir die implementering en die gebruik van die OBR. 'n Konseptuele raamwerk, gebaseer op die gehalte en doeltreffendheidsresultate, word voorgestel om OBR praktyk te verbeter en voorstelle word gemaak vir verdere navorsing.

Sleutelwoorde: Omgewingsbestuursraamwerk, strategiese omgewingsbestuur, evaluasie, gehalte, doeltreffendheid.

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Psalm 115:1 (NIV)

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CHAPTER ONE

INTRODUCTION

1.1. Introduction

The earth is presently finding itself in an era where human activities are increasingly modifying the global environment – a geological epoch referred to as the ‘Anthropocene’ (see Crutzen, 2002; Steffen *et al.*, 2015a, 2015b). This era is characterised by a constant increase of human-induced impacts on global natural systems such as water, air and biodiversity. According to the 5th Global Environment Outlook report (UNEP, 2012:xvii):

“...humans have long been aware of the effects of their activities on the local environment [but] only in the last few decades has it become apparent that these activities can cumulatively affect the global environment.”

In response, the global environmental problems have resulted in global and local action, especially in relation to responsive policy interventions, which have further led to legislative reform and the introduction of various policy implementation instruments. South Africa, like many other nations, has set a course to address environmental issues through policy and related instruments. According to the 2013 South African environment outlook (South Africa, 2012a:1):

“...it is becoming evident that concerns around environmental matters are now mainstreaming in terms of political and business decision making. Environmental impacts are no longer a peripheral issue, but as shown in South Africa’s most recent (2012) National Development Plan (NDP): Vision 2030, environmental issues are included as part of the development agenda. It is recognition of the inter-connectedness and interdependence of the natural environment, human well-being and the economy.”

Dealing with the inter-connectedness of issues is however no easy task. One way of dealing with multiple inter-connected issues, within the South African context, has been through the development and application of strategic tools such as strategic environmental assessments (SEA), biodiversity conservation plans, environmental outlooks, spatial development frameworks (SDF), municipal open space plans, and more recently environmental management frameworks (EMF). However, the quality of these tools as well

as the extent to which they are having an effect has rarely been evaluated (Kidd and Retief, 2009:1031-1047), with the possible exception of SEA (see Retief 2007b; Retief *et al.*, 2008).

1.2. Problem statement and research aim

The concept of environmental management frameworks (EMFs) was first introduced in South Africa in the late 1990's as part of the integrated environmental management (IEM) procedure. It was initially envisioned as a tool that would be used to manage activities and developments within specific geographical areas by indicating the types of activities that would be permissible in certain areas and those that would not (Heydenrych & Claassen, 1998:23). Although some aspects of EMFs have evolved quite significantly since the introduction of the concept, its central purpose – which is to inform decision making at both the project and the strategic levels – has stayed unchanged (South Africa, 2012b:3). However, the extent to which EMFs have been achieving the aforementioned has never been empirically evaluated. Considering the lack of knowledge on the performance of EMF and considering that the South African Department of Environmental Affairs (DEA) in 2014 initiated the drafting of a new 'Environmental Management Framework Strategy' aimed at improving the implementation and use of EMFs in South Africa, the need for an empirical evaluation of the quality and effectiveness of EMFs is not only necessary, but also timely. Based on the problem statement the aim of this research is:

'...to evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice.'

1.3. Research questions

In order to achieve the research aim described in the previous section, five different research questions are formulated as reflected in **Table 1.1**. Therefore, this research engages with a set of clearly formulated, explicit and researchable questions guiding the enquiry. These questions guide the process of data capturing and analysis and will also determine the types of methods used (Rule & John, 2011:25; Gray, 2014:56; Miles *et al.*, 2014:25). The research questions were informed by theory, practice and policy (Rule & John, 2011:2-3) as discussed in **Chapters 2 and 3**. Questions 1 and 2 provide the basis for the design of the research, design of the methodology and specifically the evaluation criteria as well as the selection of case studies. Questions 3 and 4 explicitly deal with the first part of the research aim focussing on quality and effectiveness, while question 5 addresses the second part of the research aim which is to improve

practice. The link between research questions, methods and chapters are dealt with in **Section 2.2, Table 2.1.**

Table 1.1: Research questions

Question	
1	What is an environmental management framework?
2	What is the status and extent of environmental management frameworks in South Africa?
3	What is the quality of EMFs?
4	What is the effectiveness of EMFs?
5	What are the factors influencing the quality and effectiveness of EMFs?

1.4. Research approach

In light of the research aim and questions described in the previous sections, it is evident that this research requires an approach that deals with the evaluation of a real world phenomenon within its real word setting. A literature review of research approaches (see Ruane, 2005; Hart, 2009; Rule & John, 2011; Yin, 2014) suggests that evaluation research is a particularly suitable approach. Evaluation research is the process of determining whether a phenomenon – usually a social intervention such as a plan or programme – has been effective and produced the desired results. There are numerous examples where the evaluation approach has been applied specifically to the evaluation of the effectiveness of policy instruments (see Deming, 1983 and Arthur & Cox, 2014).

In its simplest form ‘evaluation’ can be defined as the process of determining the merit, worth, value or effectiveness of something (Rossi *et al.*, 2004:2). However, evaluation in itself is not necessarily a research method, but should rather be viewed as a research approach in which a number of research methods such as interviewing or documentation analysis can be applied (Rossi *et al.*, 2004:28; Babbie, 2011:368). Evaluation research has often been used to inform policymaking (Brewer 1983:16) and according to Weiss (1972:3) should produce objective evidence that can be used to inform and facilitate intelligent decision-making (Edwards *et al.*, 1983:140). For this evidence to be produced, knowledge of the goals and objectives against which effectiveness can be measured must be available (Brewer, 1983:18; Deming, 1983:94). These goals and objectives, *i.e.* criteria or outcomes (Babbie, 2011:362-363), against which

quality and effectiveness will be measured are not universal and must be established for the specific phenomenon that is being evaluated and viewed within the context within which that phenomenon operates (Rossi *et al.*, 2004:18-32). In this research an evaluation research approach was applied to evaluate both the quality and the effectiveness of EMFs in South Africa – a topic on which very little information exists – with a view to improve EMF practice. A more detailed discussion on the research design and methodology is presented in **Chapter 2**.

1.5. Thesis structure and chapter layout

The study consisted of five phases which are documented in eight chapters as illustrated in **Figure 1.1**. The following sections describe these five phases.

1.5.1. Phase 1: Research design and methodology

The success of any research study is hinged on the quality and logic of the methods used throughout the study. Careful planning and design is therefore vital to ensure successful data capturing, analysis and interpretation. Phase one entailed the design of the study which involved reflecting on different research approaches, theoretical frameworks and methodological approaches as well as the development of a review protocol. **Chapter 2**, which is titled '*Research design and methodology*' documents the research design process and reflects on the different methods that were used to answer the research questions.

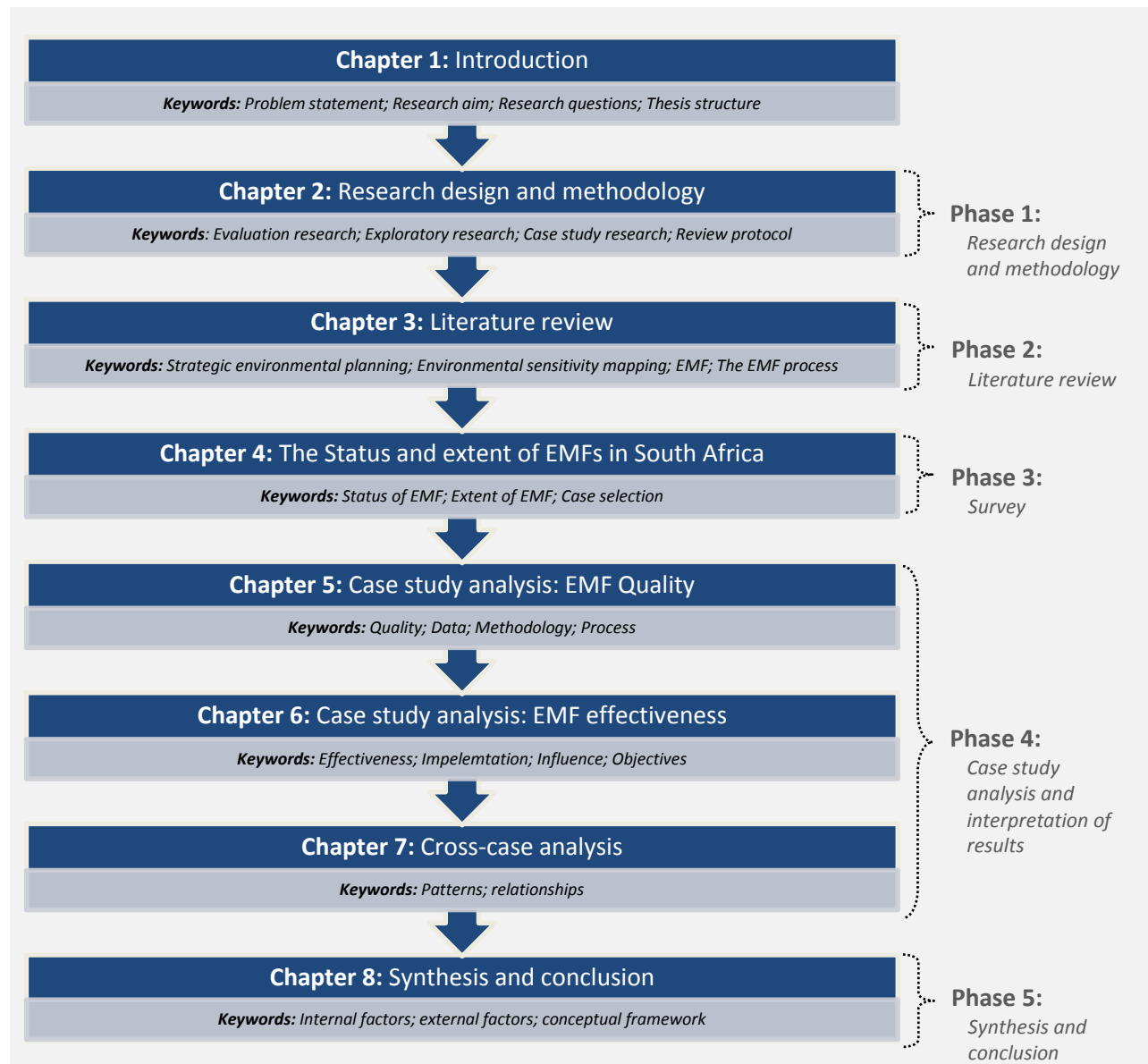
1.5.2. Phase 2: Literature review

The analysis of existing knowledge of legal frameworks, policy frameworks and current research form the theoretical foundation on which a research study builds. Phase two involved an analysis of published research reports, legislation and policy documents to establish the baseline of knowledge of EMFs and subsequently identify possible information gaps. The aim of the literature review was to gain a better understanding of EMF and its different components and also gauge how it relates to environmental management in the international context. The literature review which is titled '*Literature review*' is documented in **Chapter 3**.

1.5.3. Phase 3: Survey

Phase three involved a survey of all EMFs conducted in South Africa in the period 2003 - 2015. Data on the number of EMFs conducted as well as their legal status were discussed along with many other attributes informing on the status and extent of EMF. The survey findings are reported in **Chapter 4** which is titled '*The status and extent of EMFs in South Africa*'.

Figure 1.1: Thesis structure



1.5.4. Phase 4: Case study analysis and interpretation of results

Upon finalization the review protocol was applied to six case studies. Phase four entailed the evaluation of the quality and effectiveness of EMFs in South Africa and the findings were documented in three chapters. The first two chapters were **Chapters 5** and **6** which are titled ‘Case study analysis: EMF quality’ and ‘Case study analysis: EMF effectiveness’ respectively. The two chapters report on the quality and effectiveness of each EMF case study evaluated. The third chapter – **Chapter 7** – which is titled ‘Cross-case analysis’ apply a comparative analysis approach to identify possible patterns and relationships related to

the development and application of EMF. These patterns and relationships are used to identify the key factors influencing EMFs practice in South Africa.

1.5.5. Phase 5: Synthesis and conclusion

The key factors identified in **Chapter 7** were finally discussed in the context of a conceptual framework for EMFs. All the findings were synthesised and closing remarks and arguments formulated. The conceptual framework and the final remarks are documented in **Chapter 8** which is titled '*Synthesis and conclusion*'.

1.6. Concluding remarks

Having introduced the problem statement, research aim, research questions, research approach and the structure of the thesis, the next chapter describes the research methodology. Of particular importance in the next chapter is the outline of the research design which assists the reader to navigate the thesis by clearly linking the research aim and questions with the research methods, process and chapters (see **Table 2.1**).

CHAPTER TWO

RESEARCH DESIGN AND METHODOLOGY

2.1. Introduction

This chapter describes and justifies the methodological design for the research and moves on from the discussion on the research approach introduced in **Section 1.4**. As an introduction to the chapter the methodological design of other similar studies specifically related to EMF is briefly reflected on in order to extract learning if relevant. To date only two studies have been conducted that focussed on aspects of EMF performance (see Marias *et al.*, 2014 and Mtolo, 2010). Marais *et al.* (2014) report on the quality of EMFs by reviewing the documentation for seven case studies. The study however neglected to investigate and provide adequate detail on key quality considerations such as the conceptualisation and delineation of management zones, the structuring of the public participation processes, the visioning of the desired state of the environment, the legal context within which the EMF will operate, the training of key role-players and the extent to which the *status quo* was analysed and discussed. The review protocol applied in the Marais *et al.* (2014) study, although providing valuable insights into EMF report quality, was not sufficient for an analysis of the complete EMF development process. The second study, which was conducted by Mtolo (2010), evaluated the perceptions and expectations of stakeholders involved in the development of EMFs as an indicator for effectiveness. The study focussed on EMFs that were being developed at the time and therefore did not consider the performance of implemented EMFs as is the aim of this research. As a result of the lack of research covering both the quality and effectiveness evaluation of EMFs a blueprint for the research design was not available for use in this study.

Chapter 2 outlines the research design that was developed to deal with the research aim and research questions discussed in **Chapter 1**. **Section 2.2** presents the research design and describes the link between the research aim and questions, methods, research process and chapter layout. The section provides an important reference point for the navigation of the thesis by the reader. This is followed by a description of the literature review and survey in **Sections 2.3** and **2.4**. The methodical approach and methods related to the case study evaluation as well as a discussion on the review protocol and related criteria are described in **Section 2.5**.

2.2. Research design

Yin (2009:24) defines the research design as the logic linking the data to be collected to the research questions of the study, *i.e.* the process the researcher will follow to successfully answer the research questions (Hesse-Biber & Leavy, 2006:57). It is therefore important that every research study must have a well-planned research design. However, before discussing the research design and methods adopted for this study, the basic concepts of research and knowledge construction are discussed.

In broad terms evaluation research, which is the approach followed for this research as introduced in **Section 1.4**, can apply either quantitative or qualitative methods or a combination of both. Quantitative research is often credited as 'hard science' while qualitative research is referred to as 'soft science' (Gillham, 2000:10; Gherardi & Turner, 2002:81) giving the impression that quantitative research is more legitimate than qualitative. However, qualitative research, although not as old as quantitative (Rule & John, 2011:60), has proven itself a valuable approach to research in which both exploratory and descriptive knowledge can be generated (Hesse-Biber & Leavy, 2006:5). Ultimately, qualitative and quantitative approaches are two different, but equally legitimate (Smith & Heshusius, 1986:4) approaches of asking questions and generating knowledge (Hesse-Biber & Leavy, 2006:5-12). One of the biggest distinctions between quantitative and qualitative research is that qualitative research is more concerned with evaluating text and words as opposed to numbers in quantitative research (Flick, 2007a:2). The combination of these two approaches into mixed-methods research has been a longstanding academic debate with strong arguments made in favour of, as well as against the idea (Smith & Heshusius, 1986:4-12; Howe, 1988:10-16; Sale *et al.*, 2002:43-53; Johnson & Onwuegbuzie, 2004:14-15). Flick (2007a:7-8) explains that the mixed-methods research approach aims to make an end to the historic feud (Johnson & Onwuegbuzie, 2004:14) between quantitative and qualitative research by establishing pragmatic links between the two approaches and emphasizing and utilizing the strengths of each. Plowright (2011:3) goes as far as to say that the use of the terms quantitative and qualitative should be avoided altogether and that a new approach embracing integrated methodologies should be adopted, *i.e.* the so-called 'third methodological movement' referred to by Tashakkori and Teddlie (2003:ix) which according to Johnson *et al.* (2007:112-123) can be defined as:

“...the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breath and depth of understanding and corroboration.”

Babbie (2011:375) supports the use mixed-methods when following the evaluation research approach and due to the evaluative nature of this research, a mixed-methods design was applied. However, the manner in which the integration between qualitative and quantitative methods transpires should be carefully considered and well planned (Morgan, 2014:4-5). The aforementioned is echoed by Flyvbjerg (2006:242) who argues that research should be problem driven and not methods driven, *i.e.* the method most suited to answering each research question should be selected (Gillham, 2005:8). This research agrees with the views of both Flyberg (2006) and Gillham (2005) and therefore the research aim and questions described in **Chapter 1** guided the selection of research methods. The structure of **Table 2.1** read from left to right demonstrates this view, where the research questions guide the design of the method, process and structure of the thesis.

Table 2.1: Research design

Research Question	Method	Phase	Chapter
Q1 - What is an environmental management framework?	Literature review	Phase 2-1: Clarify the purpose and objectives of EMFs in South Africa	Chapter 3: Literature review
		Phase 2-2: Understanding EMF	
Q2 - What is the status and extent of environmental management frameworks in South Africa?	Survey	Phase 3-1: Determine the status and extent of EMFs in South Africa	Chapter 4: The status and extent of environmental management frameworks in South Africa
Q3 – What is the quality of EMFs?	Case study research: - Documentation reviews - Data and methodology review - Interviews	Phase 4-1: Determine the data and methodological requirements for developing an EMF	Chapter 5: Case study analysis: EMF quality
Q4 – What is the effectiveness of EMFs?		Phase 4-2: Assess the ‘real world’ effect that EMFs are having	Chapter 6: Case study analysis: EMF effectiveness
Q5 - What are the factors influencing the quality and effectiveness of EMFs?	Case study research: - Within-case analysis - Cross case analysis	Phase 4-3: Critically evaluate the <i>status quo</i> of Environmental management frameworks in South Africa	Chapter 7: Cross case analysis
		Phase 5-1: Synthesis and conclusion	Chapter 8: Synthesis and conclusions

The suitability of a research method or combination of research methods for answering a specific research question also determines the validity and reliability of the results. Validity involves constantly questioning whether the method being used is really measuring that which it should, *i.e.* how valid or credible are the data, while reliability contemplates whether a methodology would generate the same results if the same phenomena was measured several times, *i.e.* how dependable are the techniques being used (Babbie, 2011:414-415; Grosseohme, 2014:111-112). The concepts of validity and reliability were considered throughout this research in an effort to ensure the reliability of the data capturing process which is discussed further in the following sections related to each method. The different research methods that were applied to each research question are shown in **Table 2.1**. These methods are subsequently discussed and explained in the light of the applicable question/s.

2.3. The literature review

A literature review is a systematic process of analysing the existing body of knowledge on a topic (Fink, 2010:3). This process of critically evaluating a selection of documents containing information, ideas, data and evidence related to the topic being studied (Hart, 2009:13-26) ensures that existing knowledge is thoroughly understood and the proposed research questions are contextualised within the existing knowledge base (Booth *et al.*, 2012:1; Hart, 2009:26-27; Jesson *et al.* 2011:10). Furthermore, the literature review also serves as a methodology (Jesson *et al.* 2011:10) aimed at answering some of the research questions being asked (Fink, 2010:162) and therefore not only justifies the credibility or desirability of a specific research question but also answers some of them (Hart, 2009:16). In this light, the literature review can be regarded as the backbone of any research study and is vital to its success.

A particular feature of the literature review for this thesis is the context specific nature of the phenomenon under investigation namely EMF. EMF, although well developed and applied within the South Africa context does not have an explicit international reference and understanding. Therefore the coverage of explicit comparable international literature is less than it would have been for other related concepts for which a rich body of international literature exists, such as SEA, EMS, EIA, etc. The literature review first investigated the concepts of environmental management and integrated environmental management (see **sections 3.2 – 3.4**) followed by a discussion on the conceptual foundations of EMF (see **section 3.5**). These discussions provided the necessary foundation for the discussion of the characteristics and purpose of EMF (see **sections 3.6 and 3.7**) as well as the relationship between EMF and other integrated environmental management tools (see **section 3.8**). The purpose of the literature review was not so much to ‘take stock’ (Booth *et al.*, 2012:7) of what has been done and identify an applicable niche –

as EMF has not been extensively researched in South Africa and very few publications exist – but rather to answer the specific question:

“What is an environmental management framework?”

- Research question 1 -

The answering of this question also underpins the context specific design of the review protocol and related indicators. The literature review involved a comprehensive search of online academic databases, library catalogues, government databases and legal inventories using various keywords related to EMF. Other key documents not identified through keywords were accessed by following the ‘chain of evidence’ in reference lists of various publications, books and reports. An approach of information literacy, described by Booth *et al.* (2012:53-125) as the skill of evaluating information and recognising when it is critical and needed, was applied to assist in the identification of key sources relevant and crucial to this research.

2.4. Survey

A survey is a systematic method of gathering information on a specific phenomenon for the purpose of examining or describing the phenomenon being studied (Groves *et al.*, 2009:2). Understanding the status and extent of EMF practice is required in order to provide a total population from which to select case studies for the quality and effectiveness review, hence the following research question:

“What is the status and extent of environmental management frameworks in South Africa?”

- Research question 2 -

A number of different surveying methods, as described in the literature (Fowler, 2009:69-85; Groves *et al.*, 2009:32-41), had to be applied due to the lack of a complete central EMF database in South Africa. As a point of departure a partial EMF database was obtained from the South African National Department of Environmental Affairs (DEA). This database was further populated through short interviews with key government officials involved in the development of EMFs in South Africa (see **Annexure A**). These interviews assisted in determining the extent to which EMFs have been developed in South Africa. To verify the comprehensiveness of the database compiled through the survey (**Annexure B**), provincial and national gazettes were reviewed for evidence on adopted and published EMFs. In terms of EMF regulations (South Africa, 2006a:55; South Africa, 2010:194) an EMF will come into effect once it has been formally approved and published in either a provincial or national gazette. In addition to the evidence on

adopted and published EMFs a general internet search and brief interviews with 14 other stakeholders (government officials and consultants) was conducted to verify the results (see **Annexure A**).

The outcome of the survey was the identification of 65 EMFs developed to date (2015) in South Africa which are described and analysed in **Chapter 4**. The combination of survey methods provides confidence that a saturation point has been reached and that the existence of more EMFs is unlikely.

2.5. Case study research

Evaluation research approaches commonly use case studies, especially when context is an important consideration in the research design (see Miles & Huberman, 1994; Sturman, 1997; Swanborn, 2010; Yin, 2014). Case study research is not a research method *per se*, but rather a research focus (Rule & John, 2011:5) in which a variety of methods are applied (Thomas, 2011:9-43). The aim of case study research is to develop a better understanding of the effect that some sort of social phenomena such as a policy, plan, decision or programme has or had (Schramm, 1971:6; Yin, 2009:15) and can involve the investigation of a single case or multiple cases (Gillham, 2000:1; Simons, 2009:4). As a result of the aforementioned a multiple case study approach was suitable to this research which was aimed at evaluating the quality (**Chapter 5**) of EMFs as well as the effect (**Chapter 6**) that they were having.

One of the biggest advantages of case study research is that it can deal with a wide variety of evidence including documentation, interviews and observations (Yin, 2009:11). It further promotes the development of novel theory that is testable and empirically valid, but can lead to complex results that might be rather biased if not interpreted correctly (Eisenhardt, 2002:29-30). This emphasises the importance of ensuring the integrity of the study by carefully designing the methodological pathway to be followed, *i.e.* the careful selection of data capturing and analysis protocols and methods for use in the study (Thomas, 2011:71; Yin, 2009:3). In the following paragraph, the selection of cases is discussed, followed by discussions on the development of a review protocol and the different methods that were used to generate data through the application of the review protocol.

2.5.1. Selection of cases

A total of seven cases were selected from the survey results presented in **Annexure B** and discussed in **Chapter 4**. One of these cases was used as a pilot case to test and refine the case study review protocol discussed in **Section 2.5.2**, while the remainder were used to answer research questions 3 – 5 through the application of the finalised review protocol. Case selection can be done in a number of ways ranging from random selection to selection on theoretical grounds (Swanborn, 2010:50-52). This research employed

the latter and relied on theoretical sampling, rather than statistical or random sampling (Eisenhardt, 2002:12-13). Theoretical sampling allows the user to select a sample of cases based on certain theoretical considerations, *i.e.* selection criteria (Rule & John, 2011:13) specific to the concept being studied (Eisenhardt, 2002:13). The theoretical sampling was done by applying the concept of ‘replication logic’ (Yin, 2003:32) which argues that the results obtained from selected cases could be expected to replicate under similar conditions and within similar contexts. The selection criteria that were applied for the selection are now discussed, followed by a list of the seven cases that were selected.

2.5.1.1. Selection criteria and selected cases

Various considerations, such as the operational scale of an EMF, its implementation status and the availability of information on the EMF were included as part of the EMF case study selection criteria. A total of seven selection criteria were developed and are discussed and justified in **Table 2.2**. Six case studies were selected through the application of the criteria (which excluded the pilot case). The pilot case was selected due to the researcher’s familiarity and involvement in the case, however due to this familiarity and to avoid potential bias (Babbie, 2011:416) the pilot case was excluded from the selected sample of cases that were used for further analysis. **Table 2.3** lists the seven cases, which are discussed in more detail in **Section 4.4**.

Table 2.2: Selection criteria

Criterion	Description	Justification
Criterion 1	Selected cases should be representative of the different scales (district municipal, local municipal and regional) at which EMFs are being developed in South Africa.	EMFs are developed at three spatial scales in South Africa. There are some differences in the way that these different types of EMFs are developed and used and therefore the selection of EMFs should include EMFs at each of these different scales.
Criterion 2	Selected cases should be representative of the different provinces in South Africa and only one case per province should be selected.	South Africa consists of nine diverse and unique provinces. In an effort to represent some of this diversity (especially ecological diversity), EMFs should be selected from different provinces.
Criterion 3	Selected cases should be finalised and adopted.	Some of the EMF projects in South Africa have never been finalised and therefore the products can’t be used effectively. For an EMF to be considered it should be finalised and adopted by the relevant authority.
Criterion 4	Selected cases should have had at least two years to be implemented.	One of the aims of this research is to evaluate the effectiveness of EMFs in South Africa. To investigate the effectiveness of an EMF it must be in use, <i>i.e.</i> it must be adopted. Therefore

Criterion	Description	Justification
		EMFs should be at least two years old (starting at the date of adoption) to be considered for selection.
Criterion 5	Selected cases should be representative of a variety of consultants and as far as possible only one case should be selected per consultancy.	Consultants follow different approaches when developing EMFs. In an effort to cover the extent of approaches being applied, EMFs from different consultants should be included.
Criterion 6	The following documentation should be available for selected cases: <ul style="list-style-type: none"> • <i>Status quo report;</i> • <i>Desired state of the environment reports; and</i> • <i>Final EMF report.</i> 	As stated, some of the EMF projects in South Africa are still in process (see Criterion 3). It is therefore important to ensure that all the necessary documentation is available for the selected cases.
Criterion 7	Spatial data should be available in an accessible GIS format for selected cases.	To assess the quality of EMFs it is necessary to evaluate the spatial datasets used in the different EMFs. Access to spatial data in a GIS format is therefore critical.

Table 2.3: Selected cases

Case #	Name	Operational scale	Province	Status	Implementation year	Consultancy (lead)
1	Waterberg District Municipality EMF	District Municipal	Limpopo Province	Adopted and Gazetted	2011	Environomics
2	West Rand District Municipality EMF	District Municipal	Gauteng Province	Adopted and concurrence granted	2013	BKS Group
3	Madibeng Local Municipality EMF	Local Municipal	North West Province	Adopted and Gazetted	2011	S.E.F.
4	Dr Pixley Ka Seme Local Municipality EMF	Local Municipal	Mpumalanga Province	Adopted and Gazetted	2012	BKS Group and SRK Consulting
5	Garden Route EMF	Regional	Western Cape Province	Adopted and Gazetted	2011	Earth-Inc Consulting
6	Cannon Rocks to Great Kei River Mouth EMF	Regional	Eastern Cape Province	Adopted	2010	SRK Consulting
Pilot case						
7	Magaliesberg Protected Environment EMF	Regional	North West Province	Adopted and Gazetted	2009	K2M Consulting and North-West University

2.5.2. Review protocol

The review protocol is the framework facilitating data capturing and enquiry by defining the procedures and methods that should be followed when evaluating individual cases. A well designed and thoroughly tested review protocol is recommended to ensure the validity and reliability of the research results (Yin, 2014:84). A general requirement for a research protocol is that it should assist in the systematic and transparent assessment (Pattyn, 2014:51) of the success or failure (Alexander & Faludi, 1989:130) of the phenomena being studied – in this case EMF. A number of methodologies dealing with quality and/or effectiveness evaluation were considered to inform the development of an EMF review protocol (Faludi, 1989; Lee & Colley, 1992; Glason *et al.*, 1996; Talen, 1996; Baer, 1997; Lawrence, 1997; Laurian *et al.*, 2004; Retief, 2007a; Van Dooren *et al.*, 2013; Laivina *et al.*, 2014; Lyles *et al.*, 2015). These methodologies were mainly from the disciplines of environmental management and development planning, although the approaches used in both these fields have to some extent been influenced by policy and programme evaluation methodologies (See Sadler, 1996; Baer, 1997; Laurian *et al.*, 2004 and Oliveira & Pinho, 2010). Due to the similarities between EMFs and spatial development plans the methodological approaches used in the latter were especially applicable. It should be noted that for the purpose of the review protocol ‘quality evaluation’ refers to the assessment of EMF products, processes and the methods used to develop them while ‘effectiveness evaluation’ deals with the manner in which the products were implemented and used to inform decision making. Quality can therefore be considered as EMF ‘inputs’ while effectiveness could be viewed as EMF ‘outputs’ (Lawrence, 1997:219-220; Retief, 2007a:453). The different approaches, and the manner in which they informed the development of the EMF review protocol, are now discussed.

2.5.2.1. Approaches to quality and effectiveness evaluation

Various fields of study have grappled with the questions of quality and effectiveness. One such field, which due to its spatial and strategic nature has strong resemblances to EMF, is the field of planning, *i.e.* land use planning and strategic spatial planning, which has long been dealing with the evaluation of plan quality (Carmona, 2003:285) to assist in answering the very important question:

“What is ‘good’ or ‘bad’ planning?”

(Alexander & Faludi, 1989:127).

Along with the assessment of quality, authors such as Alexander and Faludi (1989), Talen (1996) and Baer (1997) have suggested approaches to evaluate the effectiveness of plan implementation as an indicator of implementation success. However, even though these proposed methodologies existed since the 1980’s

their application in formal research studies was not immediate (Brody and Highfield, 2005:159) and it was only during the last two decades that many studies started applying a variety of both quality and effectiveness review methodologies to evaluate the effectiveness of plan implementation internationally (see Loh, 2011; Alfasi *et al.*, 2012; Long *et al.*, 2012; Zhong *et al.*, 2014; Lyles *et al.*, 2015).

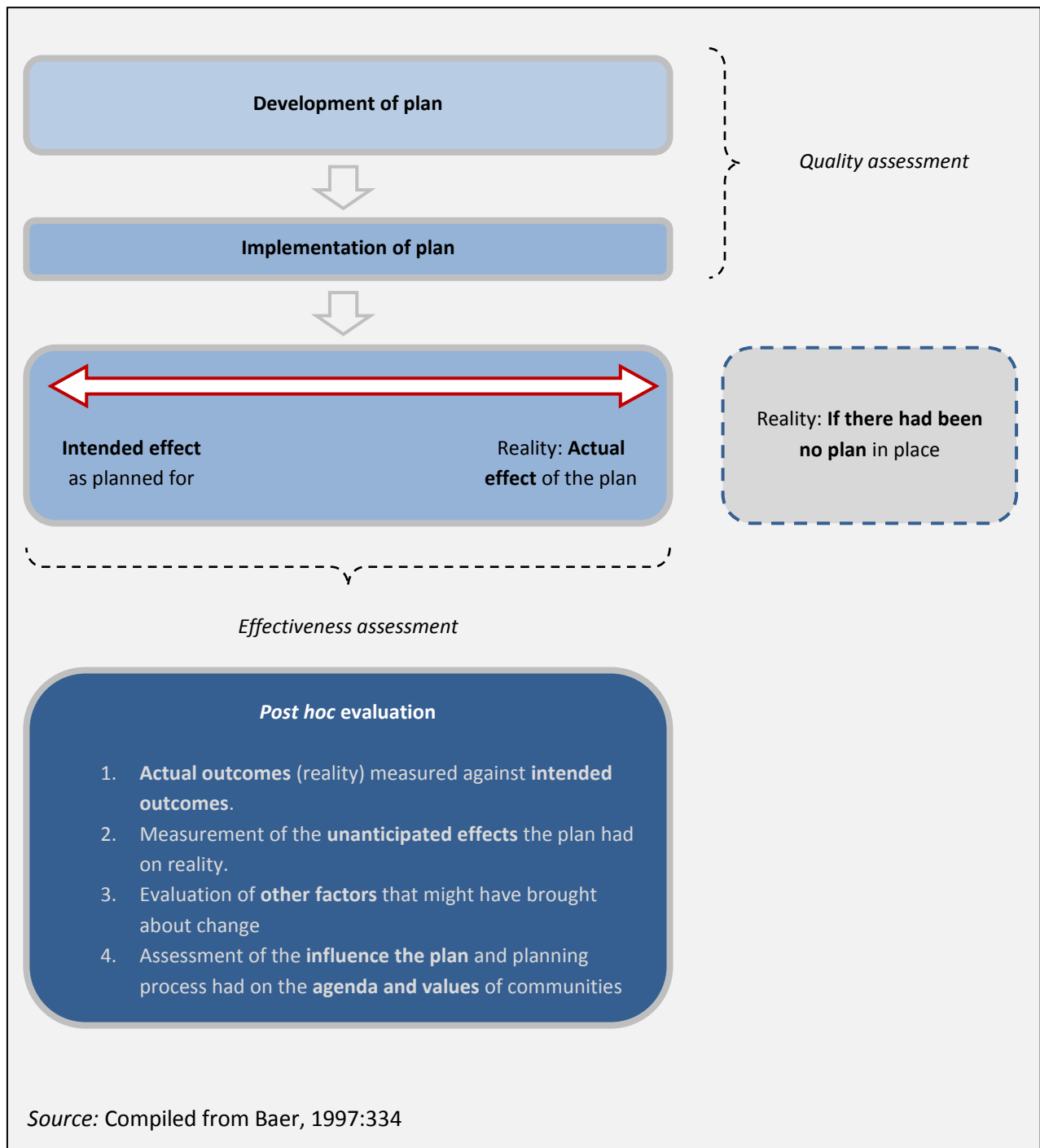
One approach to quality and effectiveness evaluation that has guided many of these studies and which is of particular relevance in the design of an EMF review protocol is that of Baer (1997). Baer (1997:330) distinguishes between the different stages in the evaluation of plans ranging from the assessment of the plan components to the so-called *post hoc* evaluation of plan outcomes, *i.e.* ranging from the 'quality' of plans to the 'effectiveness' of plans. In Baer's (1997:330-332) view the quality evaluation component could be conducted in a variety of ways ranging from a general critique of the plan to an in-depth evaluation of the different plan components which may or may not include aspects of the actual implementation of the plan¹. In terms of evaluating *post hoc* outcomes or effects, Baer (1997:333) suggests that evaluations could range from:

- Evaluating plan outcomes against what the *status quo* would have been if no plan was applicable (something which might be difficult to determine in most cases);
- Evaluating intended outcomes against the actual outcomes of the plan;
- Evaluating the unanticipated outcomes of the plan;
- Evaluating other factors other than the plan that might have brought about changes; and
- Evaluating the effect that the plan had on the perceptions and agendas of different stakeholders.

Figure 2.1 presents a slightly adapted version of Baer's approach to evaluation. The figure illustrates that *post hoc* evaluation (effectiveness) is mostly focused on the spectrum between 'plan intent' and 'current reality'. The proposed approaches to evaluation within this spectrum (which excludes 'reality' if no plan existed) could be applied separately or together when evaluating.

¹ Some components of plan implementation, such as the drafting of an implementation plan, could be considered as part of quality evaluation while others, such as the actual implementation of the plan, could be considered as part of effectiveness evaluation.

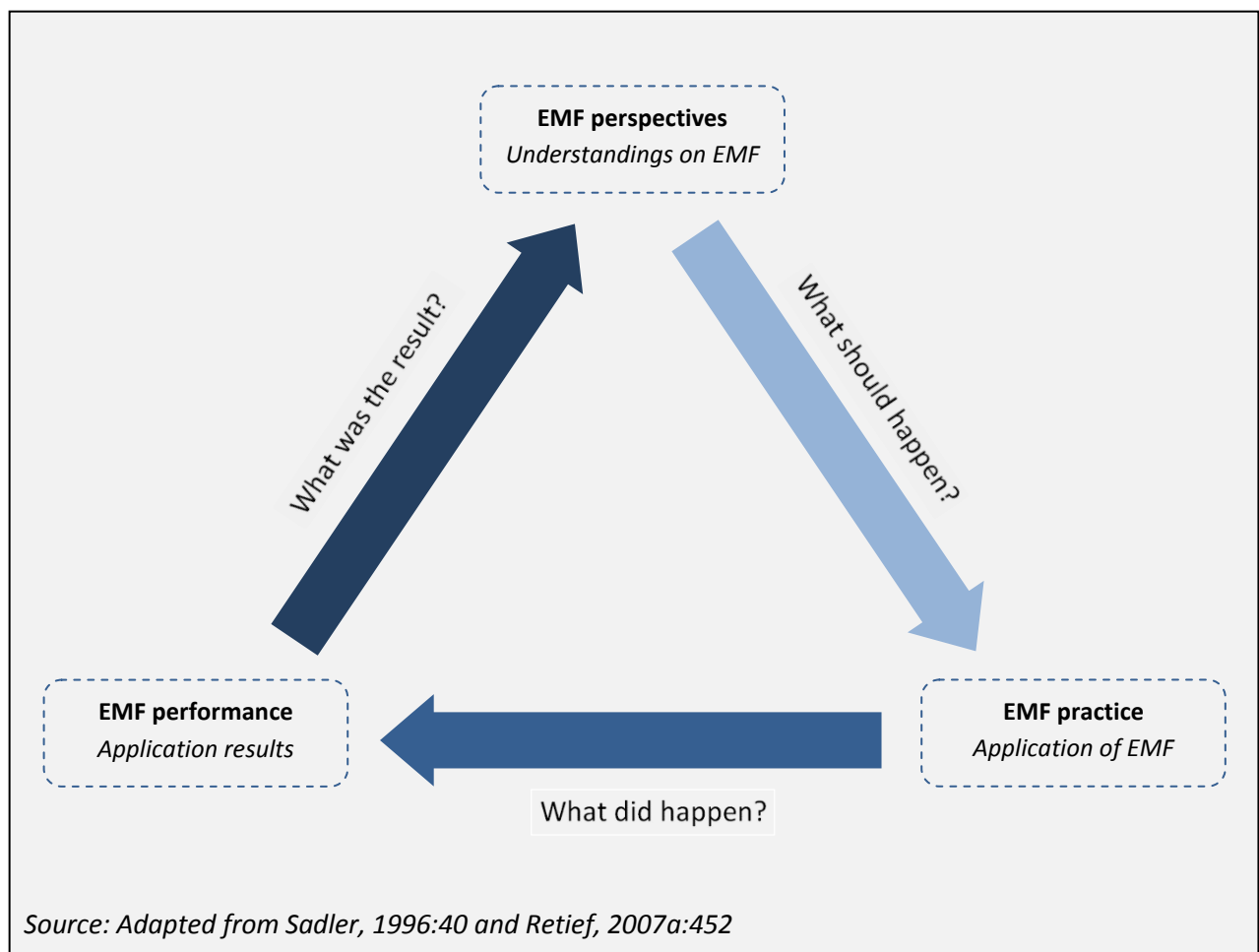
Figure 2.1: An adaption of Baer’s review approach



Within the field of environmental management itself several approaches dealing with the evaluation of environmental management tools have been proposed (see Lee & Colley, 1992, Glason *et al.*, 1996; Lawrence, 1997; Retief, 2007a; Van Doren *et al.*, 2013; Laivina *et al.*, 2014). These approaches provide further insights into the development of an EMF review protocol. In his paper on the assessment of EIA quality and effectiveness in Canada, Lawrence (1997:220) argues that evaluation should consider both

macro and micro level perspectives. In the context of EMF evaluation, macro level perspectives would refer to aspects such as perceptions of EMF and the legal context within which it operates while micro level perspectives would refer to the detailed components of EMF such as methods and documents. The macro level context is first defined followed by the assessment of micro level criteria (Retief, 2007a:449). Lawrence (1997:220) further notes that *post hoc* evaluation should consider both direct and indirect outputs. Direct outputs refer to outcomes that are linked to the objectives of the plan – or in this case EMF – such as objectives that were reached or decisions that were affected. Indirect outputs refer to outputs that were either unexpected or are not linked to the core purpose of the tool such as changes in the way stakeholders perceived the environment and changes in institutional arrangements (Retief, 2007a:454). The notion of direct and indirect outputs could be aligned with Bear's (1997:333) view on *post hoc* evaluation approaches as presented above.

Figure 2.2: The adjusted effectiveness triangle



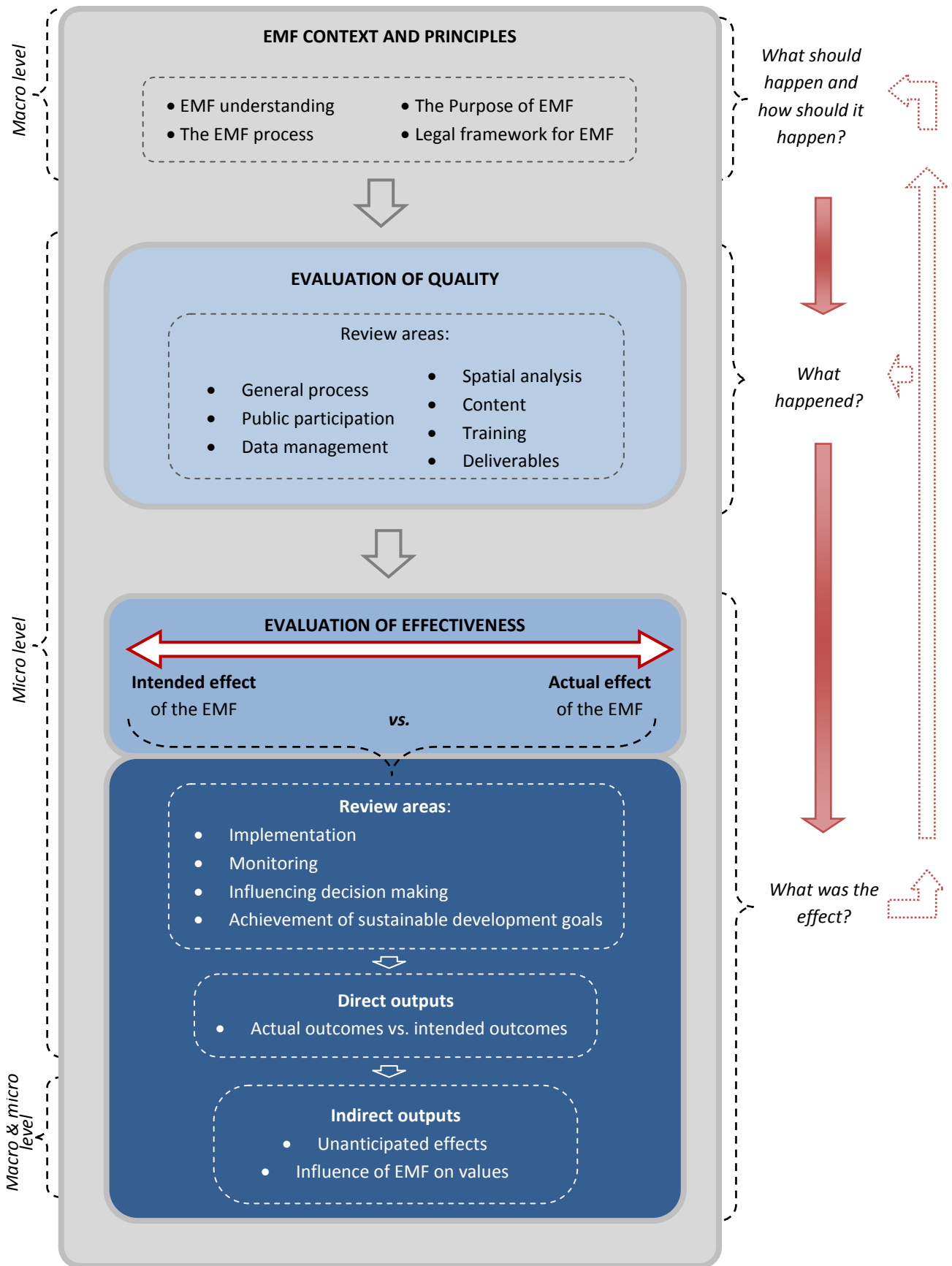
Sadler (1996:39-40) in his international assessment of the effectiveness of environmental assessment proposed the application of an 'effectiveness triangle' as a framework for evaluation. Sadler was not the first to propose the concepts contained in the 'effectiveness triangle' concept and it has been applied to other evaluation studies within environmental management since the 1980's (see Baker & McLelland, 2003:583-584 for a discussion). To date the 'effectiveness triangle' has sometimes been applied in environmental assessment studies as is (see e.g. Baker & Donehue, 2005) or has been adjusted to fit different purposes (see e.g. Baker & McLelland, 2003). One such adjustment was that of Retief (2007a:451-452) who proposed a quality and effectiveness review protocol for strategic environmental assessment (SEA) and for this purpose adjusted the 'effectiveness triangle' to the assessment of SEAs in South Africa. Considering that there are some similarities between SEA and EMF (see **Chapter 3**) his proposed changes to the 'effectiveness triangle' should be considered. The most significant change is that Retief (2007a:451) opted for the use of the term 'perspectives' instead of 'theory' at the top of the triangle (see **Figure 2.2**). The argument was that the 'theory' for SEA was not developed yet and that there was only 'perspectives' on SEA. The same line of arguing is true for EMF which lacks a solid theoretical base. The adapted view of the effectiveness triangle was therefore opted for and is shown in **Figure 2.2**. The effectiveness triangle presents a cyclical approach to evaluation where the 'perspective' is the starting point.

The understanding of the phenomena being studied, in this case EMF, will develop the expectation as to what should be happening *i.e.* what an implemented EMF should look like and what it should be achieving. The actual EMF is then developed and applied in practice after which the question 'what did happen?' could be asked. This question again relates to Baer's views on *post hoc* evaluation approaches discussed earlier. The Performance of the EMF is then assessed where-after the findings are used to further inform perceptions on EMF and possibly inform and improve future EMF practice.

2.5.2.2. A framework for EMF quality and effectiveness review

Building on the approaches and protocols as discussed, a framework for EMF quality and effectiveness review was developed, which is presented in **Figure 2.3**. The framework is based on the understanding and perspectives on EMF. These are the 'fundamentals' that guide the development and use of EMFs and develops the expectations for EMF. They are assessed at the macro level as they involve the broad concepts surrounding EMFs which are often developed at National levels. The micro level assessment involves the evaluation of EMF quality and some aspects of EMF effectiveness.

Figure 2.3: EMF review protocol framework



The evaluation of quality focuses on the assessment of a number of review areas representing the different detailed components of EMF. When assessing the quality of EMFs the components are evaluated against the expectations for each component. The manner in which the EMF conformed to the expectations is measured and used to assess its quality. The evaluation of effectiveness investigates the manner in which the intended outcomes of the EMF were achieved. It follows a similar approach as the one used for quality in that it uses review areas for assessment. The framework distinguishes between direct outputs and indirect outputs. Direct outputs are assessed at the micro level while indirect outputs are assessed at either the macro or micro level. The reason for this is that direct outputs are linked directly to the EMF while the indirect outputs could be EMF related or linked to a higher level such as 'perceptions on the environment'. For the framework to be applied the review areas needs to be expanded into evaluation criteria. The evaluation criteria and the manner in which they were selected are subsequently discussed.

2.5.3. Evaluation indicators– KPAs and KPIs

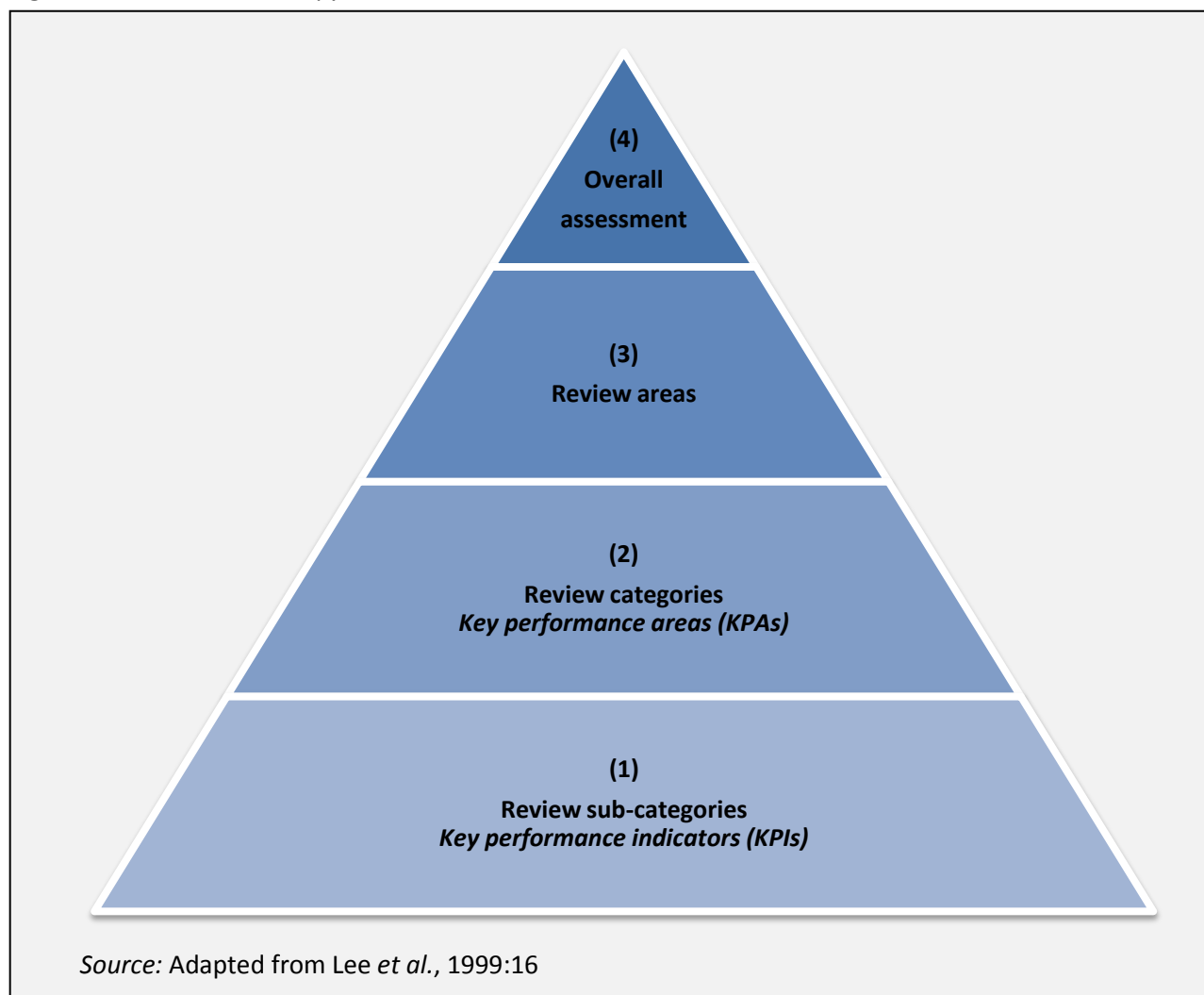
Sound criteria are the basis for any evaluation (Faludi, 2000:309) and are probably the most important aspect in the design of a review protocol. This view is confirmed by Alexander and Faludi (1989:131) who state that:

“...evaluation is unworthy of the name unless there are criteria for the evaluator to recognize the ‘good’ and distinguish it from the ‘bad’”.

The selection of criteria is therefore crucial to ensure that quality and effectiveness can be thoroughly reviewed. However, the term 'performance indicators' were used instead of 'performance criteria' as criteria suggest a level of precision that is not necessarily obtainable whereas indicator simply suggests that the measurement is 'indicative' of something (Retief, 2007a:455). The rationale for structuring the indicators was obtained from probably the best-known approach to quality review in environmental management – the so-called 'Lee and Colley' review package (see Lee & Colley, 1992 and Lee *et al.*, 1999). The review package – and adaptations of the package – have been applied in various countries (Anifowose, 2011; Badsr *et al.*, 2011; Kabir & Momtaz, 2012; Barker & Jones, 2013; Chang *et al.*, 2013; McGimpsey & Morgan, 2013; Phylip-Jones & Fischer, 2013; Mounir, 2014) including South Africa (Kruger, 2012; Sandham *et al.*, 2013a; Sandham *et al.*, 2013b; Hildebrandt & Sandham, 2014; Marias *et al.*, 2014; Thorpe, 2014; Wylie, 2015) to evaluate the quality of environmental assessment reports and prescribes a list of criteria that could be used for the review of environmental assessments (Lee *et al.*, 1999:15). The package proposes the use of an 'assessment pyramid' to arrange evaluation criteria in a hierarchical structure as

illustrated in **Figure 2.4**. Following the hierarchy, level one criteria are assessed first and then used to inform the assessment of the higher order criteria (levels two to four). Lee and Colley (Lee *et al.*, 1999:18) further propose the use of 'letters' instead of 'numbers' for the assessment of the different criteria. The Lee and Colley review criteria (review areas, review categories and review sub-categories) are mostly limited to the reviewing of environmental assessment report quality (Lee *et al.*, 1999:33-39) and are therefore not applicable to the evaluation of EMFs, however the principles contained in the Lee and Colley package, such as the hierarchical approach and the use of letters for rating, were however used in the design of the EMF review protocol. The 'overall assessment' and 'review areas' were left unchanged but 'review categories' and 'review sub-categories' were changed to 'key performance areas' (KPAs) and 'key performance indicators' (KPIs) as shown in **Figure 2.4**.

Figure 2.4: *The assessment pyramid*



The review areas, KPAs and KPIs were selected following a 'bottom-up' approach. KPIs were selected first and classified into KPAs where-after the KPAs were grouped into review areas. For the selection of KPIs the South African National Environmental Management Act (NEMA, Act 107 of 1998), the South African EMF Regulations (South Africa, 2006a; South Africa, 2010) and associated EMF Guidelines (South Africa, 2006b; South Africa, 2012b) were consulted. The NEMA and the Regulations provided the legal requirements against which EMF quality and effectiveness could be assessed while the Guidelines provided indicators of best-practice in terms of methodology and processes. To qualify for selection indicators had to conform to the following principles as adapted from Retief (2007a:463):

- The place of the indicator within the EMF context had to be clear;
- The indicator had to be either quantitatively or qualitatively measurable;
- The information needed to measure the indicator had to be available; and
- The indicator had to be easy to understand and interpret.

The review areas, KPAs and KPIs for quality assessment are first discussed followed by a discussion on the effectiveness criteria.

2.5.3.1. Quality indicators

The quality indicators are presented in **Table 2.4** along with the source document from which each indicator was derived and the EMF principle within which it is grounded. A total of 86 KPIs were identified which were grouped into 29 KPAs informing ten review areas. Review area one dealt with the general aspects of the EMF process such as the context within which an EMF was developed and the requirements of the specific EMF. Review area two entailed the public participation process and the extent to which stakeholders and interested and affected parties were included in the EMF development process. Review area three concerned the issue of data management and the quality and suitability of data sources used in the development of the EMF. Review area four reflected on the acceptability and suitability of spatial analysis techniques that were used to analyse datasets. Review areas five to eight dealt with various components of the EMFs content ranging from the initial discussion on the *status quo* of the environment to the final EMF decision support tool. Review area nine concerned the issue of training stakeholders in the use of the EMF tool while review area ten reflected on the final EMF deliverables. Each review area with its KPAs and KPIs are discussed in detail in **Table 2.4**.

Table 2.4: Quality indicators

Indicator source	EMF Principles and requirements	Key Performance Areas (KPA) and Key Performance Indicators (KPIs)	
Quality criteria			
Review area 1: General process			
<ul style="list-style-type: none"> • 2006 EMF Guidelines 3.1, 3.2, 4.2 & 4.4.3. • 2012 EMF Guidelines 4.1 & 4.2. 	An EMF should be customized to the context of the study area and reflect the areas issues, environmental goals and priorities.	KPA 1.1.	Context
		KPI 1.1.1.	To what extent where the issues and priorities applicable to the study area discussed in the context of the study area?
		KPI 1.1.2.	To what extent were environmental goals defined and discussed in the context of the study area?
		KPI 1.1.3.	To what extent did the EMF reflect on development trends, pressures and needs within the study area?
<ul style="list-style-type: none"> • 2010 Regulations 3(3)(a) • 2012 EMF Guidelines 5.2. 	The need for the EMF must be assessed as part of the EMF development process.	KPA 1.2.	Need
		KPI 1.2.1.	To what extent was the need for the EMF defined?
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.1. • 2012 EMF Guidelines 5.1. 	The specific requirements and objectives of the EMF should be agreed upon between different parties prior to the commencement of the EMF.	KPA 1.3.	Requirements and objectives
		KPI 1.3.1.	To what extent were the objectives of the EMF defined and agreed upon?
		KPI 1.3.2.	To what extent was the scope of the EMF defined and agreed upon?
		KPI 1.3.3.	To what extent were the technical requirements of the EMF defined and agreed upon?
		KPI 1.3.4.	To what extent was reference made to the operational scale of the EMF and was it agreed upon?
		KPI 1.3.5.	To what extent were the expected EMF deliverables defined and agreed upon?
Review area 2: Public participation process			
<ul style="list-style-type: none"> • 2006 Regulations 70(2)(b) • 2006 EMF Guidelines 3.1, 4.3.2. - 4.3.4 & 4.5.3. • 2010 Regulations 3(2)(a) • 2012 EMF Guidelines 6. 	Public consultation must be conducted to inform the preparation of an EMF.	KPA 2.1.	Structuring and execution of public participation process
		KPI 2.1.1.	To what extent was a public participation process planned?
		KPI 2.1.2.	To what extent were possible interested and affected parties (I&APs) and stakeholder groups identified and informed of the project?
		KPI 2.1.3.	To what extent were the relevant background information and the process through which interested parties could participate communicated?
		KPI 2.1.4.	To what extent were stakeholders asked to assist in drafting a strategy and vision for the area?
		KPI 2.1.5.	To what extent was the public participation process documented in the final EMF document?

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Quality criteria			
<ul style="list-style-type: none"> • 2006 Regulations 70(2)(b)(i-ii) • 2006 EMF Guidelines 4.3.5. • 2010 Regulations 3(2)(c)(i-ii) • 2012 EMF Guidelines 6.1. 	A draft EMF report must be made available to the general public for inspection at a convenient location and notices should be placed in local newspapers to invite potential interested and affected parties to inspect and comment on the report.	KPA 2.2.	Opportunity to comment
		KPI 2.2.1.	To what extent was a draft EMF report made available at a suitable location?
		KPI 2.2.2.	To what extent was a notice inviting interested and affected parties to comment on the EMF report published in a local newspaper?
		KPI 2.2.3.	To what extent did the timeframe allow for the interested and affected parties to respond to the invitation?
<ul style="list-style-type: none"> • 2006 EMF Guidelines 3.1. • 2010 Regulations 3(2)(c)(iii) & 4 • 2012 EMF Guidelines 4.1. 	The EMF should be easily accessible to any person that needs to access it.	KPA 2.3.	Ease of access
		KPI 2.3.1.	To what extent were steps taken to ensure that those persons that could not participate in the normal public participation process due to disabilities, illiteracy or any other disadvantage, could still participate in the process?
		KPI 2.3.2.	To what extent was the final EMF made available in a clear and easily understandable format and on an easily accessible platform to people outside of government?
<ul style="list-style-type: none"> • 2006 Regulations 70(2)(c) • 2006 EMF Guidelines 4.3. • 2010 Regulations 3(2)(d-f) • 2012 EMF Guidelines 6.3. 	The draft EMF should be reviewed in the light of comments received from interested and effected parties as well as other stakeholders and the responses should be compiled in a 'comments and response' report.	KPA 2.4.	Consideration of comments
		KPI 2.4.1.	To what extent were the comments resulting from the public participation process considered in the final EMF?
		KPI 2.4.2.	To what extent was a 'comments and response' report compiled indicating the manner in which comments were considered and addressed?
		KPI 2.4.3.	To what extent was feedback provided to the interested and affected parties were applicable?
Review area 3: Data management			
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.2, 4.2.1. & 4.2.3. • 2010 Regulations 4(i) • 2012 EMF Guidelines 5.3. 	A gap analysis or information matrix identifying possible information gaps and the quality, credibility, scale and accuracy of data should be done as part of the EMF study.	KPA 3.1.	Gap analysis
		KPI 3.1.1	To what extent did the gap analysis identify possible information gaps?
		KPI 3.1.2.	To what extent did the gap analysis investigate the quality and credibility of identified datasets?
		KPI 3.1.3.	To what extent did the gap analysis reference the sources of datasets?
		KPI 3.1.4.	To what extent did the gap analysis discuss the spatial scale of identified datasets?
		KPI 3.1.5.	To what extent did the gap analysis discuss the accuracy of identified datasets?

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Quality criteria			
		KPA 3.2.	Data use
		KPI 3.2.1.	To what extent were the datasets selected for use in the study at a suitable scale?
		KPI 3.2.2.	To what extent were the datasets selected for use in the study of suitable quality, accuracy and credibility?
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.5.3. • 2012 EMF Guidelines 5.3. 	Supporting metadata should be provided for all data and the procedures followed to capture new data explained.	KPA 3.3.	Metadata
		KPI 3.3.1.	To what extent were adequate metadata included for all spatial datasets used in the study?
		KPI 3.3.2.	To what extent were the methods and procedures used to capture or derive new datasets described?
Review area 4: Spatial analysis			
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.5.1. • 2012 EMF Guidelines 5.7. 	As part of the EMF a sensitivity analysis must be conducted.	KPA 4.1.	Sensitivity analysis
		KPI 4.1.1.	To what extent was a scientifically sound approach followed to arrive at sensitivity?
		KPI 4.1.2.	To what extent was the sensitivity analysis methodology (weighting, criteria, etc.) well documented and discussed?
		KPI 4.1.3.	To what extent was the term 'sensitivity' defined?
		KPI 4.1.4.	To what extent did the final results effectively reflect the sensitivity of analysed attributes?
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.4.4. • 2012 EMF Guidelines 5.9 & 5.10. 	As part of the EMF environmental opportunities and constraints must be identified and management zones demarcated.	KPA 4.2.	Delineation of environmental management zones
		KPI 4.2.1.	To what extent were the spatial constraints present in the environment mapped and used as input for the delineation of management zones?
		KPI 4.2.2.	To what extent were the spatial opportunities present in the environment mapped and used as input for the delineation of management zones?
		KPI 4.2.3.	To what extent was a scientifically sound approach followed for the delineation of management zones?
		KPI 4.2.4.	To what extent was the methodology that was used to delineate the management zones well documented and discussed?
		KPI 4.2.5.	To what extent did the management zones fit the context of the study area?
Review area 5: Content – Status quo analysis			
<ul style="list-style-type: none"> • NEMA S24(3) • 2006 Regulations 69(1)(a) & 71(a-d) • 2006 EMF Guidelines 3.1, 4.2 & 4.4.1. • 2010 Regulations 	An EMF should spatially reflect the environmental attributes present in the study area as well as the legal and strategic planning context within	KPA 5.1.	Description of the bio-physical environment
		KPI 5.1.1.	To what extent were the bio-physical aspects applicable to the study area adequately reflected in the EMF?
		(a)	<i>Geology, including geological stability;</i>
		(b)	<i>Geohydrology, including water quality, water</i>

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Quality criteria			
3(3)(b-d) & 4(a-d&h) • 2012 EMF Guidelines 4.2 & 5.4.2.	which the EMF will function.		<i>quantity and irrigation potential;</i>
		(c)	<i>Surface hydrology, including drainage systems, flow rates, water quality and ecological requirements;</i>
		(d)	<i>Topography, including landscapes and visual character;</i>
		(e)	<i>Soil, including erosion potential and agricultural potential;</i>
		(f)	<i>Vegetation, including important habitats, threatened species and conservation potential;</i>
		(g)	<i>Fauna, including threatened species and conservation potential;</i>
		(h)	<i>Current and potential sources of air pollution; and</i>
		(i)	<i>Current and potential sources of water pollution.</i>
		KPA 5.2.	Description of the socio-economic environment
		KPI 5.2.1.	To what extent were the socio-economic aspects applicable to the study area well reflected in the EMF?
		(a)	<i>Current use of land depicting the actual uses that occur on land in detail;</i>
		(b)	<i>Infrastructure and engineering services, including water provision, sanitation, transportation elements, electricity, solid waste disposal and telecommunication;</i>
		(c)	<i>Current and potential sources of noise or other types of irritation;</i>
		(d)	<i>Land which is subject to mining activities;</i>
		(e)	<i>Cultural and historic features, including archaeological sites, old buildings, important structures and sites associated with current use or past events and religious structures and sites;</i>
		(f)	<i>Population characteristics, including spatial distribution, structure, income levels, age, gender, literacy and growth trends;</i>
		(g)	<i>Economic characteristics, including employment sectors, economic drivers and growth sectors; and</i>
		(h)	<i>Current development and planning trends and processes, including the SDF's and IDP's.</i>
		KPA 5.3.	Description of the legal context
		KPI 5.3.1.	To what extent was the legal mandate for the EMF explained?
KPI 5.3.2.	To what extent were the relevant laws, policies, plans and programs applicable to the study area discussed in the context of the EMF?		

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Quality criteria			
		KPA 5.4.	Description of the strategic planning context
		KPI 5.4.1.	To what extent were the relevant National strategic plans and initiatives evaluated in the context of the EMF?
		KPI 5.4.2.	To what extent were the relevant Provincial strategic plans and initiatives evaluated in the context of the EMF?
		KPI 5.4.3.	To what extent were the relevant Local strategic plans and initiatives evaluated in the context of the EMF?
		KPI 5.4.4.	To what extent were all other existing environmental management plans or frameworks relevant to the EMF discussed?
<ul style="list-style-type: none"> • NEMA S24(3) • 2006 Regulations 69(1)(a) & 71(a-d) • 2006 EMF Guidelines 4.4.1. • 2010 Regulations 4(a-d) • 2012 EMF Guidelines 5.4.2. 	An EMF should reflect on the sensitivity, extent, interrelationship, conservation status and significance of environmental attributes within the geographical area to which it applies.	KPA 5.5	Analysis of environmental attributes
		KPI 5.5.1.	To what extent was the sensitivity of all relevant environmental attributes reflected in the EMF?
		KPI 5.5.2.	To what extent was the extent of environmental attributes reflected in the EMF?
		KPI 5.5.3.	To what extent was the interrelationship between environmental attributes reflected in the EMF?
		KPI 5.5.4.	To what extent was the significance of environmental attributes reflected in the EMF?
		KPI 5.5.5.	To what extent was the conservation status of environmental attributes reflected in the EMF?
Review area 6: Content – Desired state of the environment			
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.5.1. • 2012 EMF Guidelines 5.5. 	The DSoE report must reflect the strategic objectives for the area and make recommendations on how the DSoE could be achieved.	KPA 6.1.	Strategic objectives
		KPI 6.1.1.	To what extent did the DSoE report discuss the vision for the area?
		KPI 6.1.2.	To what extent did the DSoE report discuss strategic objectives relating to the DSoE?
		KPI 6.1.3.	To what extent did the DSoE report discuss ways in which environmental resources could be managed in order to preserve or improve their current status and achieve the DSoE?
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.2, 4.3.2 & 4.4.2. • 2010 Regulations 3(3)(b-d) 	An EMF must contain an analysis of all the relevant information and inputs pertaining from the previous phases of the EMF to arrive at a 'desired state of the environment' scenario (DSoE).	KPA 6.2	Describing the desired state of the environment (DSoE)
		KPI 6.2.1.	Was the information contained in the <i>status quo</i> report considered during the DSoE phase?
		KPI 6.2.2.	Were the issues raised throughout the public participation process reflected in the DSoE?
		KPI 6.2.3.	Was a DSoE described and presented?

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Quality criteria			
<ul style="list-style-type: none"> • 2006 Regulations 71(e) • 2010 Regulations 4(e) • 2012 EMF Guidelines 5.5. 	The DSoE report must reflect the environmental management priorities for the area.	KPA 6.3.	Priorities (issues, challenges and opportunities)
		KPI 6.3.1.	To what extent did the DSoE report in general reflect the environmental management priorities in the area?
		(a)	<i>Were bio-physical priorities discussed?</i>
		(b)	<i>Were socio-economic priorities discussed?</i>
		(c)	<i>Were priorities relating to the legal and institutional framework discussed?</i>
Review area 7: Content – EMF tool			
<ul style="list-style-type: none"> • 2006 Regulations 71(f-g) • 2010 Regulations 4(f-g) • 2012 EMF Guidelines 4.1. 	An EMF should indicate the kind of developments, activities and land uses that would have either a significant impact or no impact on identified environmental attributes.	KPA 7.1.	Identification of impacts in relation to environmental attributes
		KPI 7.1.1.	To what extent did the EMF identify developments, activities and/or land uses that would have a significant impact on specific environmental attributes?
		KPI 7.1.2.	To what extent did the EMF identify developments, activities and/or land uses that would have only a minimal impact on specific environmental attributes?
		KPI 7.1.3.	To what extent did the EMF give an indication of the information needs that might be necessary for impact assessments pertaining to specific activities and specific management zones?
<ul style="list-style-type: none"> • 2006 Regulations 71(f-g) • 2006 EMF Guidelines 2.1, 2.2. & 4.5.1. • 2010 Regulations 4(f-g) • 2012 EMF Guidelines 4.1. 	An EMF should identify developments, activities and land uses that will be undesirable in specific parts of the study area and <i>vice versa</i> .	KPA 7.2.	Desirable and undesirable land uses
		KPI 7.2.1.	To what extent did the EMF indicate developments, activities and/or land uses deemed desirable within a specific area?
		KPI 7.2.2.	To what extent did the EMF indicate developments, activities and/or land uses deemed undesirable within a specific area?
		KPI 7.2.3.	To what extent did the EMF propose the listing and/or de-listing of activities in specific areas as a result of 7.2.1 and 7.2.2?
<ul style="list-style-type: none"> • 2006 EMF Guidelines 2.2 & 3.1. • 2012 EMF Guidelines 3.2, 4.1 & 9. 	An EMF should contribute to sustainable development by providing early warnings in respect to thresholds, limits and cumulative impacts.	KPA 7.3.	Thresholds, limits and cumulative impacts
		KPI 7.3.1.	To what extent did the EMF reflect on thresholds and limits for specific environmental attributes?
		KPI 7.3.2.	To what extent did the EMF consider the effect and management of cumulative impacts?
		KPI 7.3.3.	To what extent were National, Provincial and any other existing targets for biodiversity, air quality, water quality and waste disposal considered in the EMF?

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Quality criteria			
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.5.1. • 2012 EMF Guidelines 5.11. 	As part of the EMF, management guidelines or a strategic environmental management plan discussing the management requirements for each management zone should be developed.	KPA 7.4.	Management zones guidelines
		KPI 7.4.1.	To what extent did the management guidelines work towards achieving the DSoE objectives?
		KPI 7.4.2.	To what extent did the management guidelines clearly reflect the management objectives defined in the DSoE?
		KPI 7.4.3.	To what extent did the management guidelines make clear recommendations regarding the way that development should occur within specific zones?
		KPI 7.4.4.	To what extent did the management guidelines maximise opportunities for both development and the environment in the area?
		KPI 7.4.5.	To what extent did the management guidelines reflect on specific environmental thresholds applicable to the area?
		KPI 7.4.6.	To what extent did the management guidelines reflect on existing policies, statutory requirements and guidelines?
Review area 8: Content – Implementation strategy			
<ul style="list-style-type: none"> • 2006 EMF Guidelines 2.1 & 4.5.2. • 2012 EMF Guidelines 5.1, 7.2, 7.3 & 8.1. 	An implementation strategy describing the linkages between the EMF and other strategic planning tools, approaches to co-operative governance and the allocation of responsibilities should be developed to assist in the effective implementation of the EMF.	KPA 8.1.	Planning for implementation
		KPI 8.1.1.	To what extent did the implementation strategy describe the relationship of the EMF to other strategic planning tools once implemented?
		KPI 8.1.2.	To what extent did the implementation strategy clarify the roles and responsibilities of different spheres of government in the implementation of the EMF and were conflicting mandates resolved and discussed?
KPI 8.1.3.	To what extent were all the relevant government departments that should be involved in the implementation of the EMF represented during the development of the EMF?		
<ul style="list-style-type: none"> • 2006 EMF Guidelines 5. • 2010 Regulations 4(j) • 2012 EMF Guidelines 5.3.2 & 5.15. 	An EMF should include a revision schedule and monitor plan.	KPA 8.2.	Revision schedule
		KPI 8.2.1	To what extent was a revision schedule proposed for the EMF?
KPI 8.2.2.	To what extent did the EMF report reflect on the monitoring of the EMF and how it should be done?		
Review area 9: Training			
<ul style="list-style-type: none"> • General principle of transfer of skills in RSA. • Many ToRs 	The relevant officials should be trained in the use of the EMF.	KPA 9.1.	Training
		KPI 9.1.1.	To what extent were the relevant officials trained in the use and implementation of the EMF?

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Quality criteria			
<i>request this.</i>		KPI 9.1.2.	To what extent was the necessary material developed to guide users in the implementation of the EMF?
Review area 10: Deliverables			
<ul style="list-style-type: none"> • 2006 Regulations 72. • 2006 EMF Guidelines 4.5.3. • 2010 Regulations 5 • 2012 EMF Guidelines 8. 	A final EMF product should be presented for approval and adoption.	KPA 10.1.	Documentation
		KPI 10.1.1.	To what extent was a comprehensive set of documentation submitted for approval and adoption?
<ul style="list-style-type: none"> • 2006 EMF Guidelines 2.5.4. • 2012 EMF Guidelines 5.14. 	The information contained in an EMF must be available in a digital GIS format.	KPA 10.2.	Spatial product
		KPI 10.2.1.	To what extent was the spatial information submitted in a suitable GIS format?
		KPI 10.2.2.	To what extent was the spatial information submitted in an easily accessible and interactive GIS format?
		KPI 10.2.3.	To what extent was the GIS data accompanied by the necessary descriptive documentation?

2.5.3.2. Effectiveness indicators

The effectiveness indicators are presented in **Table 2.5** in the same way as the quality indicators were presented. For the effectiveness evaluation a total of 14 KPIs were identified and grouped into six KPAs which informed four review areas. Review area eleven (the first of the effectiveness review areas) concerned the monitoring of EMFs after implementation, while review area twelve reflected on the actual implementation process and how it was conducted. Review area thirteen gauged the extent to which the EMF was influencing decisions while review area fourteen considered the contribution of the EMF towards sustainable development goals and objectives. Each KPA and KPI is again discussed in detail in **Table 2.5**.

Table 2.5: Effectiveness indicators

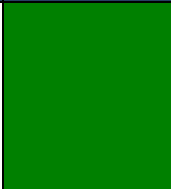


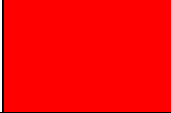

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Effectiveness criteria			
Review area 11: Monitoring			
<ul style="list-style-type: none"> • 2010 Regulations 5(5) 	An adopted EMF must be monitored on a regular basis to ensure that it achieves its purpose and	KPA 11.1.	Monitoring
		KPI 11.1.1.	To what extent was the EMF monitored to determine its effect?

Indicator source	EMF Principles and requirements	Key Performance Areas (KPAs) and Key Performance Indicators (KPIs)	
Effectiveness criteria			
	goal.	KPI 11.1.2.	To what extent did the EMF achieve its goals and objectives?
Review area 12: Implementation			
<ul style="list-style-type: none"> • 2006 Regulations 72(1-2) • 2010 Regulations 5(2-4) 	An EMF should be formally adopted and gazetted to ensure that it will be taken into account in the consideration of applications for environmental authorisations.	KPA 12.1.	Adoption
		KPI 12.1.1.	To what extent was the EMF formally adopted by the relevant authority through the prescribed adoption process?
		KPI 12.1.2.	To what extent was the finalized EMF Gazetted?
<ul style="list-style-type: none"> • 2006 EMF Guidelines 4.5.2. • 2012 EMF Guidelines 5.1. 	The roles of different spheres of government and government departments must be clarified for implementation processes.	KPA 12.2	Roles and responsibilities
		KPI 12.2.1.	To what extent was the EMF implemented by the relevant role-players?
		KPI 12.2.2.	To what extent were agreements in terms of co-operative governance reached with regards to roles and functions?
Review area 13: Influencing decision making			
<ul style="list-style-type: none"> • NEMA S24O(1)iii)(v) • 2006 Regulations 8(b)(vi) & 69(1)(b) • 2006 EMF Guidelines 2.1. • 2010 Regulations 2(b-c) • 2012 EMF Guidelines 3. 	Information contained in an EMF must inform environmental management and must be taken into account by any competent authority when considering environmental authorisation in the area where the EMF is applicable.	KPA 13.1	Influencing EIA
		KPI 13.1.1.	To what extent was the EMF used to guide the screening process for EIA?
		KPI 13.1.2.	To what extent was the EMF used to determine the requirements of specialist studies for EIA?
		KPI 13.1.3.	To what extent did the EMF influence decision on environmental authorizations?
		KPI 13.1.4.	To what extent did the EMF lead to the listing or de-listing of activities in specific areas?
<ul style="list-style-type: none"> • SPLUMA S12(m) • 2006 EMF Guidelines 3.1. • 2012 EMF Guidelines 3. 	Information contained in a published EMF must be available to be considered during the development of SDFs and should inform decisions on land use change.	KPA 13.2.	Influencing spatial planning and land use management systems
		KPI 13.2.1.	To what extent was there any proof that the EMF influenced the development of spatial development frameworks (SDFs)?
		KPI 13.2.2.	To what extent did the EMF influence decisions on land use change?
Review area 14: Sustainable development and environmental protection			
<ul style="list-style-type: none"> • 2010 Regulations 3(a-c) 	An EMF should promote sustainability and secure environmental protection.	KPA 14.1.	Sustainable development
		KPI 14.1.1.	To what extent did the EMF contribute to sustainable development?
		KPI 14.1.2.	To what extent did the EMF contribute to environmental protection?

2.5.3.3. Evaluation and ratings

As stated earlier, letters instead of numbers were used to evaluate each of the KPIs. Each KPI was rated on a score sheet as either A, B, C, D or N. The five possible ratings with their definitions and methods of application are discussed in **Table 2.6**. These ratings were applied to the different KPIs by the researcher. Although this thesis relied on a single reviewer, *i.e.* the researcher, wider application of the protocol and ratings could use multiple reviewers. The use of a single reviewer implies an unavoidable but acceptable level of subjectivity of results which is typical of an evaluation research approach. The discussion of results should be viewed with this level of subjectivity in mind.

Table 2.6: Rating schedule

Rating	Definition	Colour code	Application
A	Conformance		'Conformance' is the highest rating that any indicator could achieve and meant that the indicator requirement was met by the final product or action. A conformance rating suggested a positive result and that the expectation linked to the applicable indicator was successfully met.
B	Partial conformance		'Partial conformance' meant that some requirements linked to the associated indicator were met, but not all of them. Some evidence found that the indicator was addressed but not thoroughly.
C	Non-conformance		'Non-conformance' suggested that the tasks or actions linked to the indicator were attempted but not adequately. Evidence suggests that the indicator was largely ignored.
D	Not attempted at all		When an indicator was not addressed at all in the EMF a rating of 'not attempted at all' was awarded. This is the lowest rating that can be awarded to an indicator.
N	Could not be determined		In some cases the indicator could not be assessed due to lack of information or because participants did not want to comment on the indicator. The awarding of this rating was avoided as far as possible.

2.5.4. Testing the review protocol via a pilot study

To test and refine the review protocol an earlier version of the protocol was applied to the pilot case. The pilot study was viewed as an opportunity to test the robustness of the review protocol (Plowright, 2011:88) through the testing of the various research methods discussed in **Section 2.5.5**. The review protocol was successfully applied to the pilot case and only minor adjustments had to be made to the final version. Adjustments concerned the phrasing of some KPIs as well as the addition of some KPIs where gaps were identified.

2.5.5. Data sources

To populate the review protocol discussed in **Section 2.5.3**, data can be obtained from a number of data sources, such as people and documents, using methods such as interviews and documentation analysis (Rule & John, 2011:61-63). The data captured via these methods are known as the evidence (Gillham, 2000:4) and are analysed and documented to form a chain of evidence which Yin (2014:237-238) describes as the links that shows how findings relate to the data or evidence that were collected. The case study methods listed in **Table 2.1** are now discussed in relation to the relevant research questions.

2.5.5.1. Documentation analysis

Documentation analysis involves the systematic analysis and description of the content of a document (Plowright, 2011:107-108) and according to Rule and John (2011:67) is the best place to start data collection before moving on to other methods such as interviews and questionnaires. This is because the analysis of documents related to a case will provide a good overview and sense of the case being studied and stimulate the development of questions that should be further investigated (Rule & John, 2011:67). Document analysis can refer to both published and unpublished documents (Gillham, 2000:37) or otherwise classified, primary and secondary documents (McCulloch, 2004:29) ranging from published reports to minutes of meetings (Swanborn, 2010:73). When selecting documents for review, the authenticity, reliability and purpose of the document must first be established to determine its suitability for use (McCulloch, 2004:42-46). The document types that were found to be suitable for use in this research can be divided into four broad categories as shown in **Table 2.7**. Documents were sourced from government departments, government websites and consultants and were mainly used to evaluate the quality of EMFs as discussed in **Chapter 5**.

Table 2.7: EMF documentation

Category	Document type	Description
1	Set of final EMF reports	<p>A set of final EMF reports were available for all cases consisting of:</p> <ul style="list-style-type: none"> • A 'Status quo report' describing the current state of the socio-economic environment, the bio-physical environment and the institutional context in the area of study; • A 'Desired state of the environment report' describing the desired state envisioned for different environmental and socio-economic aspects; and • A 'Final EMF report' discussing the management approach and guidelines that should be implemented in order to achieve the desired state.

Category	Document type	Description
		These reports along with each EMFs spatial database were the main sources of information pertaining to the quality evaluation.
2	Inception reports and terms of reference	Upon commencement of an EMF an inception report is drafted in which the detailed requirements and outcomes of the EMF are discussed. These reports (and their associated terms of reference documents) were not available for all cases and were only used to provide background information on cases where they were available.
3	Minutes of meetings	Minutes of meetings were also only available for some cases and were never included as part of the final EMFs. For the cases where minutes were available, they provided some background information that assisted in the evaluation of the EMFs. Where they weren't available interviews were used to access the required background information.
4	Other documents	Where available, other documents such as presentations, e-mails, letters and specialist reports were also used to gain a deeper understanding of the different cases.

2.5.5.2. Interviews

Interviewing allows a researcher to determine the understanding, experiences and views of an interviewee on a specific topic being studied (Rubin & Rubin, 1995:35; Simon, 2009:43). Many forms of interviewing can be distinguished ranging from less structured approaches such as topical oral histories and life histories to more structured approaches such as evaluation interviews and survey interviews (Rubin & Rubin, 1995:27; Morgan, 2014:54-56). This research employed a semi-structured evaluation interview approach which was focussed on evaluating the quality and effectiveness of EMFs. The interviews relied on lines of enquiry related to the different KPIs (see **Tables 2.4** and **2.5**). Therefore, although the interviews were semi structured they were not open-ended.

Interviews are time consuming in that they require thorough preparation, take time to do and are tedious to transcribe and analyse (Gillham, 2000:62; Rule & John, 2011:64). To avoid the situation where fruitless and unnecessary interviews were conducted an approach of 'purposeful sampling' (Rule & John, 2011:64) was adopted for the selection of interviewees. This meant that interviewees were selected based on either their knowledge and experience on EMFs in general or their experience with one of the specific EMF cases. A list of all the individuals that were approached for interviews is presented in **Annexure C**. The main categories of interviewees were government employees and consultants. Interviewees with general knowledge on EMFs were identified through engagement with the DEA who identified the key government officials that have been involved in EMF since its inception in the early 2000's. These officials assisted in the identification of key knowledgeable individuals at provincial departments who again

assisted in the identification of key individuals at the relevant local governments. The details for key consultants pertaining to specific cases were obtained from the EMF reports. A total of 42 individuals was identified and approached for interviews of which 36 agreed to the request. Six of the interviewees either did not respond to e-mails, voicemails and text messages or was not willing to participate in the research for reasons that were not disclosed.

2.5.6. Data analysis

Data analysis was conducted in two separate steps as also recommended by Miles *et al.* (2014:100-101). The review data was first analysed through a single case analysis (step 1) followed by the analysis of data through a cross-case analysis (step 2). Both dealt with and relate to research questions 3 to 5 namely:

What is the quality of EMFs?

- Research question 3 -

What is the effectiveness of EMFs?

- Research question 4 -

What are the factors influencing the quality and effectiveness of EMFs?

- Research question 5 -

The single case analysis focussed on analysing and discussing the review data and results for each individual case (see **Chapters 5 and 6**). The analysis started by capturing the results on an evaluation matrix which indicates the different scores in relation to the KPIs. The validity of the results was strengthened through the continual triangulation of data from the documentation analysis and interviews in relation to the KPIs. The discussion of the review results per case were structured around each KPA. Although all KPAs and their related KPIs were covered in the discussion of the results the qualitative nature of the data necessitates a discussion which reflects a context specific interpretation and discussion. In the end the discussion aimed to tell a story reflecting the full richness of the data rather than an over-emphasis on specific KPIs in a quantitative manner which could lead to misinterpretation and superficiality (see Miles & Humberman, 1994:173).

The cross-case analysis focussed on analysing the review data across all cases in an effort to identify possible patterns and relationships (see **Chapter 7**). The selection of cases based on certain contextual criteria (see **Table 2.2**) allows for a more generalised analysis across cases that do not completely erode

the context specific bases of individual cases and at the same time achieves results beyond the particular case. The cross-case analysis was conducted as follows:

- The review results for all cases were first consolidated in a meta-matrix (**Annexure D**) which served as the master dataset from which all subsequent analysis were done.
- From the meta-matrix the KPI breakdown for each review area across all cases was calculated and expressed as percentages. These breakdowns were used to discuss the overall performance of each review area.
- KPIs were then analysed for possible patterns across all cases and any patterns were discussed. These discussions contributed to the understanding of factors influencing EMF quality and effectiveness.
- Next each case was given an overall performance rating per review area. The ratings ranged from 'poor' to 'good' and were awarded through the application of the criteria shown in **Table 2.8**. The overall ratings (*presented in Table 7.15*) were plotted on a graph (**Annexure E**) and analysed for possible relationships between EMF components. Two components were regarded as having a relationship when the ratings (*see Table 2.8*) for the majority of cases were closely aligned. An example of a relationship will be where one component was rated as 'poor' and the other as either 'poor' or 'poor to average'.
- The patterns and relationships were finally used to identify and discuss factors affecting EMF quality and effectiveness (**Chapter 8**). A factor was an EMF characteristic that showed significance across cases and that could be considered important to EMF quality and/or effectiveness. The identified factors were finally used to develop a conceptual framework aimed at improving EMF practice in South Africa. It must be emphasised that the data analysis did not allow for the establishment of causal linkages but only patterns and relationships. The research approach and methodology did not allow for the determination of causality. Rather, it identified patterns and relationships pointing towards influencing factors. The identification of causal relationship will require a different methodological approach which might be less structured and focused on dealing with the causality between different EMF components through a real-world or action research approach.

Table 2.8: Review area evaluation

Rating	Criteria
Poor	A 'poor' performance rating was awarded if the following criteria were met: <ul style="list-style-type: none"> • Most KPIs did not conform to expectations; • Very few or none of the KPIs partially conformed to expectations; and • None of the KPIs conformed to expectations.

Rating	Criteria
Poor to average	<p>A 'poor to average' performance rating was awarded if the following criteria were met:</p> <ul style="list-style-type: none"> • Approximately half the KPIs did not conform to expectations; • Very few or none of the KPIs partially conformed to expectations; and • Very few or none of the KPIs conformed to expectations.
Average	<p>An 'average' performance rating was awarded if the following criteria were met:</p> <ul style="list-style-type: none"> • Very few or none of the KPIs did not conform to expectations; and • The majority of the KPIS either conformed or partially conformed to expectations of which more partially conformed than conformed.
Average to good	<p>An 'average to good' performance rating was awarded if the following criteria were met:</p> <ul style="list-style-type: none"> • Approximately half of the KPIs conformed to expectations; • Many of the remaining KPIs partially conformed to expectations; and • Very few or none of the KPIs did not conform to expectations.
Good	<p>A 'good' performance rating was awarded if the following criteria were met:</p> <ul style="list-style-type: none"> • Most KPIs conformed to expectations; and • The remaining KPIs partially conformed to expectations.

2.6. Concluding remarks

This chapter outlined the research design and methods that were applied in this study. In **Chapters 3 – 8** the application of these methods and their ensuing results are discussed.

Research Question	Method	Phase	Chapter
Q1 - What is an environmental management framework?	Literature review	Phase 2-1: Clarify the purpose and objectives of EMFs in South Africa	Chapter 3: Literature review
		Phase 2-2: Understanding EMF	
Q2 - What is the status and extent of Environmental management frameworks in South Africa?	Survey	Phase 3-1: Determine the status and extent of EMFs in South Africa	Chapter 4: The status and extent of Environmental management frameworks in South Africa
Q3 – What is the quality of EMFs?	Case study reviews: - Documentation reviews - Data and methodology review - Interviews	Phase 4-1: Determine the data and methodological requirements for developing an EMF	Chapter 5: Case study analysis: EMF quality
Q4 – What is the effectiveness of EMFs?		Phase 4-2: Assess the ‘real world’ effect that EMFs are having	Chapter 6: Case study analysis: EMF effectiveness
Q5 – What are the factors influencing the quality and effectiveness of EMFs?	Case study reviews: - Within-case analysis - Cross case analysis	Phase 4-3: Critically evaluate the <i>status quo</i> of EMFs in South Africa	Chapter 7: Cross case analysis
Research Aim			
To evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice		Phase 5-1: Synthesis and conclusion	Chapter 8: Synthesis and conclusions

CHAPTER THREE

LITERATURE REVIEW

3.1. Introduction

In its broadest sense an environmental management framework (EMFs) could be described as a proactive strategic environmental planning tool which aims to provide strategic environmental context, guidance and decision support towards more environmentally sound and sustainable outcomes. However, despite extensive EMF practice within the South African context, no single common understanding exists. Moreover, because EMF is a uniquely South African concept it is not commonly recognized internationally. Within this context this chapter reflects on the different theoretical understandings of EMFs and addresses the following fundamental research question:

“What is an environmental management framework?”

- Research question 1 -

The answer to this research question provides the basis for the design of the review protocol as well as the synthesis and conclusions in **Chapter 8**. Due to the context specific nature of EMF the theoretical discussion is bound to be more context (or South Africa) specific than for other instruments with wider international application such as SEA and conservation planning. The next section starts by describing the conceptual foundations of EMF in relation to broader environmental management debates after which the key components of EMF are presented. This is followed by a critical reflection on EMF in relation to other IEM tools, in particular SEA, bioregional planning and state of the environmental reporting. The chapter concludes with a critical discussion on the purpose of EMF, which forms the basis for the quality and effectiveness evaluation in **Chapters 6 to 7**.

3.2. Environmental management

In the South African context EMF is typically described as one of the instruments (or tools) within the integrated environmental management toolbox (*see* Chapter 5 of NEMA, Act 107 of 1998). However, internationally and in South Africa the term ‘environment’ and subsequently also the term ‘environmental management’ are not easily defined. Therefore, it is necessary, at the outset to reflect on the concept of ‘environmental management’ internationally and in the South African context. Historically, environmental management can be linked to the concept of ‘conservation’ and it could well be argued that the two

disciplines have the same origin as is alluded to by Allen (1959:8) when he states that the term conservation is a derivative from the term ‘conservator’ which was a title used to describe a person responsible for managing land resources in India in the early 1900s. With this in mind one could further the investigation into the circumstances that initiated the idea of managing the environment. Evidence suggests that society’s concern for the protection of the natural environment actively started as early as the late 1800s in areas such as North-America and Great Brittan (Allen, 1959:9-10; Warren & Goldsmith, 1974:1-2; O’Riordan & Turner, 1983:2-3). However, this concern for protecting the environment was not driven by the notion that humanity had negative impacts on the environment, but was rather fuelled by the idea of protecting the aesthetic beauty offered by certain landscapes for personal enjoyment (Nicholson, 1974:v-vi; Warren & Goldsmith, 1974:1). According to O’Connor (1974:88) this way of thinking started to change with the development of the concept of ecology and as an understanding of how ecological systems function developed. The realization that humans had some negative impacts on the natural environment made for a paradigm shift calling for more to be done than just simply fencing of areas for conservation (Nicholson, 1974:v). In time, concern for humanities impacts on the environment started to grow and the issue moved to the foreground in industrialized countries in the 1960s and eventually became an international priority in 1972 after the Stockholm conference on the human environment hosted by the United Nations (Beale, 1980:ix). During this period disciplines such as Town and Regional Planning started to experiment with the integration of environmental sciences with planning processes (O’Riordan & Turner, 1983:136). A well-known example of this is Ian McHarg’s pioneering work ‘*Design with nature*’ (McHarg, 1969) in which suggestions are made for pro-actively – almost strategically – managing impacts on the environment during the planning phases of a project.

Defining the term ‘environmental management’ is not a straightforward task, especially when considering the influence of environmental worldviews on the understanding of the concept (Wilson & Bryant, 1997:61). O’Riordan (1995:6-7) distinguishes between two environmental worldviews or ideologies: ‘technocentrism’ and ‘ecocentrism’. Technocentrism is defined as a worldview in which technological and market-based environmental management solutions to environmental problems are emphasized, while in contrast the ecocentric worldview argues that technology and economic growth are the main drivers of environmental degradation and that society should define and recognise environmental thresholds and manage activities in such a way that they are not exceeded (Wilson & Bryant, 1997:62). Technocentrism and ecocentrism can further be split into two sub-views each as described in **Table 3.1** which further influence the way in which environmental management can be defined and understood.

Table 3.1: Basic environmental ideologies

Ecocentrism		Technocentrism	
Deep Environmentalism	Soft Technologism	Accommodatorism	Cornucopianism
Advocates the importance of nature for our survival and recognises the right of ecosystems and natural landscapes to remain unmodified. Calls for the absolute prioritisation of environmental conservation and argues that economic development should focus on providing for the basic needs of the poor.	Emphasizes the importance of managing our natural resource base in a sustainable manner through environmental management practices based on the principle of environmental conservation through the reform of policies and practices.	Acknowledges the existence of environmental problems, but is confident that technological, scientific and political solutions can be found. Accepts that environmental management can be the mediator between man and the environment.	Argues that there is no real environmental crisis and that humanity will always find a way to solve environmental problems through political, scientific and technological approaches.

Source: Compiled from O’Riordan (1995:7) and Wilson and Bryant (1997:62-63)

Due to the underlying influence of these environmental worldviews many different definitions for environmental management can be found in the literature. For example Nel and Kotzé (2009:1) describe environmental management as the management or governance strategy aimed at influencing the manner in which people interact with their surrounding environment while Theobald (2008:vii) argues that it should be viewed as a tool that deals with the protection of sensitive habitats, the control of environmental hazards and the use and conservation of our natural resource base. It is clear that the underlying environmental worldviews on which these definitions are based differ with the first definition leaning towards a soft technological/accommodatoristic worldview and the second towards a deep environmentalistic worldview. Other definitions include Wilson and Bryant (1997:5) who argue that it could be seen as a multi-layered process of interaction between various stakeholders concerned with the management and use of the environment and Agarwal (2011:2) who defines it as an interdisciplinary regulatory force concerned with minimizing the impact of human activities on the physical and ecological environment through resource conservation and recycling. Finally Barrow (2005:15) states that environmental management is concerned with meeting the basic needs of society whilst at the same time limiting the negative effects that the associated development may have on the environment. When considering all these definitions it might be said that environmental management does not necessarily mean the ‘management of the environment’ *per se*, but rather refers to the process of managing human activities and associated impacts in such a way that socio-economic development is promoted while damage to the natural environment is kept to a minimum.

To further the investigation into the term and gain a better understanding of its meaning, especially within the South African context, it is useful to first establish what is meant by the word 'environment'. The term environment can have different meanings to different people depending on the context within which the term is being used (Fuggle, 1999:4). The South African National Environmental Management Act 107 of 1998 (NEMA) defines the 'environment' as being:

“...the surroundings within which humans exist and that are made up of – (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationship between them and; (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.”

Nel and Kotzé (2009:4-7) however raise the concern that this definition is not clear on how cultural issues should be considered and whether reference is made to the natural environment, the built environment, or to both. For a healthy understanding of the NEMA definition and to address the aforementioned concern, the underlying approach that was most likely used to formulate the definition must be considered. According to Rabie (1999:84) there are two possible approaches that should be considered: the extensive approach and the limited approach. Under the extensive approach the 'environment' will include a combination of so-called 'ingredients' such as the natural environment, the spatial environment (towns, cities, etc.), the economic environment and the sociological environment while under the limited approach it will only refer to specific components or ingredients, for example to only the social environment (Rabie, 1999:84-86). When then considering the term in the context of the South African Constitution (Act 108 of 1996) which states in Section 24b (South Africa, 1996) that the environment should be protected through measures that:

“...prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

it could be argued that the term environment as used in the NEMA context was defined following an extensive approach which should include the natural-, built-, social- and economic environments, especially when considering the goals defined in Section 24b that should be achieved. Environmental management therefore refers to the process of managing human activities and their impacts on the various components of the environment in such a way that will promote more sustainable outcomes.

3.3. Integrated environmental management (IEM)

In South Africa a number of environmental management tools are used to assist environmental managers in this task of balancing socio-economic development and environmental protection towards more sustainable outcomes. These IEM tools cover the entire management cycle (plan-do-check-act) and range from project level tools such as environmental impact assessment (EIA) to strategic level tools such as strategic environmental assessment (SEA) as well as implementation tools such as environmental management plans (EMPs). The development of the IEM concept was strongly influenced by international authors such as Ritter (1985), Bowonder (1987), Guruswam (1989) and Downs *et al.* (1991) who argued in favour of a holistic, integrated approach to environmental management. The broad concept of IEM (applied internationally in different ways – see Margerum & Born, 1995) gained momentum during the late 1980s and early 1990s (Margerum & Born, 1995:371; Argent *et al.*, 1999:693) and was first formally introduced in South Africa in 1989 by the then ‘Council for the Environment’ (Hamann *et al.*, 2000:14) as a pro-active and holistic approach to environmental management through which environmental considerations could be integrated into the various applicable planning, decision-making, development and management processes in South Africa (Sowman *et al.*, 1995:46-51). Initially, and particularly in practice, IEM was considered almost synonymous with project level EIA (Hamann *et al.*, 2000:14; Kidd and Retief, 2009). However, in 1992 a revised IEM procedure accompanied by a set of guidelines was published by the National Department of Environmental Affairs (Sowman *et al.*, 1995:53; Heydenrych & Claassen, 1998:9) followed by an updated discussion document in 1998 (Lindeque, 2003:34) and a series of IEM overview information documents in 2004, which explicitly broadened the remit of IEM beyond the well-known remit of EIA. Notwithstanding, uncertainty remained and in 2004 a series of IEM information documents were published which addressed the general critique expressed by Margerum and Born, (1995:371) at the time that IEM needed clearer operational guidelines. A Chapter in the 1998 National Environmental Management Act (107 of 1998) (NEMA) was further dedicated to IEM promoting the integrated environmental management of activities affecting the environment (South Africa, 2004a:1). Section 23(2) of NEMA defined the general objectives of IEM as to:

- | |
|---|
| (a) <i>promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment;</i> |
| (b) <i>identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2;</i> |
| (c) <i>ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;</i> |
| (d) <i>ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;</i> |

- (e) ensure the consideration of environmental attributes in management and decision making which may have a significant effect on the environment; and
- (f) identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2.

The environmental management principles contained in Section 2 are binding to all organs of state (Van der Linde, 2009:198) and promote development that is socially, environmentally and economically sustainable, *i.e.* 'sustainable development'. The importance of the Section 2 principles is also echoed in Preston *et al.*'s (1999:749) statement that IEM should ensure that the benefits gained from development should outweigh the environmental costs of that development to society. Although the concept of IEM was well accepted in South Africa, the implementation thereof remained problematic in that – to a large extent – it only focussed on environmental impact assessment (South Africa, 2004a:7). To address this issue and ensure that the environment would be considered in the early planning stages of development proposals (Nel & Du Plessis, 2004:189) the 2004 IEM information series (South Africa, 2004a:7) called for the development and implementation of a wider range of tools that would contribute to the national goal of sustainable development.

3.4. The IEM toolset

In South Africa IEM has developed into a sustainability orientated school of thinking supported by a suite of environmental assessment and management tools (South Africa, 2004a:7). As alluded to earlier an entire chapter of NEMA has been dedicated to IEM which according to Section 23(1) of NEMA is meant to:

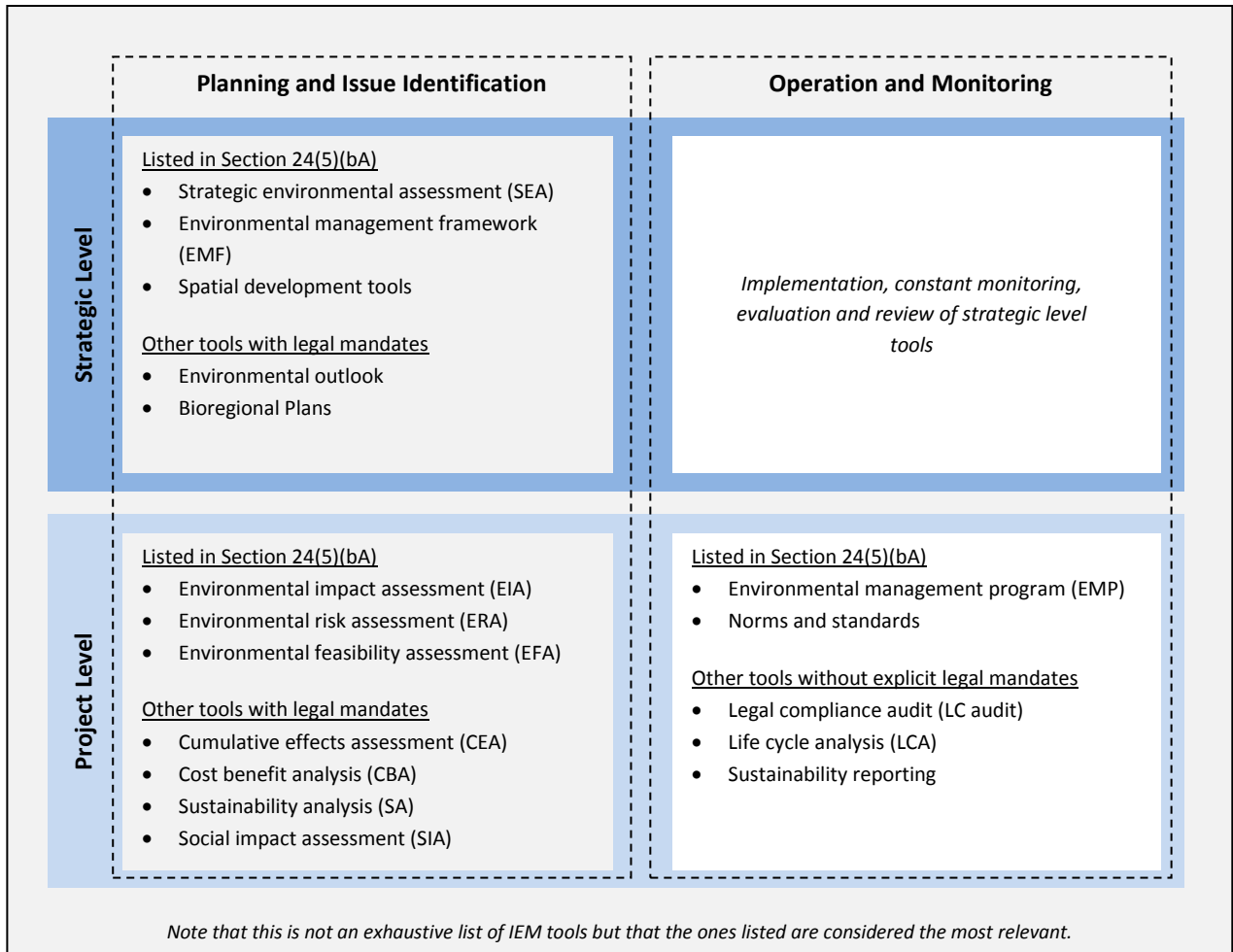
“...promote the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities.”

The chapter proposes a number of environmental management tools that should be used in this endeavour of IEM. They are listed in Section 24(5)(bA) of NEMA as:

- (i) Environmental management frameworks;
- (ii) Strategic environmental assessments;
- (iii) Environmental impact assessments;
- (iv) Environmental management programmes;
- (v) Environmental risk assessments;
- (vi) Environmental feasibility assessments;
- (vii) Norms or standards;
- (viii) Spatial development tools; or

(ix) Any other relevant environmental management instrument that may be developed in time.

Figure 3.1: The IEM toolset



According to Section 24(5)(bA)(ix) of NEMA the list of IEM tools should remain open ended and not limited to only existing tools and instruments. As a result many other environmental management tools – not listed above – have been developed and applied as part of the IEM procedure giving effect to the view of Nel and Du Plessis (2004:189) that IEM should be regarded as a framework within which various tools could be integrated and adopted. **Figure 3.1** lists the different IEM tools being applied in South Africa. Distinction is made between Section 24 NEMA listed tools and other legally mandated tools. IEM tools can be applied at the project or strategic level and either as ‘planning and issue identification’ orientated tools or ‘operation and management’ orientated tools. ‘Project level/Planning and issue identification’ orientated tools are those tools and instruments that deal with the identification and assessment of project specific impacts and criteria prior to project commencement. Examples of these tools are

environmental impact assessments (EIAs) and social impact assessments (SIAs). The 'Project level/Operation and management' orientated tools again deals with the implementation phase of projects ensuring that identified impacts are mitigated and that management guidelines are adhered to. Examples of such tools are environmental management programmes (EMPs) and legal compliance audits. Strategic level tools are developed in the 'planning and issue identification' phase and progress to the 'operation and management' phase once implemented. Strategic level tools deals with the identification of issues and environmental management priorities at the strategic and often more general level. Examples of such tools are strategic environmental assessments (SEAs), bioregional plans and environmental management frameworks (EMFs).

In order to distinguish EMFs from other strategic level IEM tools, the conceptual basis and key characteristics of EMFs are now discussed.

3.5. The conceptual foundations of EMF

EMF as a tool was conceived as a strategic environmental management tool aimed at pro-actively dealing with conflicts between sensitive natural environments and development activities. According to a 1998 IEM discussion document this was to be achieved through the delineation of environmental management zones within which specific management guidelines would apply (Heydenrych & Claassen, 1998:23). In terms of the first set of EMF Guidelines (South Africa, 2006b:15) these management guidelines were to give guidance on, amongst other things, the desirability and undesirability of specific activities within an area and the environmental priorities that were to be managed through strategic management intervention. In many ways the introduction of the EMF concept in South Africa was a direct answer to a call made in the international literature during the 1980s for the integration of strategic level environmental planning into environmental management (Beale, 1980:93-132; O'Riordan & Turner, 1983:135-207).

Although the EMF concept is unique to the South African context² it does however share some similarities with other internationally recognised concepts. The concept with the most similarities to EMF is that of 'environmental sensitivity mapping' in which environmental sensitivity maps (ESMs) are used to assess the possible impacts of human activities on specific features in the environment (Buckley, 1991:35-46). ESMs aim to spatially indicate the probable environmental impacts of different activities in a defined

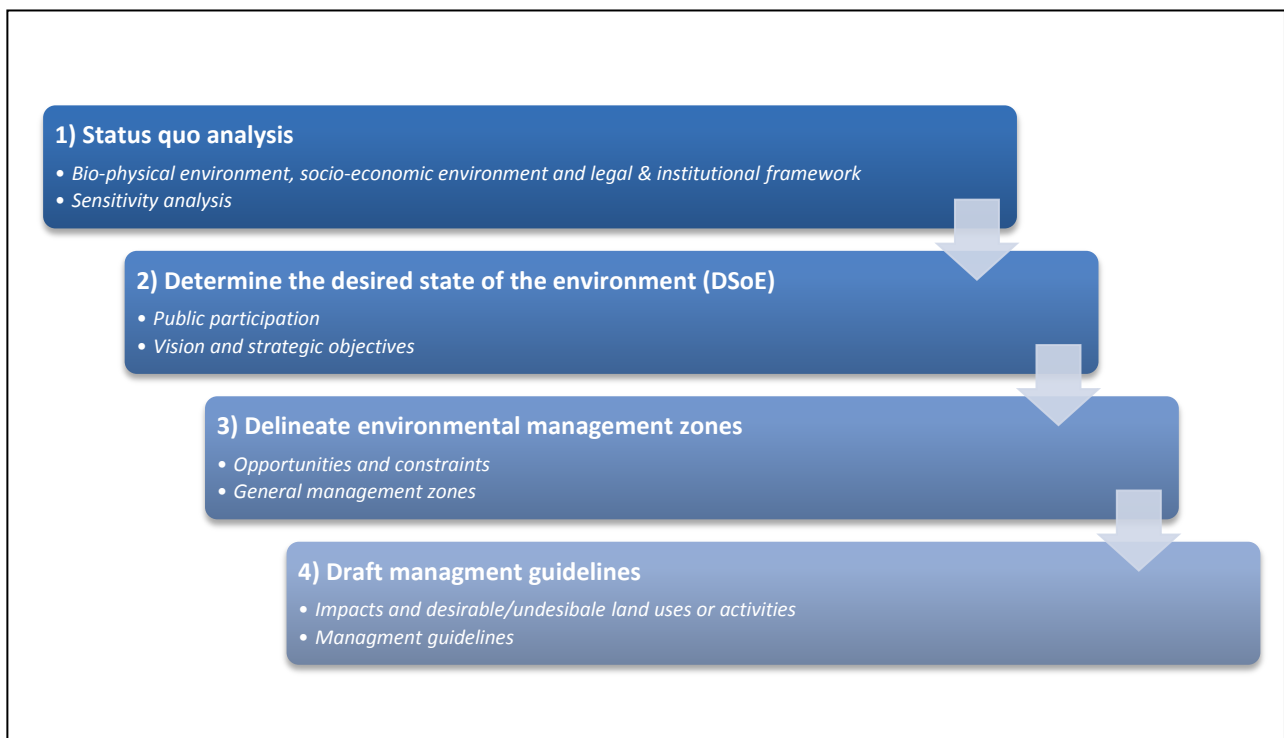
² The World Bank employs a tool also known as an 'environmental management framework' which drastically differs from environmental management frameworks as applied in South Africa. Subsequently no clear relationship exists between the two tools.

geographic area (Buckley, 1991). To achieve this environmental attributes are assessed in terms of the extent to which specific activities will inflict damage on them, *i.e.* their 'sensitivity' to change/impacts. Another concept that also shows strong similarities to the EMF approach is that of 'vulnerability analysis'. Van Straaten (1998:57) defines vulnerability analysis as an approach in which the possible environmental impacts of an activity, such as a road or a railway, is evaluated through a GIS based multi-criteria approach. Vulnerability is defined as the sensitivity of an environmental attribute to changes brought about by human-induced activities (Van Straaten, 1998:57). Highly sensitive environments will therefore show significant changes in reaction to human-induced activities making them vulnerable to change (Van Straaten & Peymen, 1997:viii). These two concepts share clear similarities with the EMF development process which is discussed below.

3.6. Key EMF components

The EMF development process can be divided into four key components as illustrated in **Figure 3.2**. The components are linked to one another and follow a clear hierarchy. Each component is now discussed as described through the 2006 and 2010 EMF Regulations (*see* South Africa, 2006a and South Africa, 2010) and the 2006 and 2012 EMF Guidelines (*see* South Africa, 2006b and South Africa, 2012b).

Figure 3.2: Key EMF components



3.6.1. Status quo analysis

The first step in the development of an EMF involves a detailed analysis of the so-called environmental *status quo*, i.e. the current state of the environment (South Africa, 2006b:6; South Africa, 2010:192; South Africa, 2012b:9). The *status quo* analysis involves the assessment of the bio-physical environment and the socio-economic environment as well as the legal and institutional framework within which an EMF will operate (South Africa, 2012b:10-11). Except for the discussion on the legal and institutional framework the *status quo* analysis is mostly spatially orientated involving the identification and mapping of environmental attributes such as vegetation types and surface water resources for the bio-physical environment, and population distribution and physical infrastructure for the socio-economic environment, as well as their description within the context of the study (South Africa, 2006b:12-13; South Africa, 2012b:11). Once all relevant bio-physical and socio-economical attributes have been identified, mapped and described they are further assessed in terms of their sensitivity to possible impacts and changes in the environment (South Africa, 2010:193; South Africa, 2012b:13-14), i.e. environmental sensitivity mapping and vulnerability analysis. The *status quo* analysis serves as the EMF backbone and aims to provide a well contextualised overview of the current state of the environment within a specific geographical area. The information and spatial datasets emanating from the *status quo* analysis are used to inform the development of a desired state of the environment.

3.6.2. Determining the desired state of the environment (DSoE)

Once the current state of the environment has been assessed and possible issues identified a desired state of the environment (DSoE) can be established (South Africa, 2006b:13; South Africa, 2010:192; South Africa, 2012b:12). The DSoE describes the desired condition for each of the environmental attributes assessed during the *status quo* analysis. A desired condition or state for each of the different bio-physical and socio-economical components is determined through a consultative public participation process (South Africa, 2012b:12). Stakeholders are asked to consider the current state of the different features described during the *status quo* analysis and propose environmental goals and strategic management objectives that would ensure the managed of these features towards a desired state (South Africa, 2006b:13; South Africa, 2012b:12). Based on the strategic objectives for the different features, the DSoE is then spatially represented to indicate possible high priority areas. These areas are used as inputs for the delineation of environmental management zones.

3.6.3. Delineate environmental management zones

The findings from both the *status quo* analysis as well as the DSoE assessment are used to identify and map environmental constraints (areas that are highly sensitive to changes and vulnerable to impacts) and

environmental opportunities (areas in which certain developments may be allowed) (South Africa, 2006a:55; South Africa, 2006b:14-15; South Africa, 2010:193; South Africa, 2012b:15-16). These constraints and opportunities are grouped together and classified into environmental management zones (South Africa, 2012b:16). Environmental management zones generally represent areas with similar characteristics such as levels of sensitivity, environmental features and development potential. An example of two management zones might be an 'agricultural development zone' and a 'conservation zone'. The first will most likely be an area that is characterised by existing agricultural activity with potential for future agricultural development while the latter will be an area that is characterised by sensitive environmental features such as ridges and wetlands. In the first zone agricultural activities will be promoted while in the second they will be discouraged. To ensure that these environmental management zones will be managed towards the DSoE, management guidelines must be developed (South Africa, 2006b:15; South Africa, 2012b:17).

3.6.4. Draft management guidelines

Management guidelines can be either generic (and applicable the whole geographic area) or management zone specific. Generic guidelines will cover issues that are not necessarily limited to particular management zones while management zone specific guidelines will focus on specific areas. To inform the development of guidelines the sensitivity analysis conducted during the *status quo* analysis is consulted to assist in the identification of activities and land uses (impacts) that should be discouraged or encouraged within specific environmental management zones (South Africa, 2012b:17). The management guidelines will inform decision makers on the desirability of proposed developments within a particular management zone and will also provide information on mitigation measures and management requirements that will have to be adhered to if a proposed development is to be considered (South Africa, 2006b:15; South Africa, 2012b:17). The Management guidelines could go as far as to prohibit certain activities within a management zone or propose the exemption of a specific activity from an environmental authorisation within a management zone (South Africa, 2012b:18). The combination of the sensitivity analysis, management zones and management guidelines are used to inform decision making in three different ways as discussed in **Section 3.7**.

3.7. The purpose of EMF

EMFs are meant to inform decision making in three different ways and at two different levels. The primary purpose of EMF is to inform the environmental authorisation process while the secondary purpose entails its influence on development planning processes.

3.7.1. Spatial screening for environmental assessment

As discussed earlier the management guidelines give guidance on the desirability of a specific activity within a particular environmental management zone. In this manner EMFs inform decision makers on the requirements for environmental assessments (South Africa, 2006a:54; South Africa, 2010:191). When a development initiative is proposed within a management zone, decision makers will consult the management guidelines which will inform them of the potential impacts that the proposed activity might have on features in the area and the subsequent desirability of the activity in the area. This information will inform the requirements for specialist studies and the extent to which an environmental assessment will have to be conducted.

3.7.2. Strategic environmental context

In addition to the guidance it provides for the need and requirements of environmental authorisations, the EMF also provides a strategic context within which environmental assessments (EA) can be considered (South Africa, 2006a:54; South Africa, 2010:191). The EMF informs decision makers on the so-called 'bigger picture' that goes beyond the site specific issues only. Information on sensitivities surrounding a particular site could be important when decisions are considered as impacts are not always only limited to the boundaries of a site.

3.7.3. Informing development planning

The final manner in which EMFs are used to inform decision making is through its influence on development planning processes (South Africa, 2006b:16; South Africa, 2012b:209). In South Africa development planning processes run parallel to EA processes. EMFs aim to influence strategic level development plans by informing them on sensitive environmental features in an area (South Africa, 2012b:209). The idea is that these development plans should reflect the same sensitive features as contained in the EMF resulting in their consideration in both the development planning authorisation and the environmental authorisation decision making processes. This influence on development planning at the strategic level should lead to less conflicting decisions between the two parallel processes.

3.8. EMF and other IEM tools

EMFs share similarities with other strategic level IEM tools applied in South Africa and internationally. The strategic level tools with the most relevance to EMF are shown in **Table 3.2**.

Table 3.2: Similarities between EMF and other strategic level IEM tools within the South African context

EMF characteristics	SEA	Bioregional planning	Environmental outlook
Assess the status quo of the environment	☹️	☹️	😊
Assesses environmental sensitivity (specific impacts)	☹️	☹️	☹️
Determines a desired state of the environment	☹️	☹️	😊
Sets targets for environmental management	☹️	☹️	😊
Develops management guidelines	☹️	☹️	☹️
Informs environmental authorisation processes	☹️	☹️	☹️
Informs development planning	😊	😊	☹️
Sustainable development focus	😊	☹️	😊
Has a formal legal mandate	☹️	😊	😊

The EMF tool shares some similarities with strategic environmental assessment (SEA), bioregional planning (often referred to as conservation planning) and environmental outlook reporting (also known as state of the environment reporting). The similarities and differences are now briefly discussed.

3.8.1. Strategic environmental assessment

SEA is applied in different ways across the world and one unambiguous definition describing the concept does not exist (Brown & Thérivel, 2000:184). A general understanding of SEA, however, is that it entails the assessment of strategic level decisions taken at the policy, planning or program tiers of decision making. In South Africa SEA has been seen as the process of integrating the concept of sustainability into decision making processes (DEAT, 2004:3). The distinction between SEA and EMF has not always been clear and it has even been acknowledged by some key IEM role-players that:

“...there is tension between SEA and EMF as the Department of Environmental Affairs has not done justice in describing the difference between the two.”

Zondi (pers. comm. 2015)

“...clarification on the difference between the two tools has not been given.”

Mtolo (pers. comm. 2015)

The EMF tool is viewed by some as a product emanating from a SEA process (pers. comm. Zwane, 2015; pers. comm. Mtolo, 2015) but this trend has not yet been observed in practice in South Africa. The big differences between SEA and EMF are that SEA has no formal legal mandate and does not guide decision making in the same manner as EMF. SEA further does not assess environmental sensitivity to the same

extent as EMF or determine the desired state through an elaborate public participation process. In practice SEA has mostly been developed and implemented separately from EMF and with a focus on very specific issues and priorities.

3.8.2. Bioregional planning

Bioregional planning is a conservation orientated tool focused on the identification, mapping and eventual protection of important biodiversity within a specific geographical area or bioregion (South Africa, 2009:23-24). As a result, bioregional plans do not consider the socio-economic environment or bio-physical features such as soil and agriculture and only focuses on biodiversity. Although some impacts on biodiversity are considered, bioregional plans are not informed by extensive sensitivity analyses or the same elaborate public participation process as is the case for EMF. They do however aim to inform development planning on biodiversity issues and are often also used in the same manner to inform the EMF *status quo* analysis (South Africa, 2009:14). Although they provide broad development guidelines pertaining to sensitive biodiversity features these are not nearly as detailed as those contained in an EMF and are not linked to specific activities. Bioregional plans can be seen as a specialist biodiversity plan that is developed parallel to an EMF and can be used to inform the EMF on issues pertaining to biodiversity (South Africa, 2009:24).

3.8.3. Environmental outlook

The last of the strategic level IEM tools is the so-called environmental outlook (see Section 16A of NEMA, Act 107 of 1998). An environmental outlook also assesses the *status quo* of the environment in much the same way as an EMF does and goes through a process of determining a 'desired state' or an outlook which is to be achieved through the implementation of certain objectives and targets. The environmental outlook does not however investigate the link between specific impacts and environmental attributes in the same way as an EMF does and does not provide the same level of detailed management guidelines. The information contained in an environmental outlook can inform the development of an EMF in much the same way as a bioregional plan which would ensure that all the relevant issues and priorities in an area are effectively considered.

3.9. Final remarks

Chapter three grappled with the question:

“What is an environmental management framework?”

The chapter discussed the key characteristics of the environmental management framework (EMF) tool and how it relates to the broader concepts of integrated environmental management (IEM). In terms of its international contextualisation the generic concepts of environmental sensitivity mapping (ESM) and vulnerability analysis were related to the EMF approach. Although EMF is a concept mostly unique to the South African situation the conceptual foundations can be applied to other internationalised tools such as SEA or to local initiatives applied in other countries. To further the discussion on EMF and what it entails, the status and extent of EMFs in South Africa are discussed in **Chapter 4**.

Research Question	Method	Phase	Chapter
Q1 - What is an environmental management framework?	Literature review	Phase 2-1: Clarify the purpose and objectives of EMFs in South Africa	Chapter 3: Literature review
		Phase 2-2: Understanding EMF	
Q2 - What is the status and extent of Environmental management frameworks in South Africa?	Survey	Phase 3-1: Determine the status and extent of EMFs in South Africa	Chapter 4: The status and extent of environmental management frameworks in South Africa
Q4 – What is the quality of EMFs?	Case study reviews: - Documentation reviews - Data and methodology review - Interviews	Phase 4-1: Determine the data and methodological requirements for developing an EMF	Chapter 5: Case study analysis: EMF quality
Q5 – What is the effectiveness of EMFs?		Phase 4-2: Assess the ‘real world’ effect that EMFs are having	Chapter 6: Case study analysis: EMF effectiveness
Q6 – What are the factors influencing the quality and effectiveness of EMFs?	Case study reviews: - Within-case analysis - Cross case analysis	Phase 4-3: Critically evaluate the <i>status quo</i> of EMFs in South Africa	Chapter 7: Cross case analysis
Research Aim			
To evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice		Phase 5-1: Synthesis and conclusion	Chapter 8: Synthesis and conclusions

CHAPTER FOUR

THE STATUS AND EXTENT OF ENVIRONMENTAL MANAGEMENT FRAMEWORKS IN SOUTH AFRICA

4.1. Introduction

Although the legal mandate for EMF was only introduced in 2006 via Chapter 8 of the 2006 EIA Regulations (South Africa, 2006a:54-56) they have been developed voluntarily since the early 2000s. According to Mtolo (2010:19) the first formal EMFs were initiated by the Department of Environmental Affairs (DEA) in collaboration with Provincial Departments for municipalities which lacked the necessary financial and human resources to achieve their environmental mandates. Since this initial introduction of EMFs, they have gained popularity as a strategic level environmental management tool in South Africa. This chapter evaluates the status of EMFs and reflects on the manner and extent to which EMFs have been applied in South Africa addressing the research question:

“What is the status and extent of environmental management frameworks in South Africa?”

- Research question 2 -

The data for this chapter were sourced through a survey approach as discussed in **Chapter 2, Section 2.4**.

4.2. The status of EMF in South Africa

To thoroughly understand the status of EMFs in South Africa, the official legal standing of the tool should be discussed.

4.2.1. Legal standing

EMFs are formally mandated through Sections 24(2) and (3) of NEMA which states that:

- | | |
|------------|---|
| (2) | The Minister, and every MEC with the concurrence of the Minister, may identify— |
| (b) | <i>geographical areas</i> based on environmental attributes in which specified activities may not commence without environmental authorisation from the competent authority; |
| (c) | <i>geographical areas</i> based on environmental attributes in which specified activities may be excluded from authorisation by the competent authority; |
| (3) | The Minister, and every MEC with the concurrence of the Minister, may compile information and maps that specify the attributes of the environment in particular geographical areas , including the sensitivity, extent, interrelationship and significance of such attributes which must be taken into account |

by every competent authority.

Section 2(1) of the 2010 EMF Regulations (South Africa, 2010), which replaced the 2006 Regulations (South Africa, 2006a), links EMFs to the Section 24 NEMA mandate by providing:

- | | |
|------------|--|
| (a) | <i>for the Minister or MEC with concurrence of the Minister to initiate the compilation of information and maps referred to in section 24(3) of the Act [NEMA] specifying the attributes of the environment in particular geographical areas;</i> |
| (b) | <i>for such information to inform environmental management; and</i> |
| (c) | <i>for such information and maps to be used as environmental management frameworks in the consideration, as contemplated in section 24(4)(b)(vi) of the Act, of applications for environmental authorisations in or affecting the geographical areas to which those frameworks apply.</i> |

Section 24O(1)(b)(v) of NEMA further mandates the use of the information contained in EMFs when decisions on environmental authorisation applications are taken when it calls for the consideration of:

- | | |
|------------|---|
| (v) | <i>...any information and maps compiled in terms of section 24(3), including any prescribed environmental management frameworks, to the extent that such information, maps and frameworks are relevant to the application</i> |
|------------|---|

This requirement is echoed in the 2010 EMF regulations Regulation 5(2) which requires that an EMF:

- | | |
|-------------|---|
| 5(2) | <i>...must be taken into account in the consideration of applications for environmental authorisation in or affecting the geographical area to which the framework applies</i> |
|-------------|---|

To enforce this requirement that an EMF **must** be taken into account, an EMF has to be formally adopted in terms of Regulation 5(1) and a notice of adoption Gazetted in terms of Regulation 5(4). If not formally adopted and Gazetted but adhering to the requirements for EMF development, the EMF is still applicable to decision makers in terms of Regulation 5(3) which states that the EMF:

- | | |
|-------------|--|
| 5(3) | <i>...may be taken into account in the consideration of applications for environmental authorisation...</i> |
|-------------|--|

Although Regulation 5(3) is less stringent with regard to the use of the EMF it still offers the opportunity for the information and management guidelines contained in EMFs to be used to support decision making. The 2010 EMF regulations will most likely be replaced by a new set of regulations that are being developed by the DEA and which will cover all the IEM instruments discussed in Chapter 3 (Van Reenen, 2015).

The 2012 EMF Guidelines (South Africa, 2012b) which replaced the 2006 Guidelines (South Africa, 2006b) provide details on the development process for EMF and the minimum requirements of a completed EMF. The guidelines describe the different EMF phases and propose a general methodology that could be followed for each phase.

4.2.2. EMF in case law

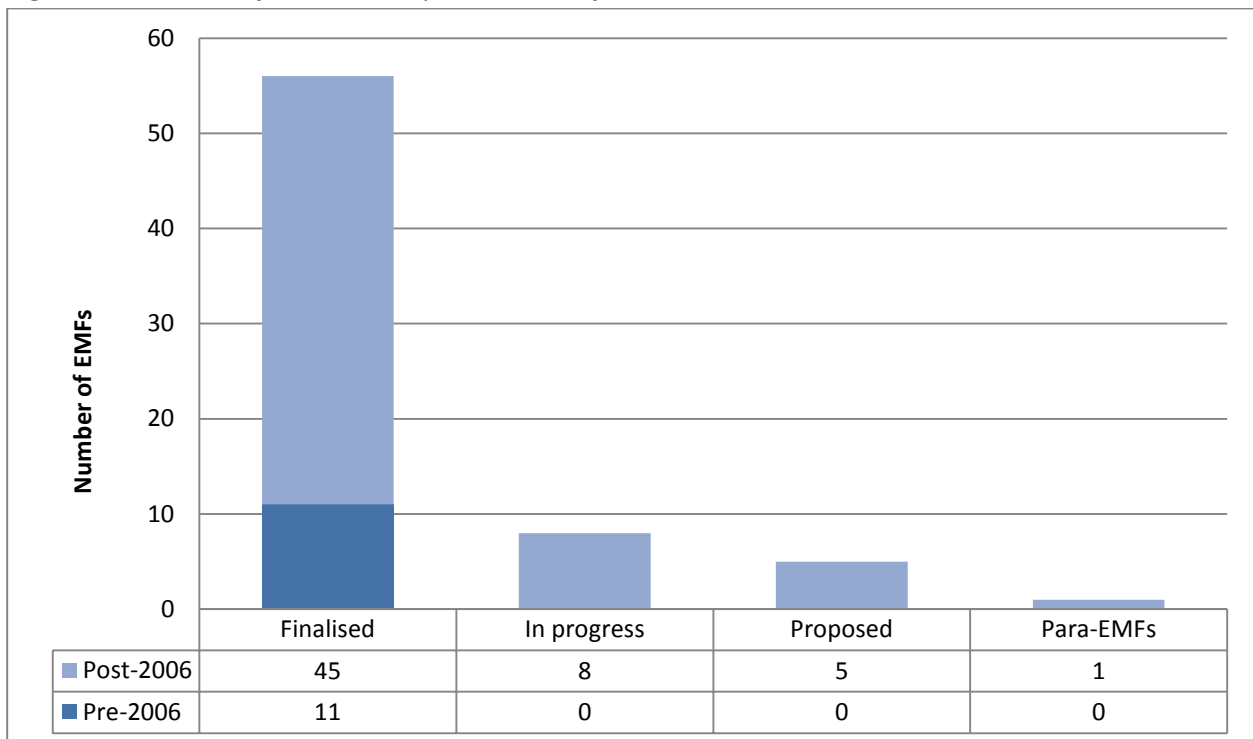
Case law is defined by Hage (2014:32) as legal decisions that may act as precedents for future decisions. Put simply, it is the interpretation of a court on a certain matter which can then be used to guide future decisions and rulings. It is therefore important to consider any case law applicable to EMFs in South Africa when considering the status of EMFs. Only one case exists where an EMF was referenced in the arguments and the eventual court ruling. The case referred to is the Magaliesberg Protection Association v MEC of Agriculture and others (South Africa, 2013b). The case concerned the Kgaswane lodge and conference facility that was developed within the Magaliesberg Protected Environment without the necessary environmental authorisation. A local environmental association – the Magaliesberg Protection Association (MPA) – in July 2008 took note of the illegal development and raised concerns with the relevant authorities. It emerged that the developers initiated a Section 24G *ex post facto* (after the facts) authorisation application and argued that they were unaware that they required an environmental authorisation before commencing with development (South Africa, 2013b:5-6). The *ex post facto* application was successful and authorisation was granted in March 2009. The MPA appealed against the decision but was informed that the member of the executive council (MEC) dismissed their appeal (South Africa, 2013b:6-7). The MPA took the matter further and contested the matter in the Supreme Court of Appeal of South Africa. One of the arguments offered by the MPA was that the MEC in his decision failed to consider the Magaliesberg Protected Environment EMF which identified the area where the lodge was developed as unsuitable to the type of development (South Africa, 2006b:10-20). In turn the respondents argued that the EMF did not have to be considered at the time as it was not formally adopted yet and only Gazetted at a later date (South Africa, 2013b:20). Although the EMF could have been considered as a policy document which does not require any formal promulgation it was not considered binding on the decision (South Africa, 2013b:21). This ruling therefore emphasises the importance of formally adopting and Gazetting EMFs in terms of Regulations 5(1) and 5(4) of the 2010 EMF Regulations.

Another court case is currently in process where the Cannon Rocks to Great Kei EMF is used to defend a decision that was taken by the relevant authority (pers. comm. Pienaar, 2015). At the time of this research no information on the outcomes of the case was available for consideration.

4.3. The extent of EMF in South Africa

Since the introduction of EMFs in South Africa a total of 65 EMFs have been developed, the first of which were developed without clear development guidelines or legal mandates. Since then EMFs have become more structured and regulated and have gained popularity across South Africa. This section discusses the extent to which EMFs have been developed in South Africa and reflects on the different characteristics of EMF development.

Figure 4.1: Number of EMFs developed in South Africa

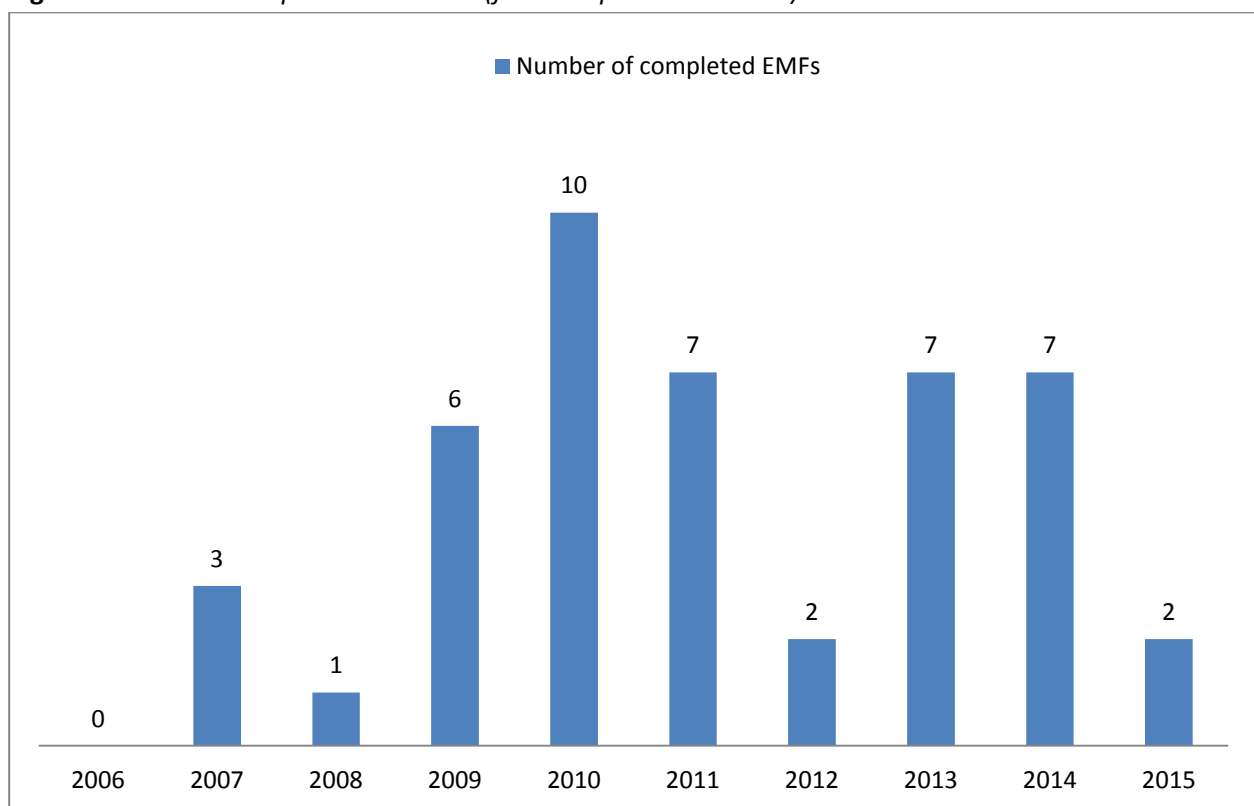


4.3.1. Number of EMFs

From the 65 EMFs that have been developed in South Africa eleven were developed prior to the introduction of the 2006 Regulations and Guidelines (see **Figure 4.1**). Therefore, these EMFs may differ quite substantially from EMFs that were developed post-2006 in line with the Regulations and Guidelines. Of the 54 EMFs that were developed post-2006, eight are still in the process of being developed while 46 have been successfully completed with one of these being regarded as a *para-EMF*. A *para-EMF* can be defined as an EMF that does not meet all the basic requirements of an EMF and that was developed for a different purpose as that described in the EMF Regulations and Guidelines. This type of EMF offers some of the characteristics of a regular EMF and also uses the name, but will be unlikely to meet the necessary criteria for formal adoption and gazetting purposes. In addition to the 65 completed EMFs another five have been proposed in recent years bringing the total number of EMFs to 70 (see **Figure 4.1**)

When considering the completion of EMFs since 2006 as depicted in **Figure 4.2** it can be observed that EMFs had a slow start in the period between 2006 and 2008 but increased significantly between 2009 and 2011 with ten EMFs being completed in 2010 alone. In 2012 a dip was experienced in EMF development which normalised in 2013 and 2014 with seven EMFs being completed in each year. When considering the five proposed EMFs along with the two already completed for 2015 it seems as if EMFs are retaining their popularity and are still being developed. Overall EMFs have been extensively used as a strategic environmental management tool since 2009 and have not yet seen a significant decrease in their development.

Figure 4.2: EMF development over time (finalised post-2006 EMFs)

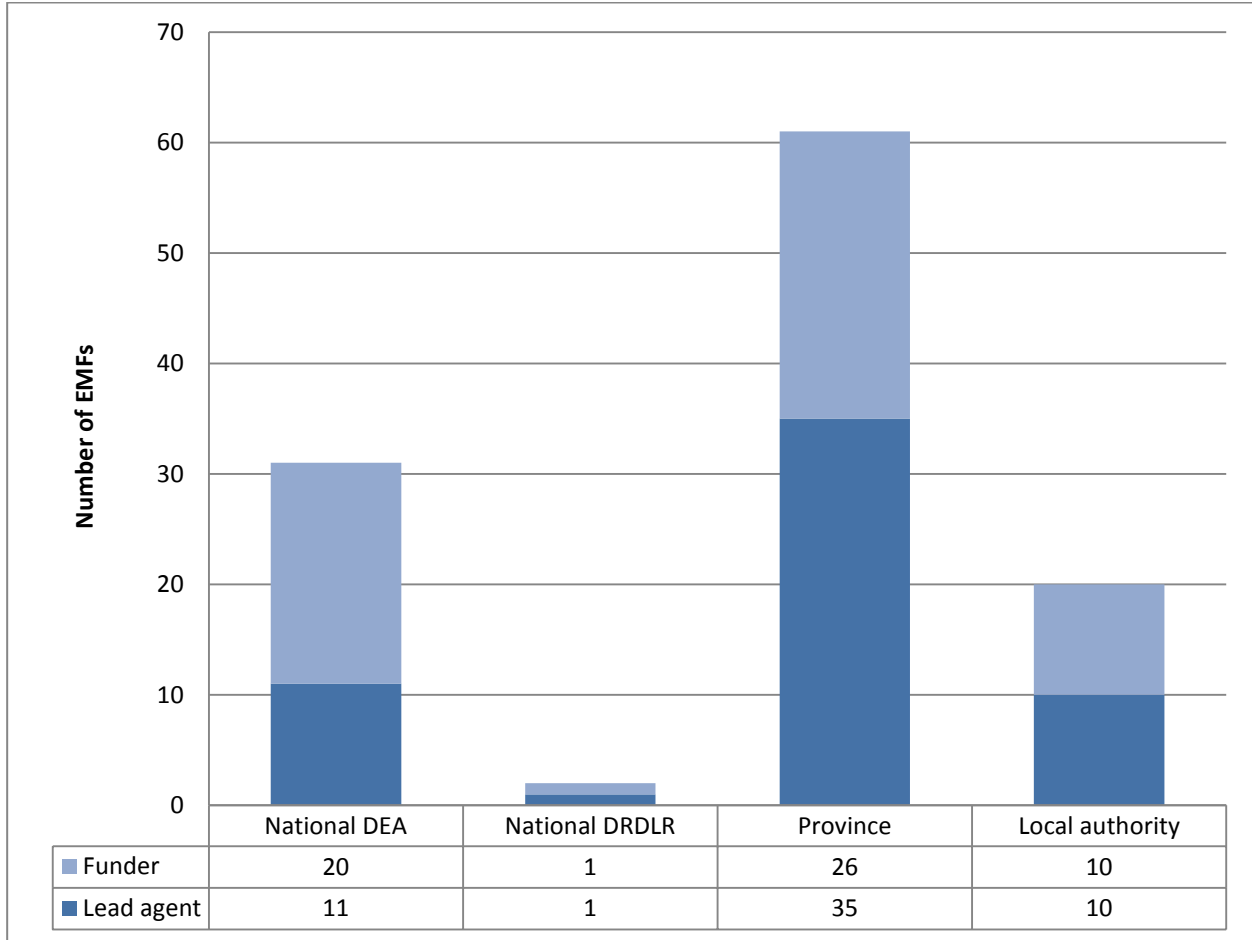


4.3.2. Lead agents and funders

In terms of both the 2006 and the 2010 EMF Regulations it is the function of the Minister or a member of the executive council (MEC) in concurrence with the Minister to initiate the development of an EMF. This might lead to confusion as to who the lead agent should be and who should be the competent authority that should be implementing EMFs (Mtolo, 2010:55). However this does not prevent local municipalities to initiate the development of EMFs for their own areas of jurisdiction, but it does require the concurrence of the relevant MEC or Minister. In the period between 2000 and 2006 before the first EMF Regulations was published local authorities funded most of the EMFs that were developed and also

took the lead role in developing them. Post-2006 this changed (**Figure 4.3**) with National DEA and Provincial Government starting to play a more important role in the development of EMFs.

Figure 4.3: Lead agents and funders (post-2006 EMFs – completed, in process and planned)



During the period 2007 and 2008 National DEA funded most EMFs but the data shows that this function gradually moved to Provincial governments, possibly because they started budgeting for EMFs. It is clear that local governments (both local municipalities and district municipalities) initiate and fund the smallest number of EMFs. This is partly due to the lack of funds in local governmental budgets for EMFs (pers. comm. Mtolo, 2015), the fact that EMFs are mostly used at the Provincial and National sphere in terms of EA processes and finally because of capacity issues in local governments. Most local municipalities in South Africa have no dedicated environmental officers that can initiate the development of EMFs. In one case an EMF was initiated and funded by the National Department of Rural Development and Land Reform (DRDLR). The reason for this was because the EMF formed part of a larger project which involved the concurrent development of a spatial development framework (a type of strategic development plan) and the EMF for the relevant municipality.

4.3.3. Spatial distribution of EMFs

The first EMFs developed in South Africa were mainly focussed in the Gauteng Province. Between 2000 and 2006 nine EMFs were developed in Gauteng Province with only one being developed in the Western Cape and Mpumalanga each. After the introduction of the 2006 Regulations and Guidelines many other Provinces got involved in the development of EMFs. In the period between 2007 and 2010 a total of 20 EMFs were initiated. Of these four were developed in Gauteng, three in the North West Province, three in the Northern Cape, two each in Limpopo, Mpumalanga, the Western Cape and Kwa-Zulu Natal and one each in the Eastern Cape and the Free State. In the period 2011 to 2015 the number of successfully completed EMFs totalled 26 with Gauteng and Kwa-Zulu Natal each completing six, followed by the Western Cape with four and the Free State with three. The North West Province and the Eastern Cape each completed two during this period while Limpopo, Mpumalanga and the Northern Cape each completed one. In addition to these, a total of 13 EMFs were still in progress or were being planned at the time of the survey. Of these three were in the Western Cape, two each in the North West Province, Mpumalanga and Kwa-Zulu Natal and one each in Limpopo, the Eastern Cape, the Free State and Gauteng.

According to Mtolo (2010:60) the EMF in Gauteng that is listed as 'still in progress' might have been terminated altogether. This would mean that Gauteng, which to date has developed the most EMFs, stopped developing new EMFs. The reason for this is because the Province recently published a 'first of its kind' Provincial EMF which would, once implemented, replace all other EMFs in the Province (GDARD, 2015:3). The relatively small size of the Gauteng Province made it suitable for a Provincial level EMF but it is unlikely that other provinces will follow suit due to their larger geographical areas.

Figure 4.4 shows the total number of post-2006 completed, in process of development and planned EMFs per province. From the data it is clear that the Gauteng Province is the leader in terms of EMF development followed by Kwa-Zulu Natal, the Western Cape and the North West Province. The Limpopo Province, the Eastern Cape, the Free State and the Northern Cape have the smallest number of EMFs.

Figure 4.5 maps the spatial footprint of EMFs in South Africa. The footprints for completed and partially completed post-2006 EMFs are shown. From the data it is calculated that approximately 47% of South Africa have not yet been mapped in terms of EMFs.

Figure 4.4: Number of EMFs per province (post-2006 EMFs – completed, in process and planned)

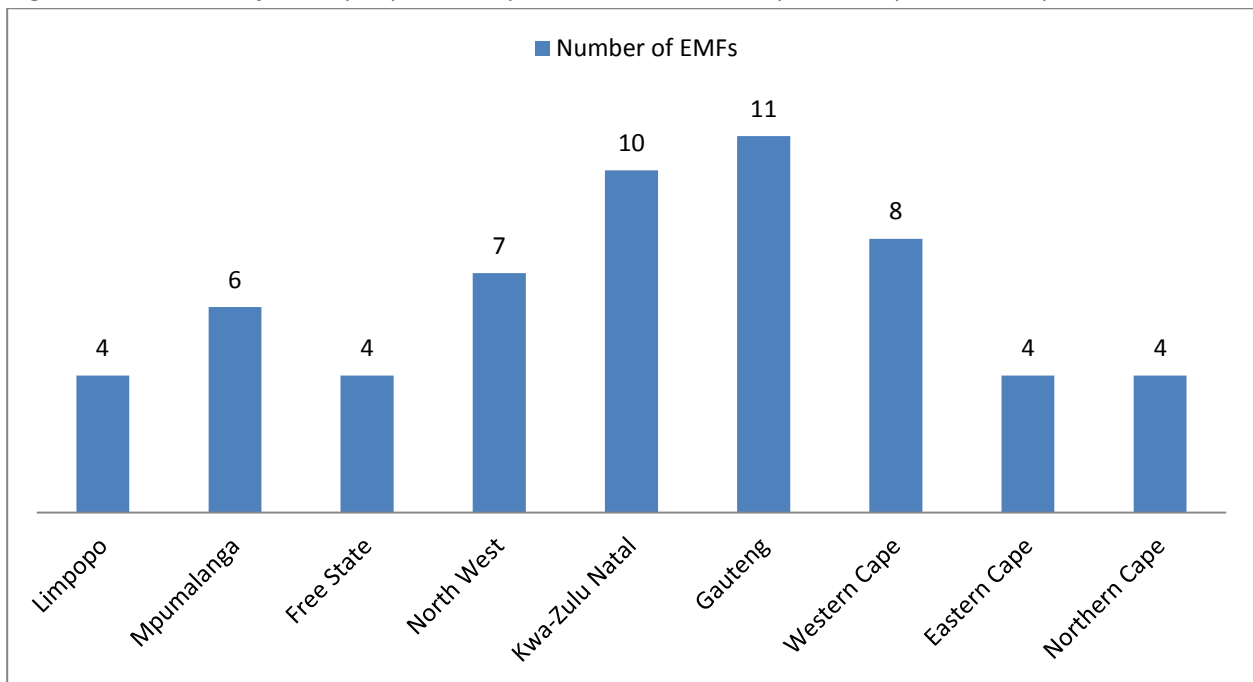
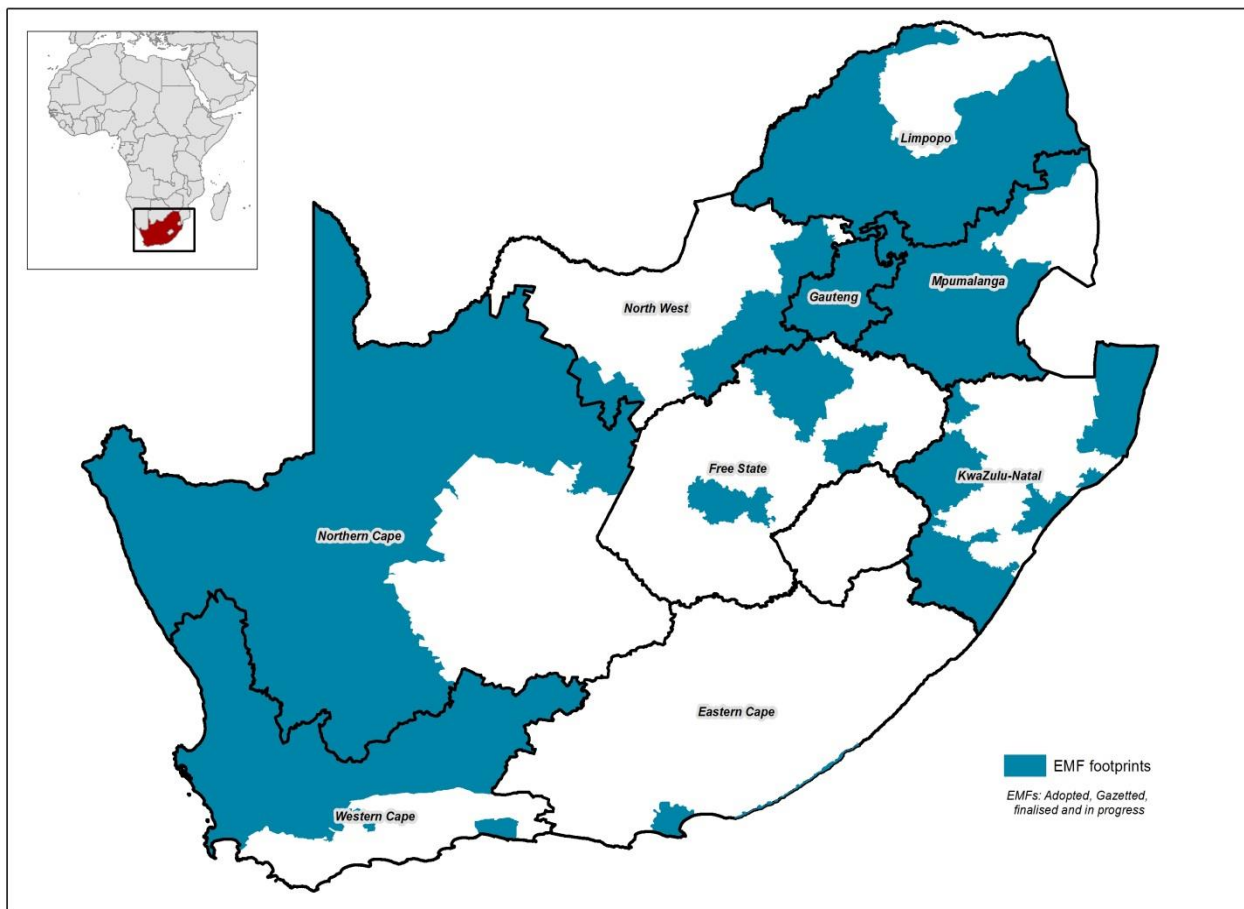


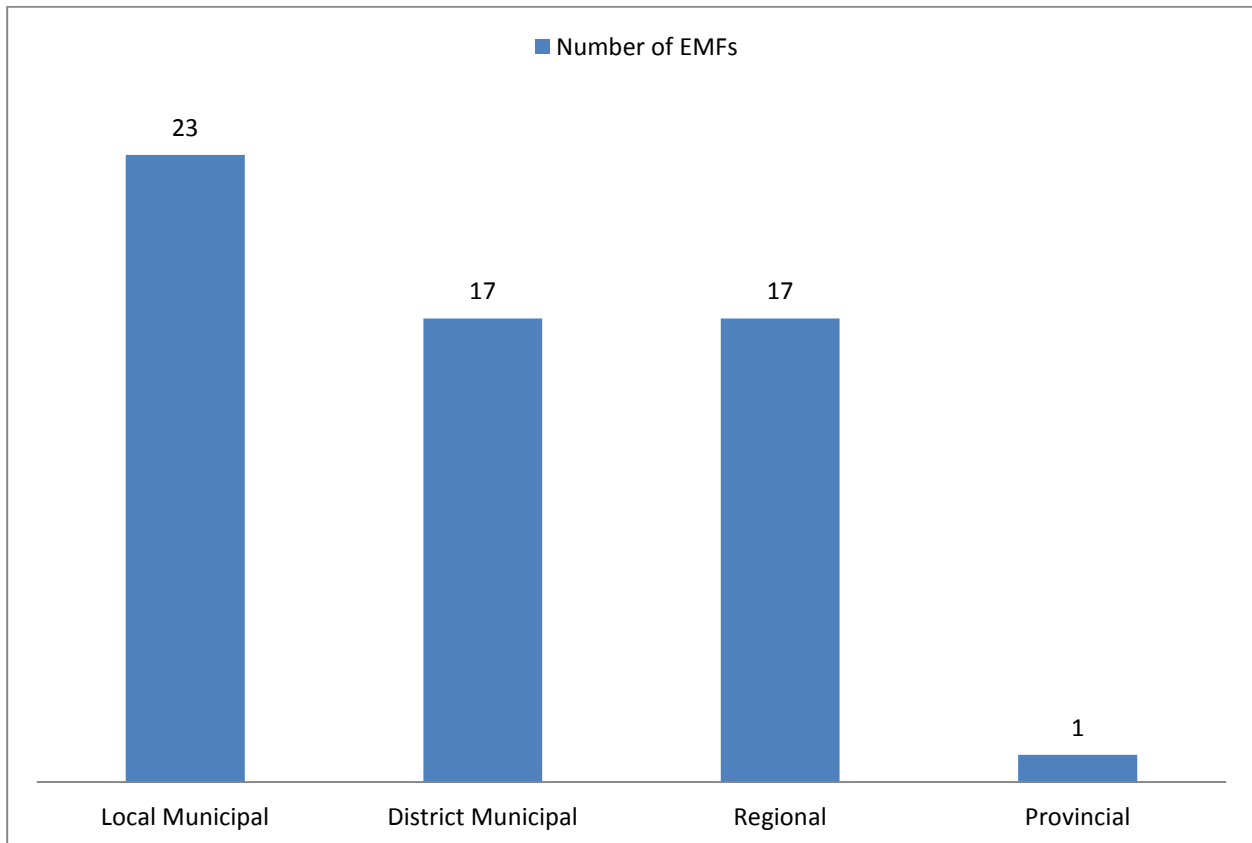
Figure 4.5: Spatial distribution of existing EMFs (post-2006 EMFs – excluding proposed EMFs)



4.3.4. Scale of EMFs

EMFs are not linked to any specific scale and can theoretically be developed at any spatial scale. The use of the term scale here refers to study area extent and subsequently scale of application. In practice four scales of EMF development can be distinguished. They are the local municipal scale, the district municipal scale, the newly introduced provincial scale and the regional scale. The first three refer to EMFs that are developed within specified administrative boundaries while the latter refers to EMFs that may cross administrative boundaries and are developed within bioregional boundaries of some sort, e.g. a water catchment. All the pre-2006 EMFs were developed at either a local municipal or a regional scale. Since 2006 and onwards EMFs have been developed at all four of these scales. From the data presented in **Figure 4.6** it can be observed that the most popular scale of EMF development is the local municipal scale followed by the district municipal scale and the regional scale. Although some of the early references to EMF called for provincial EMFs to be developed (Claassen & Heydrenrych, 1998:26) only one has formally been developed in 2015. South Africa is divided into nine provinces, 44 district municipalities and 234 local municipalities (including metropolitan municipalities). Therefore the significance of the higher number of EMFs at local municipal EMFs should be evaluated against the ratio of local municipalities, district municipalities and provinces.

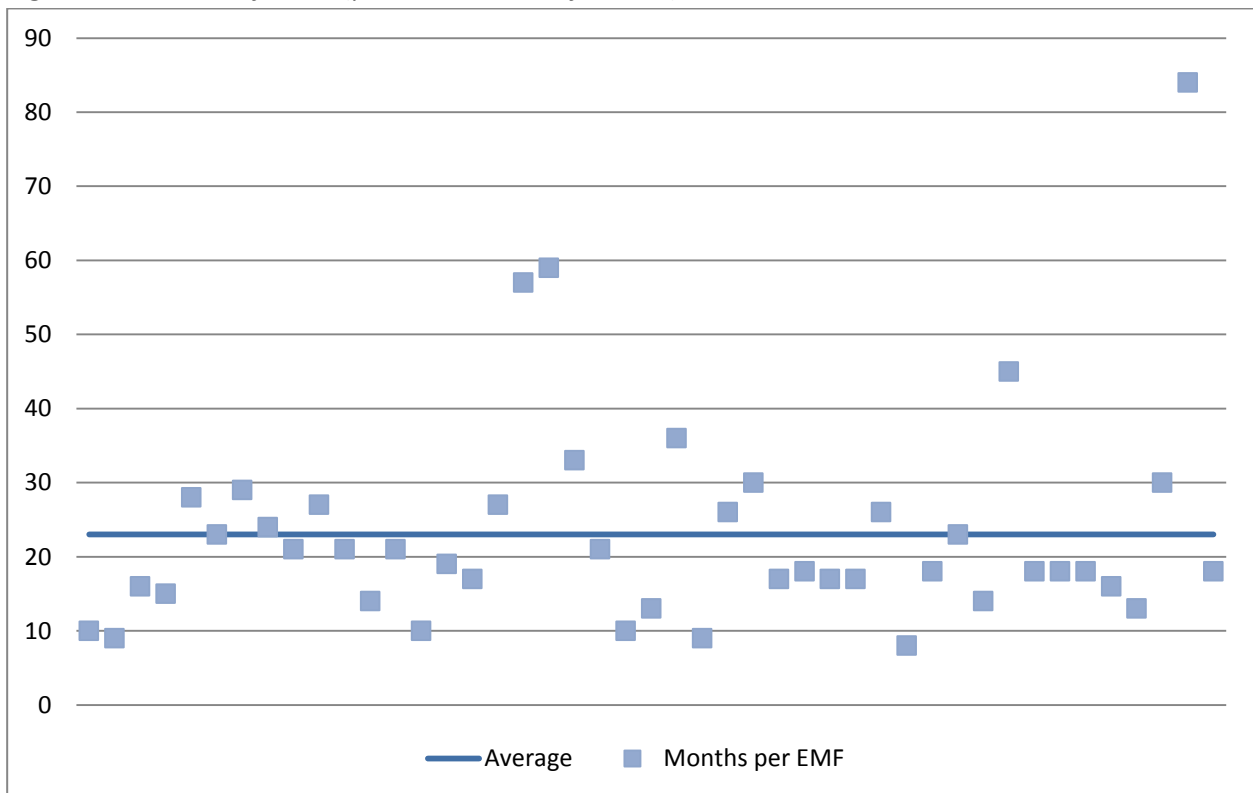
Figure 4.6: EMF application scale (post-2006 EMFs – completed, in process and planned)



4.3.5. EMF timeframes

Neither the EMF Regulations nor the EMF Guidelines make any reference to the prescribed timelines for EMF development. Expected delivery dates for the different EMF phases are usually described in the applicable terms of reference of the project or agreed upon during the inception meeting where the service level agreement is finalised between Government and the consultant. Usually the set date for completion is between 8 – 14 months from project inception. **Figure 4.7** shows the timeframes for post-2006 completed EMFs in months. The data revealed that only eight EMFs were completed within a 14 month period while the rest all took much longer to complete. Four EMFs took more than 40 months to complete, but this was likely due to issues with the projects resulting in them being halted for a period of time (pers. comm. Mtolo, 2015). Nonetheless, most EMFs still took more than 20 months to complete with the average time spent per EMF (four outliers excluded) being 19 Months. Concerns have been raised that, due to these extensive timeframes, some sections of EMFs are already out-dated by the time of completion (pers. com. Zondi, 2015). The reason for the extensive EMF timeframes are usually ascribed to extensive public participation processes, issues with data sourcing, and the difficulty of arranging meetings with all the relevant stakeholders involved in the project development. All these reasons could however be addressed through sound management and project planning processes which could assist in greatly reducing the average timeframe of EMFs in South Africa.

Figure 4.7: EMF timeframes (post-2006 EMFs – finalised)



4.3.6. Adoption of EMFs

As stated earlier in **Section 4.2.1** an EMF must be formally adopted and gazetted for it to obtain its required legal standing. The importance of this step was emphasised by the *Magaliesberg Protection Association v MEC of Agriculture and others* (South Africa, 2013b:21) ruling discussed in **Section 4.2.2**. **Figure 4.8** shows the adoption and gazetted rate of completed EMFs in South Africa. The data showed that less than half (42%) of all completed EMFs developed since 2006 have been gazetted. Of the remainder 16% were formally adopted by the relevant authority and awaiting gazetting while a staggering 42% were not gazetted nor formally adopted.

Figure 4.8: EMF adoption rate (post-2006 EMFs – finalised)

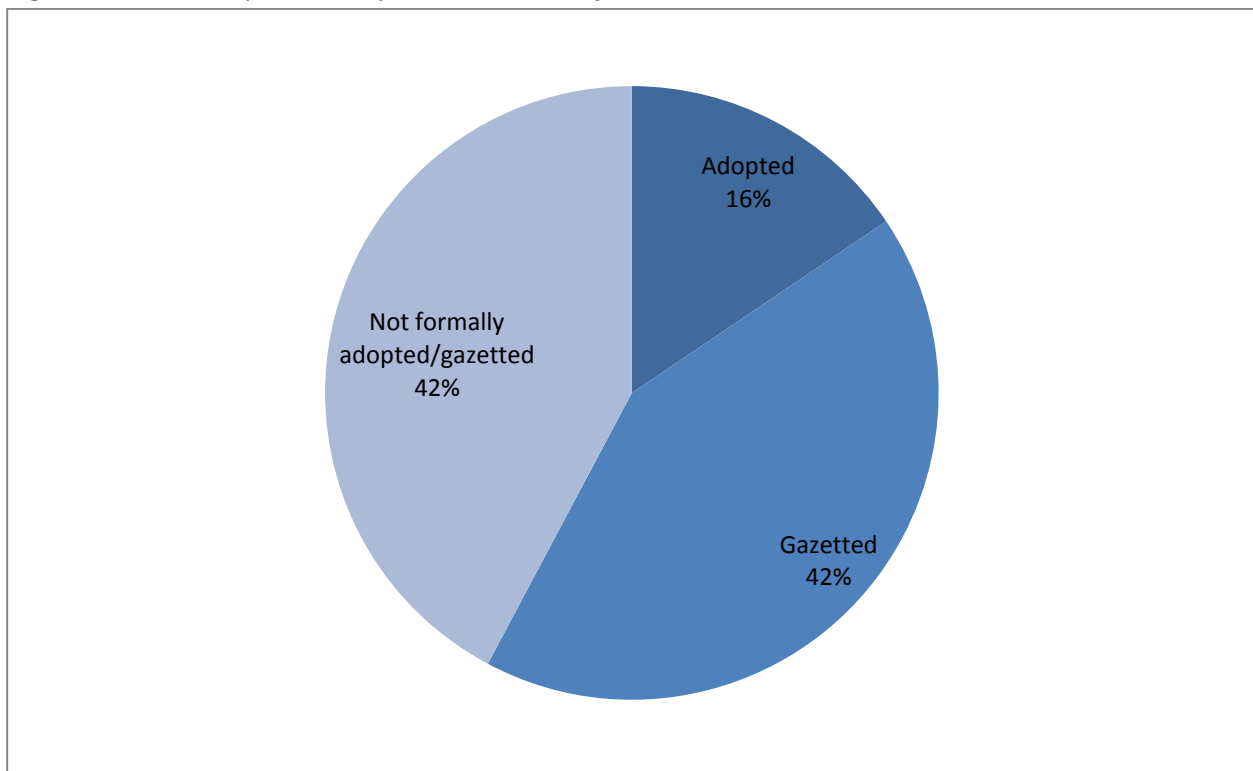


Figure 4.9 maps the spatial distribution of gazetted EMFs against the number of completed EMFs per province. From the data it can be observed that the Free State and Kwa-Zulu Natal provinces are the worst off when it comes to gazetting and adoption of EMFs. The North West Province boasted a 100% success rate in terms of adoption and gazetting followed by Gauteng with 80% and Mpumalanga and the Northern Cape with 75% each. The Limpopo Province and the Eastern Cape adopted and published around 67% of their EMFs while the Western Cape adopted and published only 40%. The gazetting of many EMFs are hampered by the high costs associated with gazetting brought about by the often large number of pages that should be gazetted (pers. comm. Pienaar, 2015). Pienaar (pers. comm., 2015)

proposed that only a summary of an EMF should be published and the rest made available online to bring down the costs of publishing. However the research found that full EMFs are almost never published and therefore the lack of publishing cannot be ascribed to the large size of documents alone. The more plausible reasons for the lack of publishing might be ascribed to the lack of budgets for publishing and the

“...lack of capacity in provincial government to drive the processes and get the required buy-in for gazetting and implementation”
(pers. comm. Steward, 2015).

In addition to the lack of adoption and publication of EMFs the time-lapse between completion and adoption and publication is an issue. **Figure 4.10** shows the time-lapse in months between finalisation and publication of all gazetted EMFs. In two extreme cases it took 40 and 43 months respectively to get the EMFs published. In general it took between 6 – 22 months to publish an EMF, although one EMF was published within one month of completion, showing that it is possible to expedite the process.

Figure 4.9: Spatial distribution of completed and Gazetted EMFs (post-2006 EMFs – finalised)

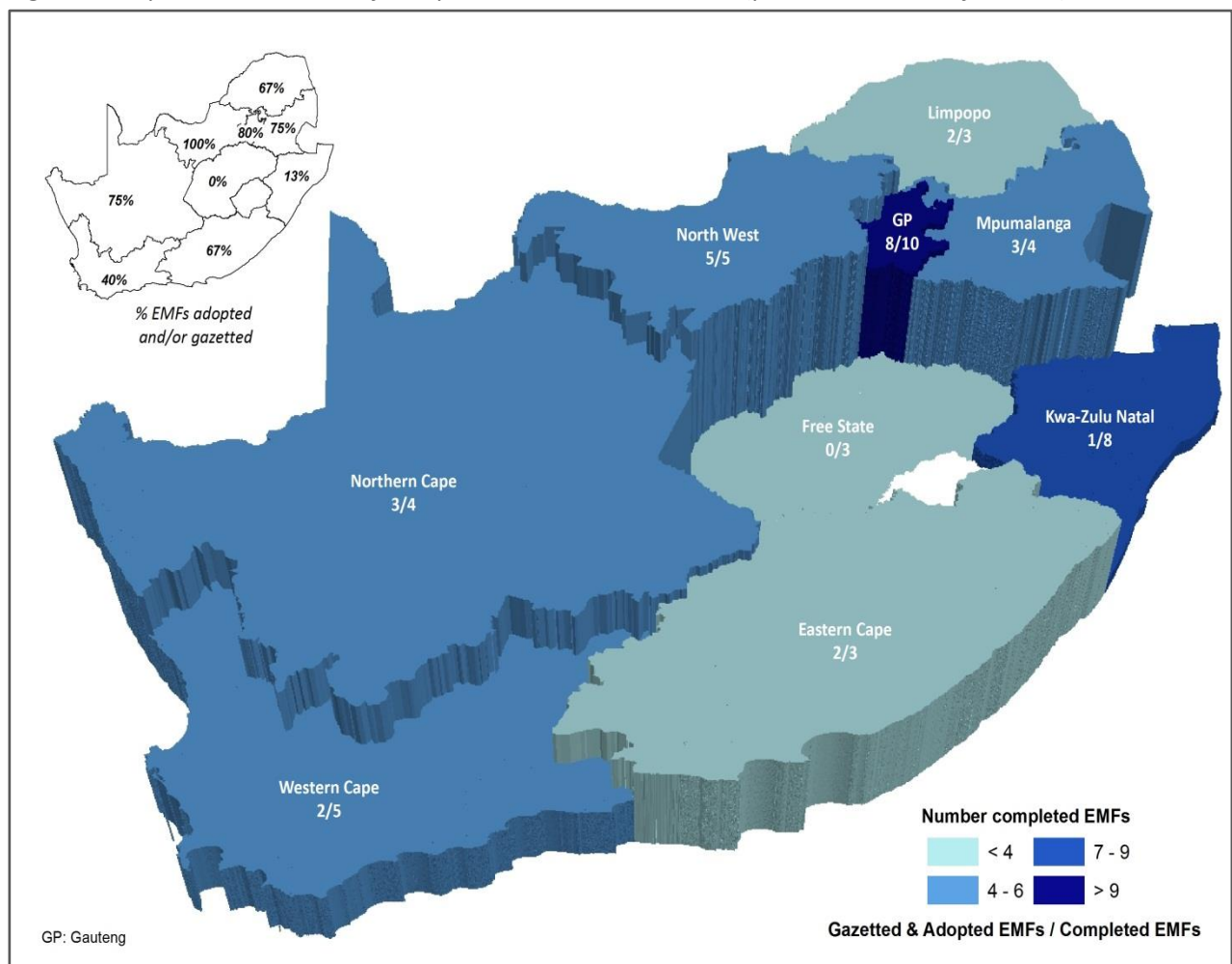
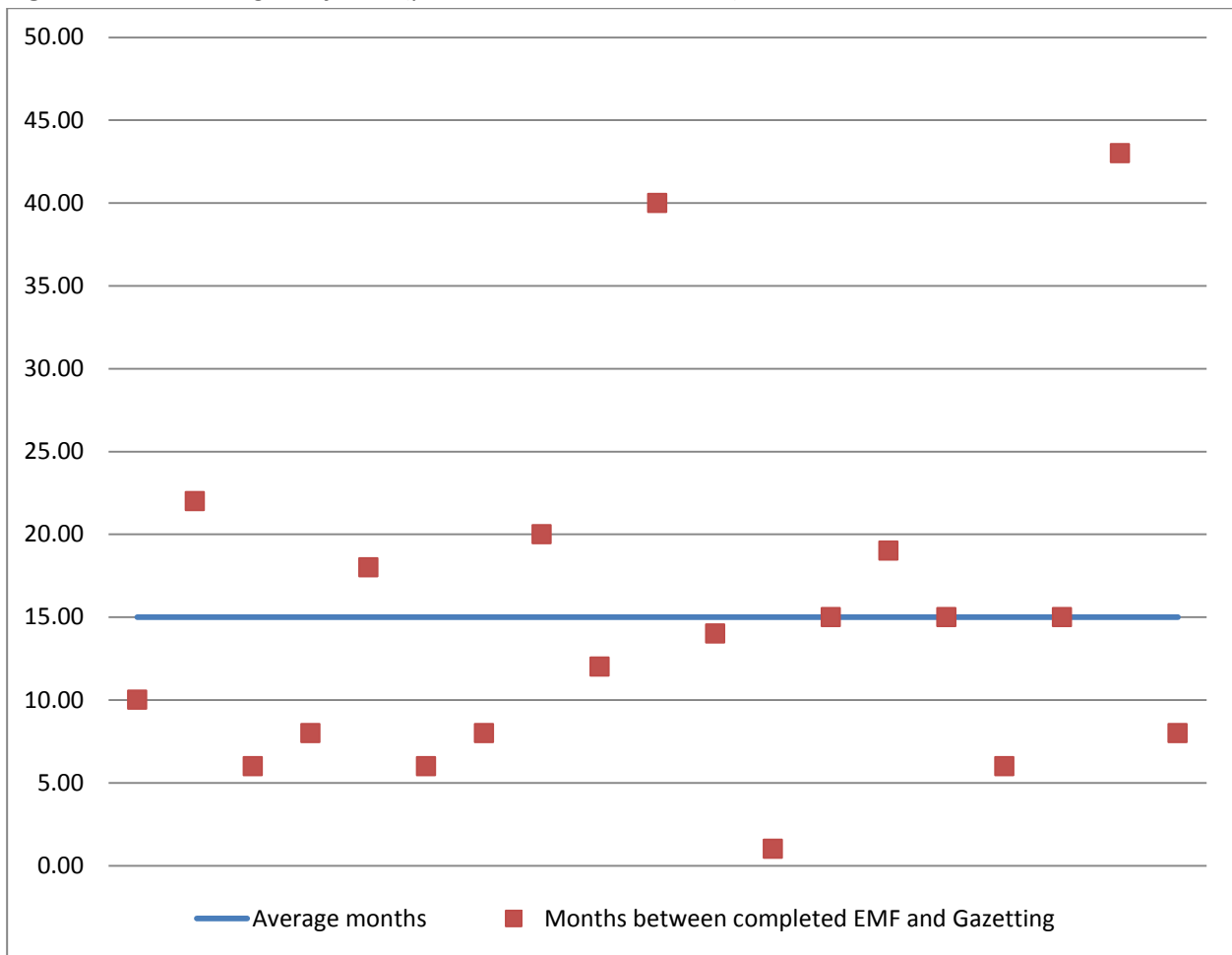


Figure 4.10: Gazetting timeframe (post-2006 EMFs – Gazetted)

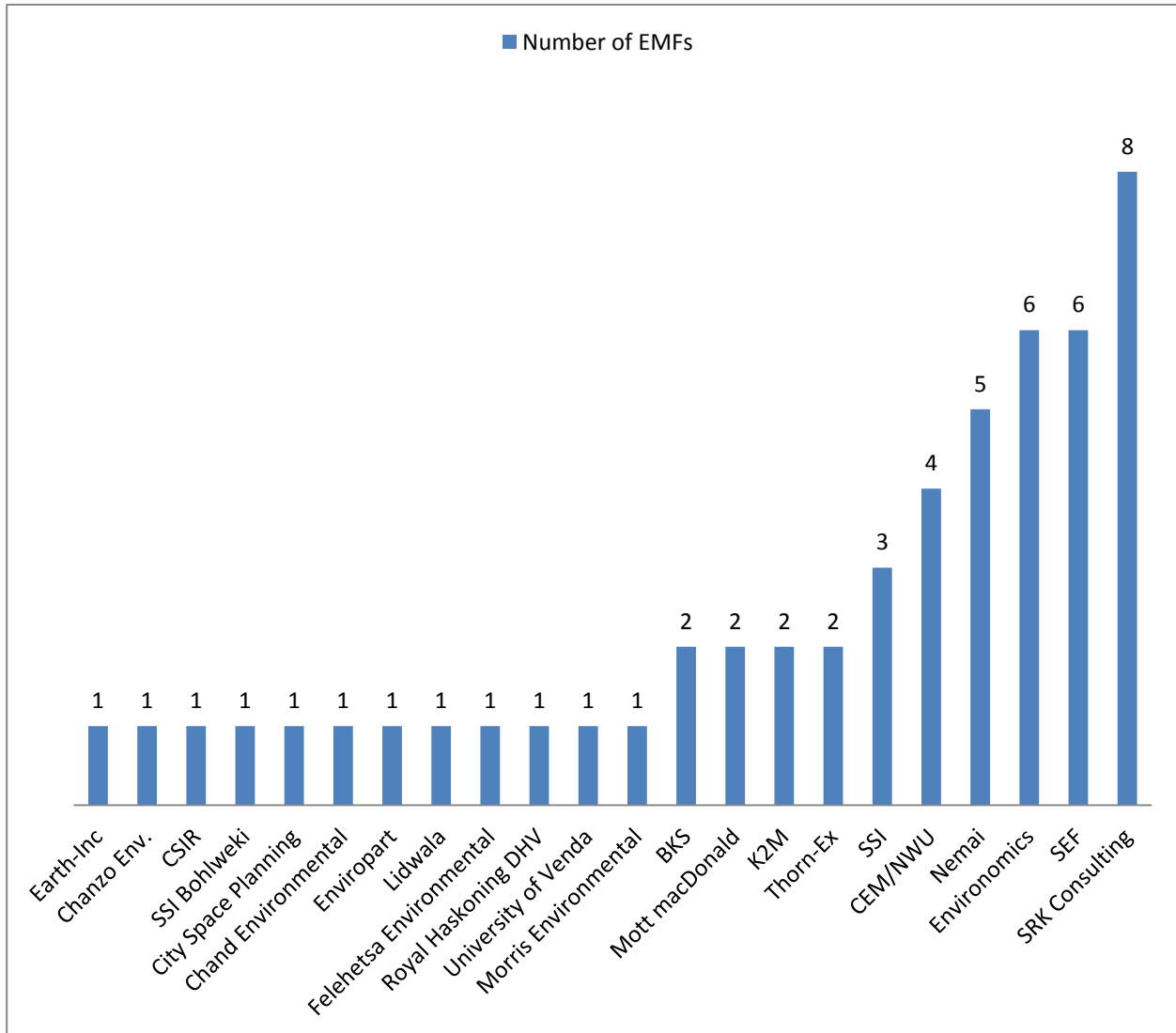


4.3.7. EMF expertise

From both the 2006 and 2012 EMF Guidelines it is clear that the intention from government is that EMFs would be developed by service providers appointed by the relevant government department (South Africa, 2006b:2; South Africa, 2012:8). **Figure 4.11** shows the 22 lead consultants involved in completed and current post-2006 EMFs. From the data it can be observed that 12 of the 22 consultants (more than half) took the lead in only one EMF. From the remainder four were involved in two EMFs while the remaining six were involved in three or more EMFs. The most prominent role player is the engineering firm SRK Consulting who developed eight EMFs followed by Strategic Environmental Focus (S.E.F.) and Environomics who completed six each. From the data it could be argued that there is a limited pool of expertise available that have experience in conducting EMF projects. The most probable reason for this is that an EMF development team must be multi-disciplinary with a wide range of experience such as environmental management, applied ecology, agricultural science, spatial analysis and mapping, hydrology, heritage assessment and many more. Small consultancies often do not have the extensive

expertise and capacity required to develop an EMF and therefore they are mostly done by larger companies such as SRK Consulting and S.E.F.

Figure 4.11: Key EMF consultants (post-2006 EMFs – finalised and in progress)

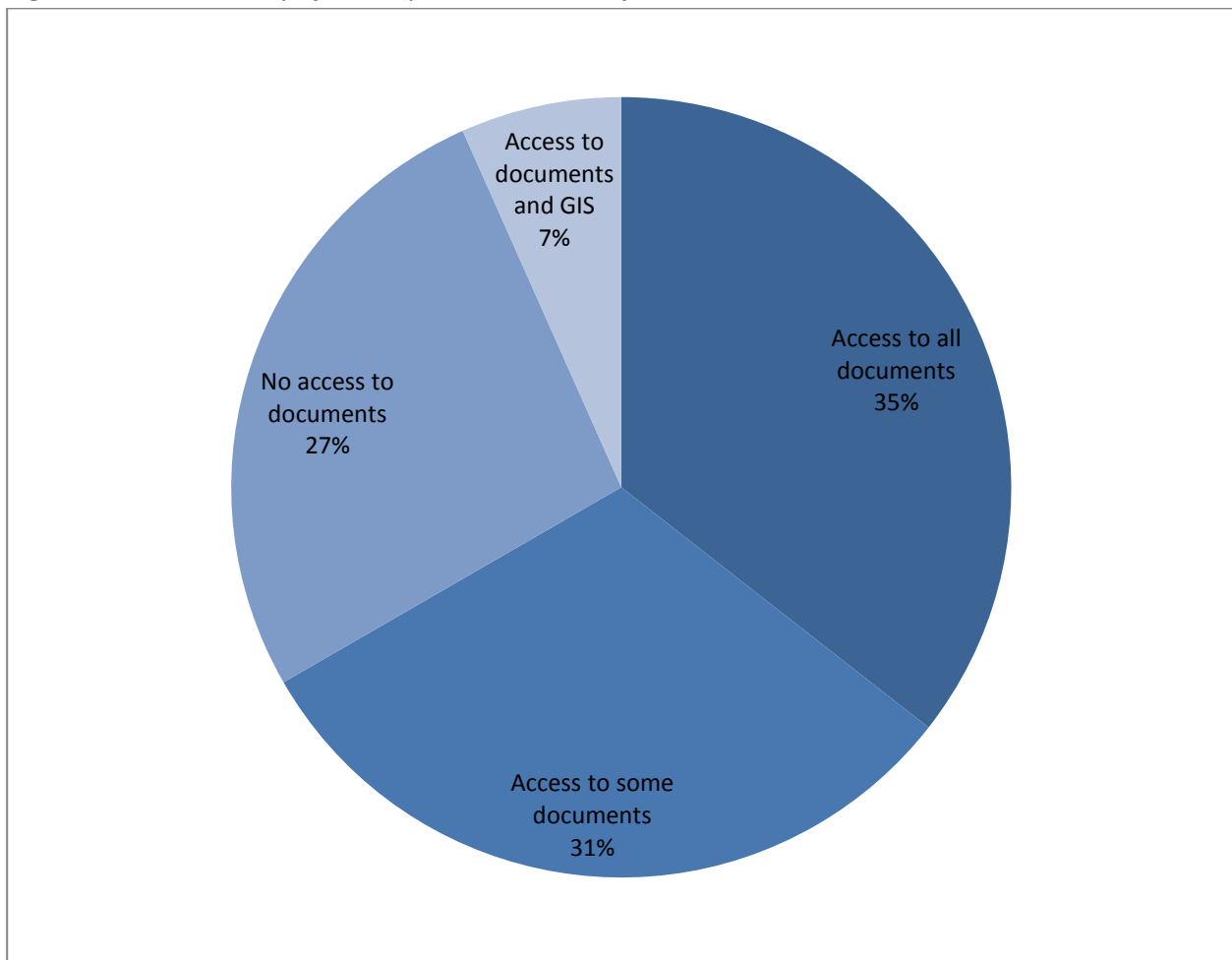


4.3.8. Accessibility of EMFs

One final aspect that was assessed in terms of EMF extent was the degree to which EMFs were available and accessible. A typical EMF consists of a number of separate documents such as a ‘*Status Quo Report*’ a ‘*Desired Sate of the Environment Report*’ and a ‘*Final EMF Report*’. In addition to the documents a typical EMF also has a spatial component or a spatial decision support tool which is usually in a digital format on a GIS platform. For anyone to be able to effectively use an EMF and consider it for planning or application purposes both the documentation and the spatial datasets have to be obtained. For the general survey the internet was used to search for these documents and datasets. **Figure 4.12** shows the survey results. Of all completed EMFs only 7% were available in full, while the documentation of 35% was accessible and

the partial documentation of 31%. For more than a quarter of EMFs (27%) no information could be accessed, rendering the EMFs effectively useless to those parties outside of government. A real concern is that only 7% of EMFs had the actual EMF data layers available online for download or on some sort of online GIS web-viewer. For EMFs to be considered by developers they have to be available and easily accessible via the internet. In some cases attempts were made to source the unavailable documentation from government departments, but in most cases attempts were unsuccessful.

Figure 4.12: Accessibility of EMFs (post-2006 EMFs – finalised)

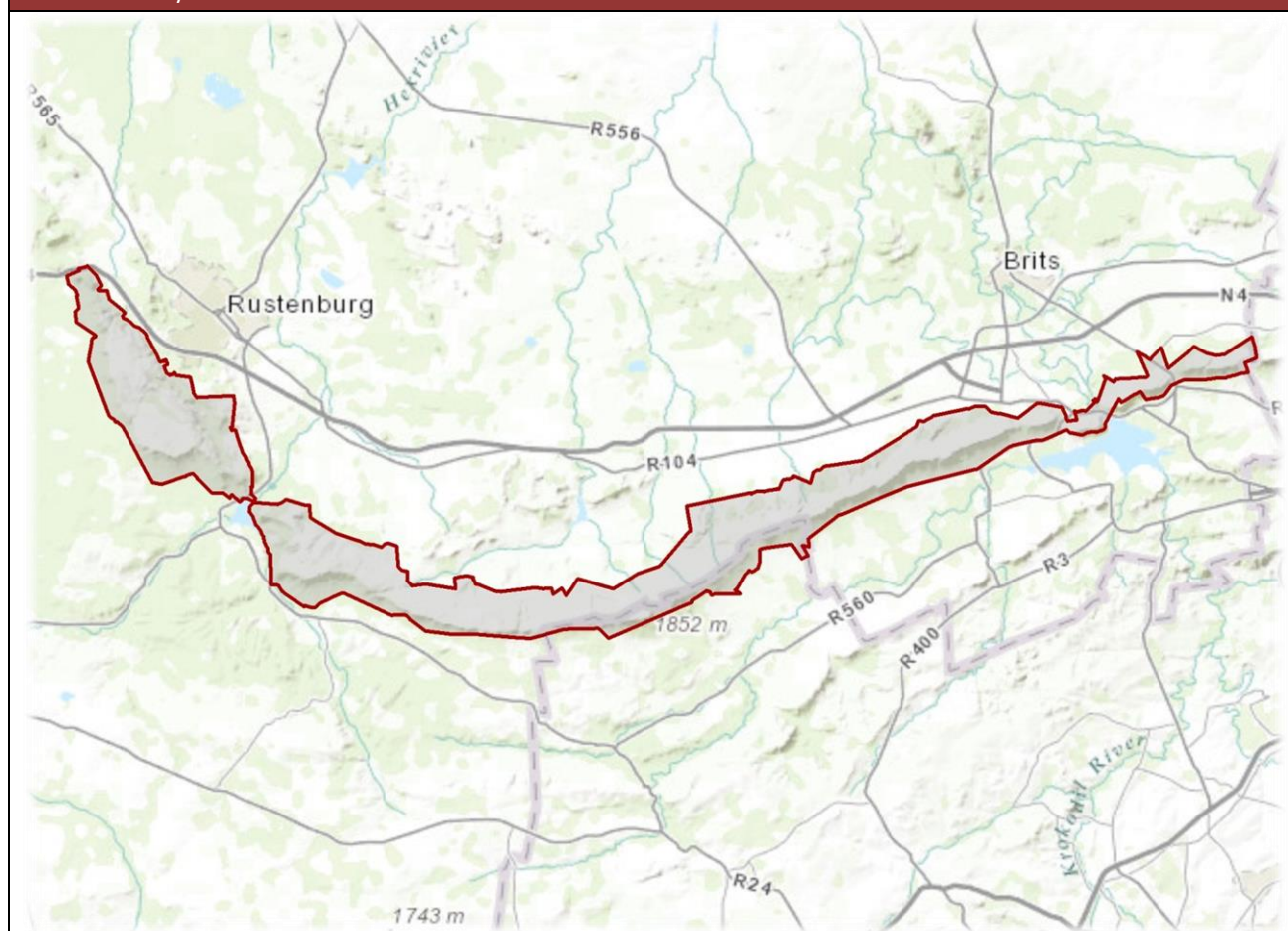


4.4. Selected cases

From the 65 identified EMFs in South Africa, seven were selected for further study and evaluation as discussed in **Section 2.5.1.1**. As discussed, the seven case studies consisted of one pilot case study and six main case studies which were selected through the application of the selection criteria presented in **Table 2.3**. **Table 4.1** provides detail on the pilot case which was used to test and refine the review protocol.

Table 4.1: Pilot case

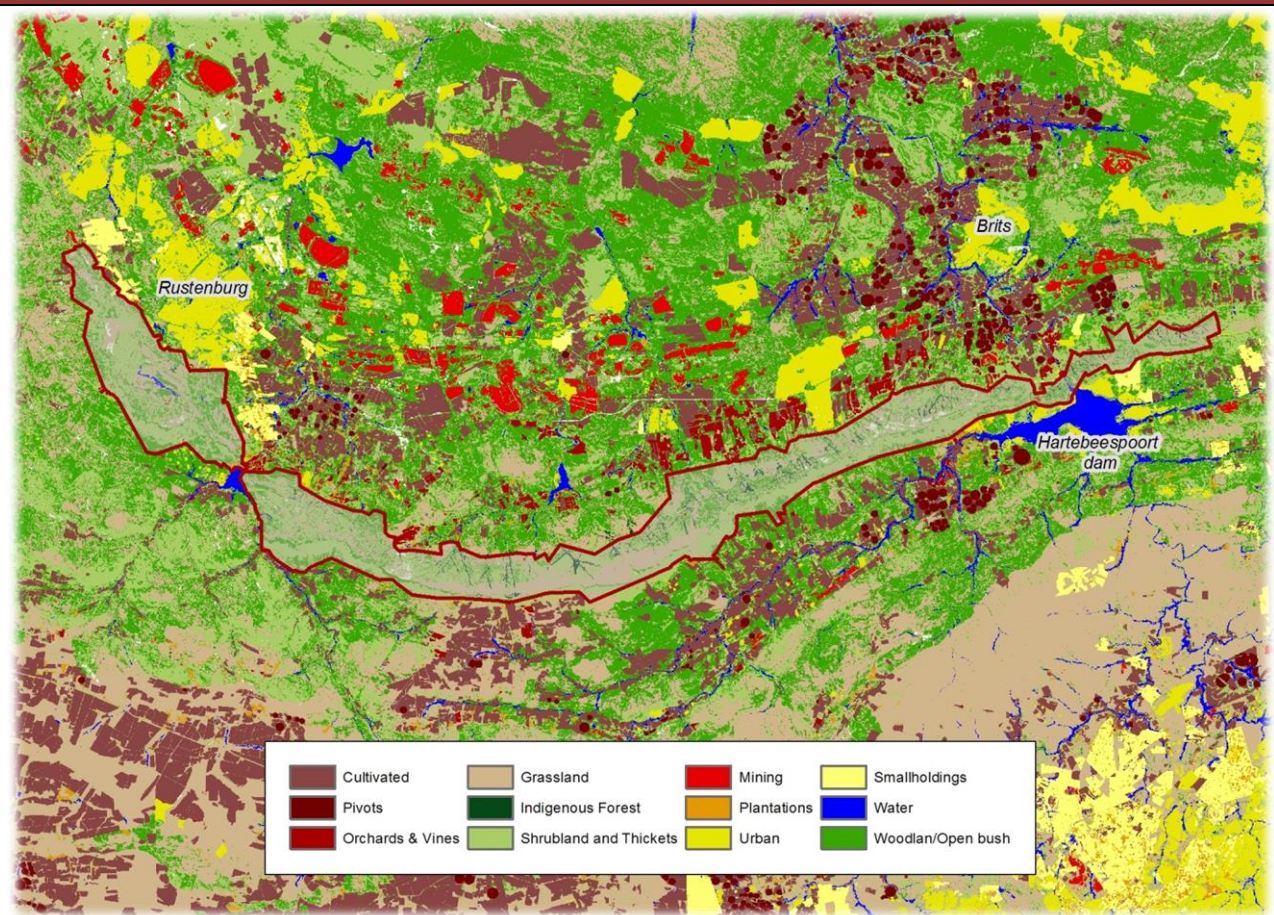
Name:	Magaliesberg Protected Environment (MPE) EMF	Consultancy:	K2M Consulting and the North West University
Province:	North-West Province	Scale:	Regional EMF
Implementation year:	2009	Status:	Adopted and Gazetted

Extent of study area**Description of study area**

The Magaliesberg Protected Environment (MPE) EMF is located within the Bojanala District Municipality of the North West Province. Both the Rustenburg Nature Reserve and most of the Magaliesberg Protected Natural Environment are included in the MPE EMF study area with only the section of the Magaliesberg Protected Natural Environment that crosses into Gauteng Province being excluded. The study area follows the Magaliesberg mountain range stretching from the Rustenburg Nature Reserve in the west (just south of Rustenburg) towards the border between the North West Province and Gauteng just north-east of the Hartebeespoortdam covering a distance of just under 100 km and a total area of approximately 345 km². As a result of the mountain range, the MPE EMF area has a very narrow linear form which is only about 8km wide at its widest point. Although most of the MPE EMF area is still in a near-natural state consisting of grasslands, shrublands, thickets and some patches of indigenous forests found in valleys, the presence of activities such as agriculture, mining and urban development all along its borders results in the area experiencing tremendous development pressures. The mountain range is considered one of the very few remaining large mountain landscapes in South Africa that has not been extensively transformed (DACE, 2007:10) and serves an important biodiversity corridor linking areas of Gauteng with the North West Province. The MPE EMF study area also forms part of the much larger UNESCO Magaliesberg Biosphere Reserve which was formally established earlier in 2015.

Name:	Magaliesberg Protected Environment (MPE) EMF	Consultancy:	K2M Consulting and the North West University
Province:	North-West Province	Scale:	Regional EMF
Implementation year:	2009	Status:	Adopted and Gazetted

Study area character



Objectives/Purpose of the EMF

The Magaliesberg mountain range, which forms the core area of the MPE EMF, is regarded as a geologically unique area which offers a wide range of unique natural landscapes and a rich diversity in species and habitat (DACE, 2007:1). This is clear from the vision that was formulated for the MPE EMF which states that (DACE, 2007:16):

“The Magaliesberg Protected Environment is internationally and nationally recognized for its unique biodiversity, geo-morphology and heritage resources which are protected and conserved to provide sustainable and quality eco-tourism and educational / research opportunities for current and future generations”

As a result of this, the area is considered sensitive to any activities that might alter its *status quo* (DACE, 2007:4). The main objective of the EMF is to provide guidance to decision makers on decisions relating to any development proposals within the MPE EMF area. This is achieved through a set of management guidelines describing the suitability of activities within different management zones. The MPE EMF also attempts to address the issue of ‘edge effects’ by proposing development guidelines for a 2.5km buffer area around the MPE (DACE, 2007:vi)

Figure 4.13 maps the footprints of the six case studies that were further studied and evaluated. Two local municipal EMFs, two district municipal EMFs and two regional EMFs were selected. The Gauteng Provincial EMF was not yet implemented during the time of this study and therefore the provincial level could not be considered. **Tables 4.2 – 4.7** provides brief summaries of each of the six cases.

Figure 4.13: Location of the six main case studies

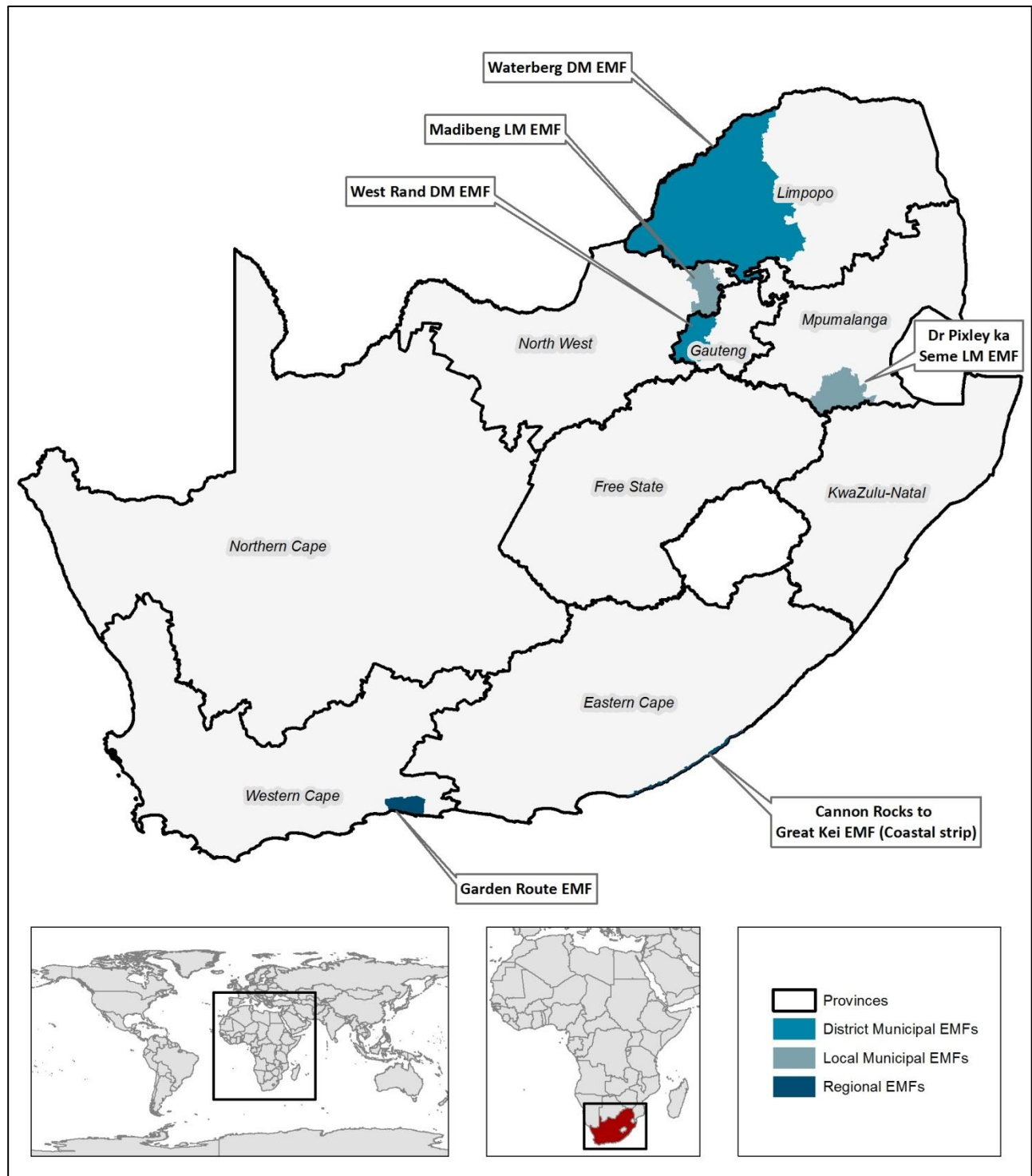
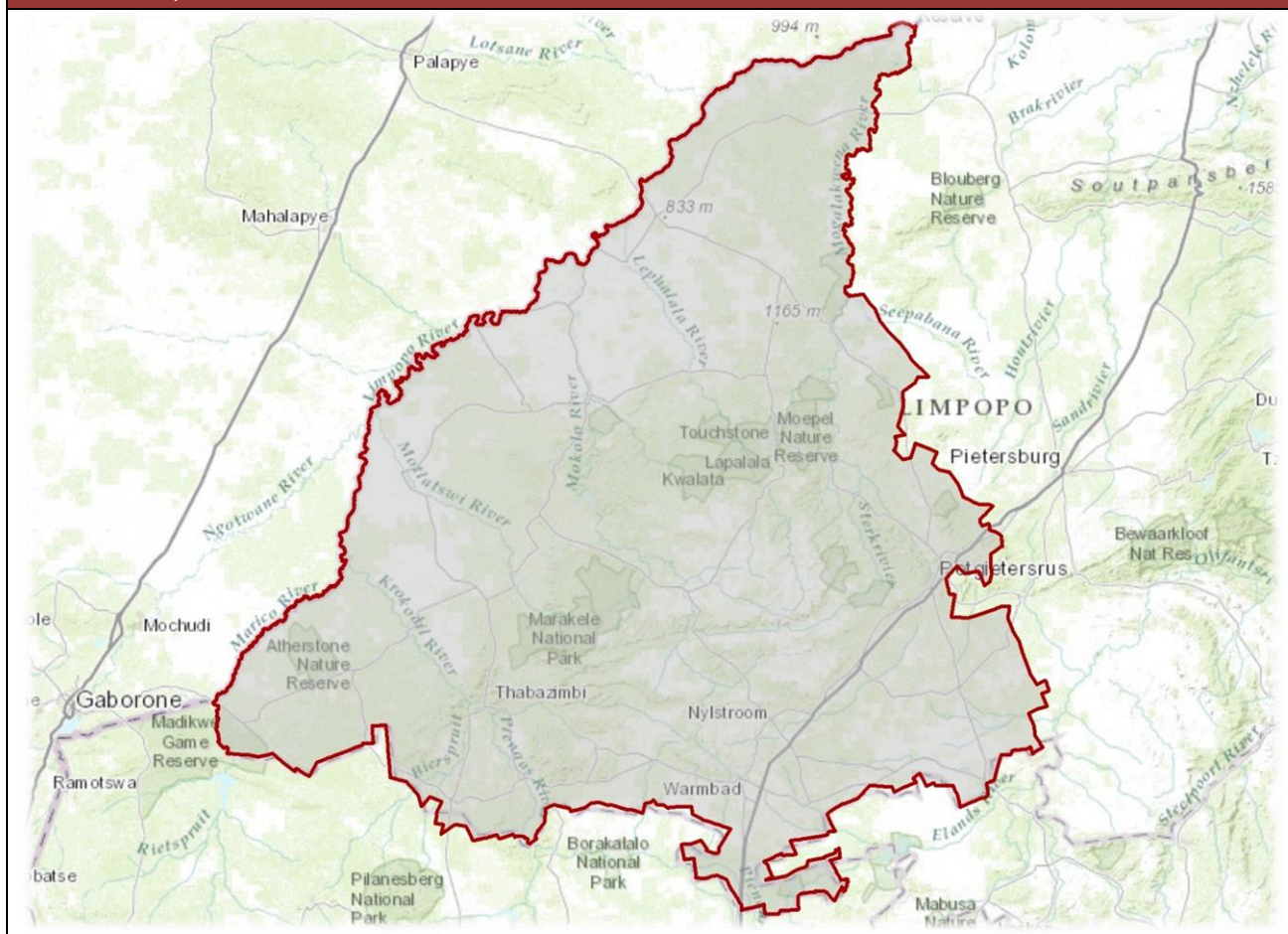


Table 4.2: Case 1

Name:	Waterberg EMF	Consultancy:	Environomics
Province:	Limpopo Province	Scale:	District Municipal EMF
Implementation year:	2011	Status:	Adopted and Gazetted

Extent of study area

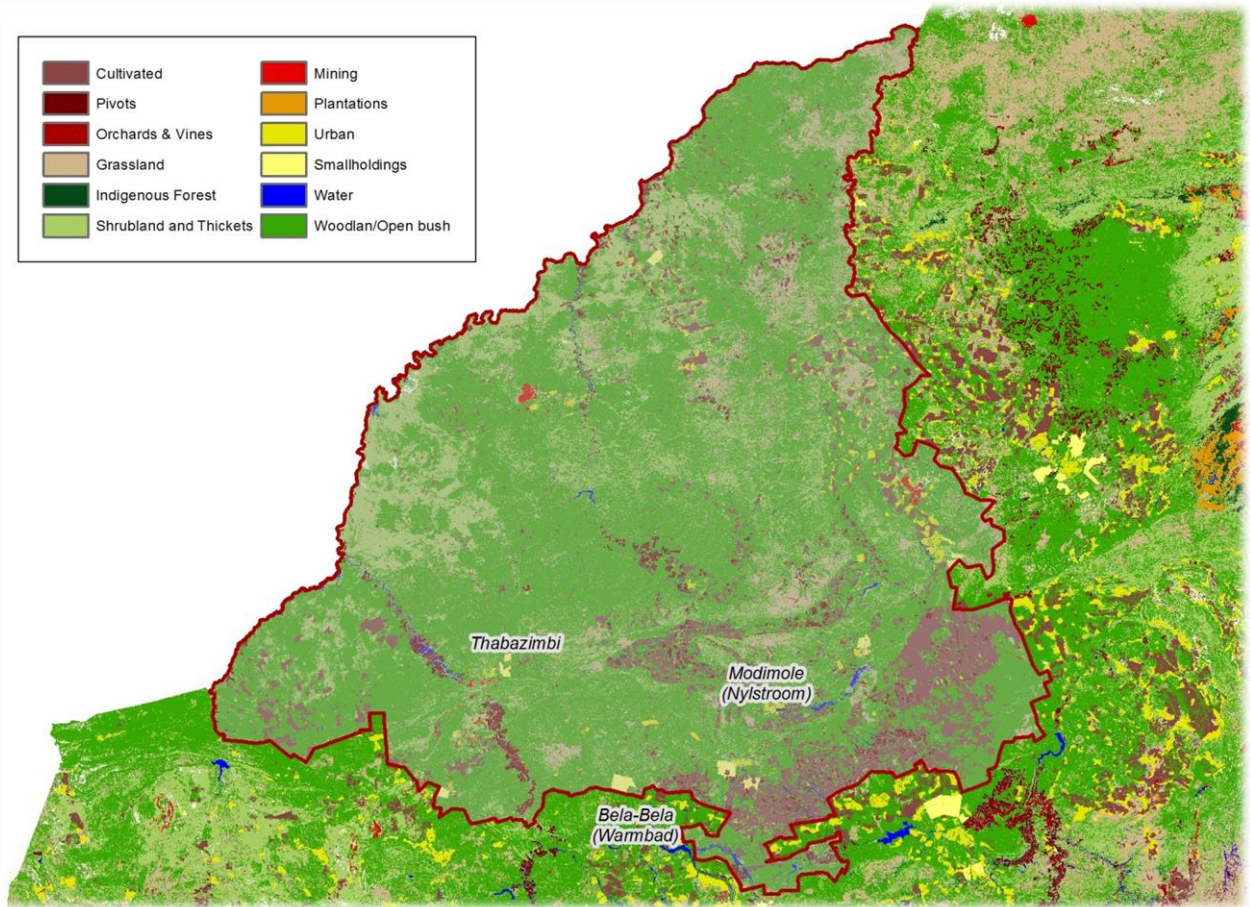
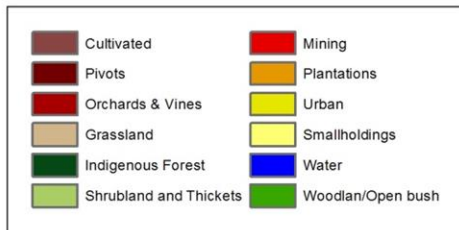


Description of the study area

The Waterberg District Municipality (WDM) consists of six local municipalities and is the largest district municipality in the Limpopo Province covering an area of approximately 50,000 km². Renowned towns in the municipality are Bela-Bela, Modimole, Mokopane, Thabazimbi and Lephalale. The area is mostly rural with large tracks of land being utilized for game and cattle farming which is a big economic driver in the area. Intensive agricultural activities are mostly concentrated in the southern parts of the municipality and are most intense just south of the Waterberg mountain range. The Waterberg mountain range, which transects the municipality, is a distinct feature in the municipality and forms a unique and important localised water catchment in an area that has a relatively low yearly rainfall average (Environomics, 2010b:20). The WDM forms part of the Bushveld complex and most of the natural vegetation is made up of woodland species and shrublands. The Springbokvlakte south of the Waterberg is considered an especially unique and important habitat type which has been extensively transformed by agricultural activities (Environomics, 2010a:45). There are a number of protected areas within the Waterberg DM such as the Marakele National Park and the UNESCO Waterberg Biosphere Reserve. Mining is the corner stone of the economy in the area (Environomics, 2010c:63) and is mostly concentrated around Thabazimbi where iron ore is mined, Lephalale where coal is mined and Makopane where platinum is mined. Lephalale is also well known for the Matimba power station which is the largest direct dry-cooled power station in the world and the Medupi power station which is currently nearing completion.

Name:	Waterberg EMF	Consultancy:	Environomics
Province:	Limpopo Province	Scale:	District Municipal EMF
Implementation year:	2011	Status:	Adopted and Gazetted

Study area character



Objectives/Purpose of the EMF

The final Waterberg DM EMF report states that (Environomics, 2010:c10):

“The purpose of this EMF is to develop a framework that will integrate policies and frameworks, and align different government mandates in a way that will streamline decision-making to improve cooperative governance and guide future development in an environmentally responsible manner.”

The EMF aims to influence decision making processes and encourage sustainable development in the Waterberg DM through (Environomics, 2010a:10; 2010c:1):

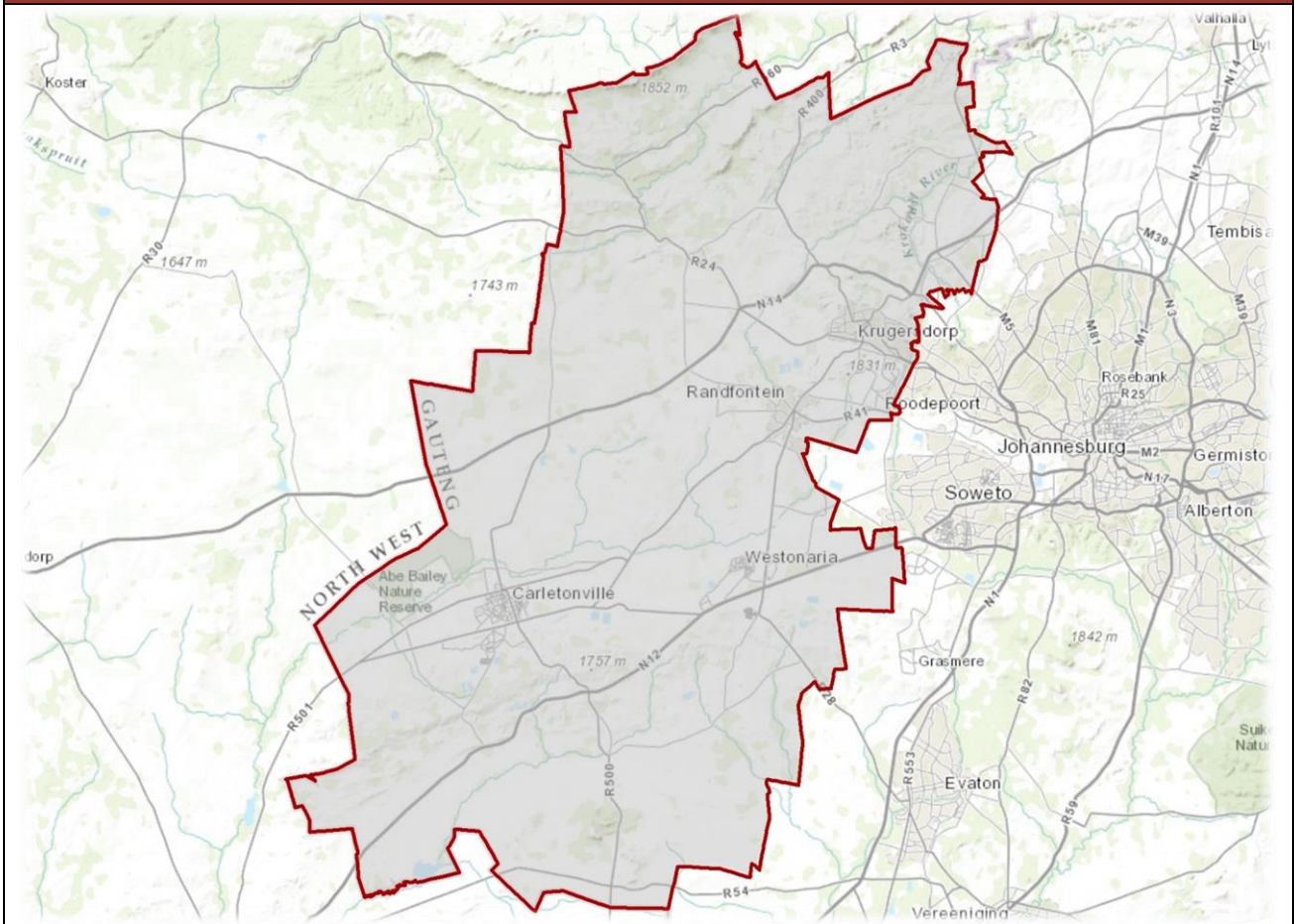
- The establishment and description of development priorities and their impacts;
- The identification of opportunities and constraints in the environment; and
- By providing strategic guidance on development suitability within specific geographical areas.

The EMF aims to give guidance on the suitability of certain types of activities and developments within identified geographical areas or management zones. This is achieved through the application of a decision support system that prompts decision makers to consider applicable environmental attributes that might be impacted by development within a specific area.

Table 4.3: Case 2

Name:	West Rand DM EMF	Consultancy:	BKS Group
Province:	Gauteng Province	Scale:	District Municipal EMF
Implementation year:	2013	Status:	Adopted and concurrence granted

Extent of study area

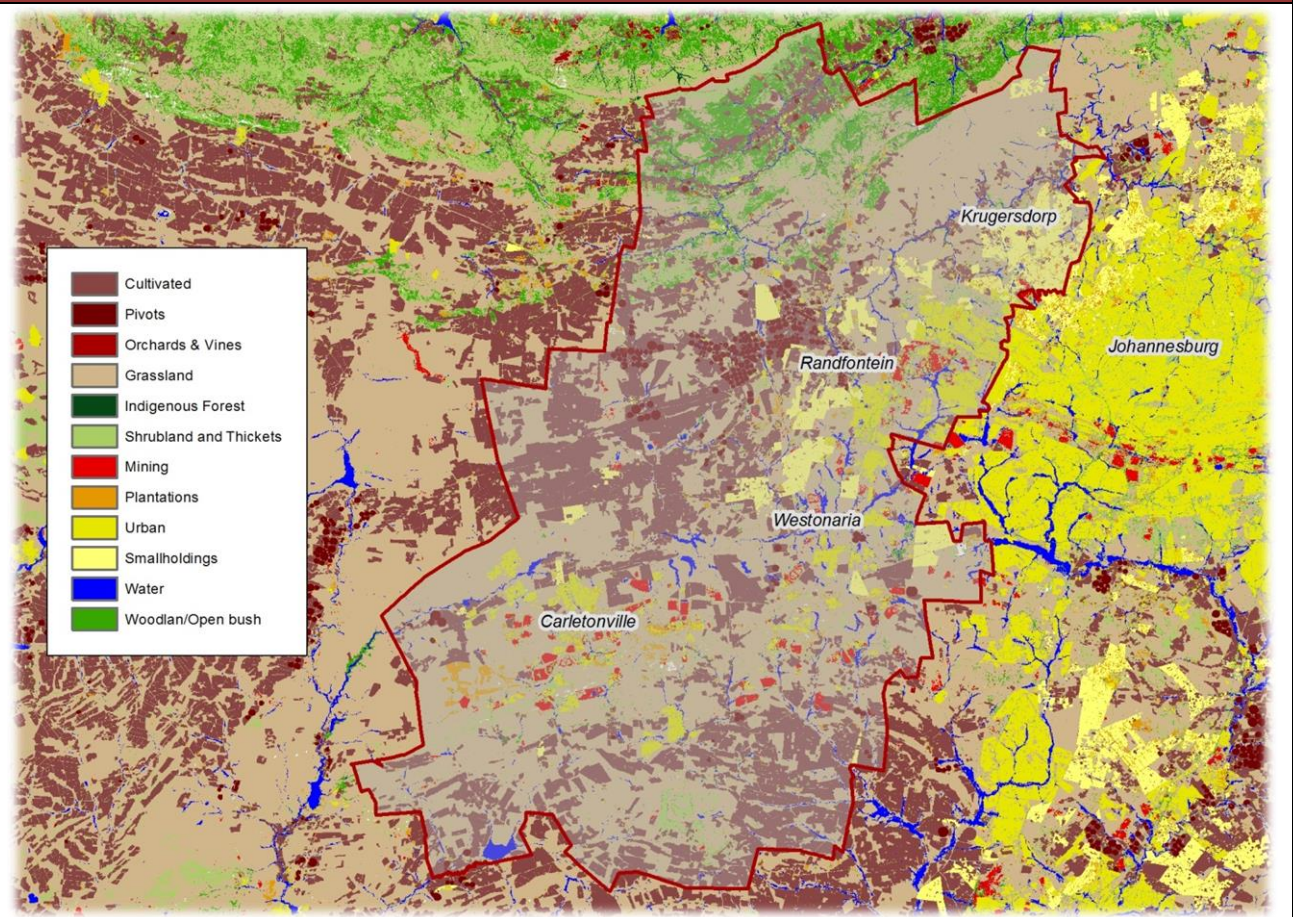


Description of the study area

The West Rand DM (WRDM) comprises four local municipalities and is located in the Gauteng Province. The municipality is just west of the Johannesburg metropolitan area, which is one of the biggest urban conurbations in the country. The district is home to a number of other large urban settlements such as Krugersdorp, Randfontein, Carletonville and Westonaria. A large section of the Cradle of Humankind world heritage site is located in the northern section of the municipality giving the municipality the status as the ‘centre of humankind’ (BKS, 2013:15). The total area of the WRDM is approximately 2,400 km² and can be described as a complex environment with a wide range of land uses that are mixed throughout the landscape. The central-eastern section of the WRDM is characterised by urban settlements while the central-western and southern sections are characterised by agricultural activities. The northern section offers some natural areas with grasslands and woodlands while the area nested between Randfontein and Magaliesburg is characterised by irrigation plots extracting water from the Magalies river. Most of the rivers in the area – including the Magalies river – are under immense pressure due to agriculture and mining. Although mining is not as active as it once were due to the depletion of many of the once rich gold reserves in the area, there are still a number of active mines in the area, some of which are re-mining old tailings using new technologies (BKS, 2013:15). The area is also notorious for acid mine drainage (AMD) issues with contaminated water decanting in the Western Basin near Randfontein.

Name:	West Rand DM EMF	Consultancy:	BKS Group
Province:	Gauteng Province	Scale:	District Municipal EMF
Implementation year:	2013	Status:	Adopted and concurrence granted

Study area character



Objectives/Purpose of the EMF

The WRDM EMF describes the aim of the EMF by stating that (BKS, 2103:2):

“This EMF is important as the WRDM is experiencing immense pressure between mining, agriculture and tourism which is having an impact on biodiversity, heritage, air quality, agricultural potential, mineral reserves, water availability and quality, and the geological constraints of the area. The lack of an overarching development vision and guidelines has meant that development has mostly taken place in an *ad hoc* and uncoordinated manner.”

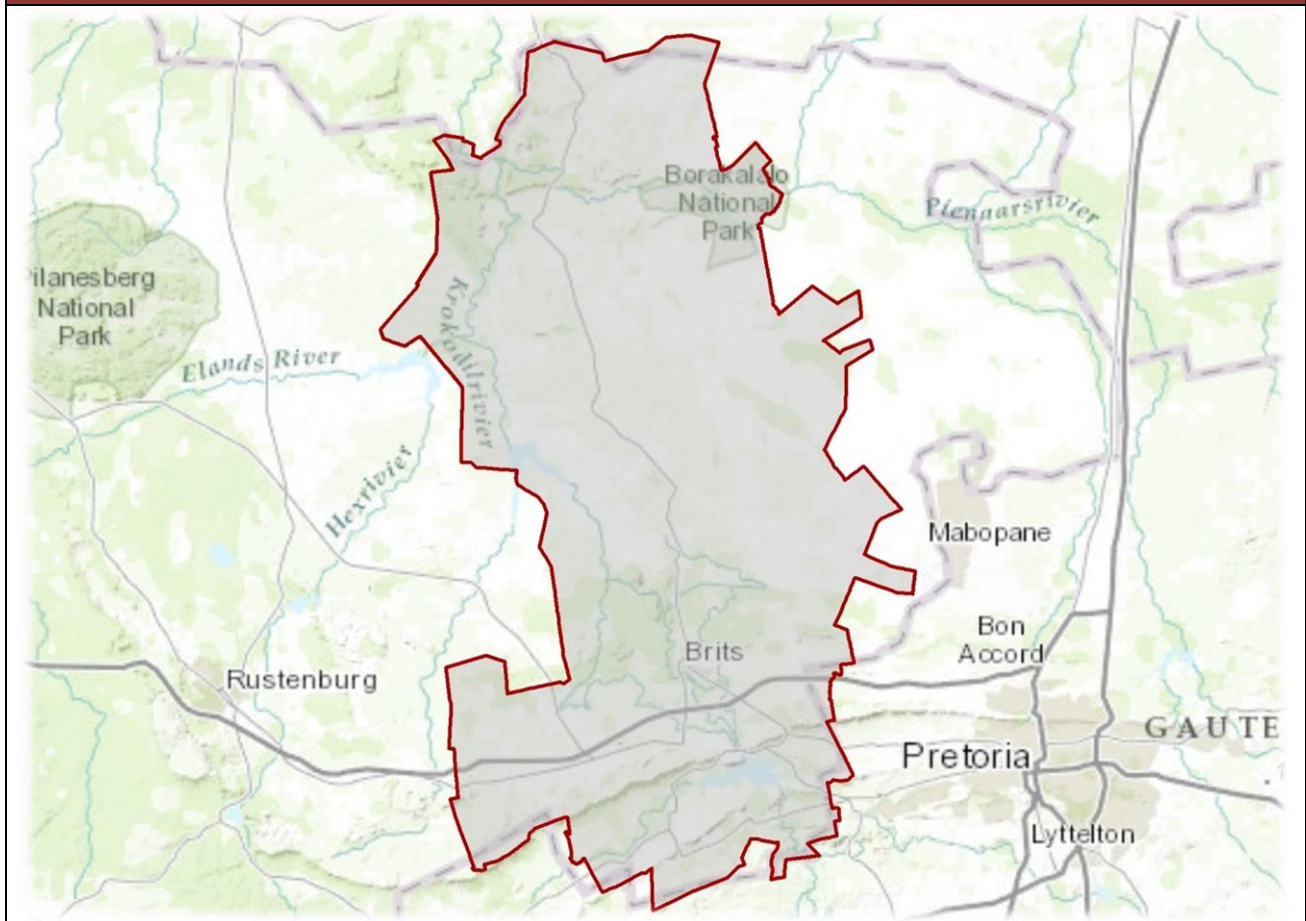
“The EMF aims to provide clear guidance to development of the constraints and opportunities the environment offers development.”

The EMF is aims to identify the key environmental issues and opportunities in the area by mapping environmental features and analysing their sensitivity to development and change. Development guidelines describing the desirability and undesirability of activities or developments and action plans will then provide the necessary facilitation and guidance needed to achieve the abovementioned aim.

Table 4.4: Case 3

Name:	Madibeng EMF	Consultancy:	S.E.F.
Province:	North West Province	Scale:	Local Municipal EMF
Implementation year:	2011	Status:	Adopted and Gazetted

Extent of study area

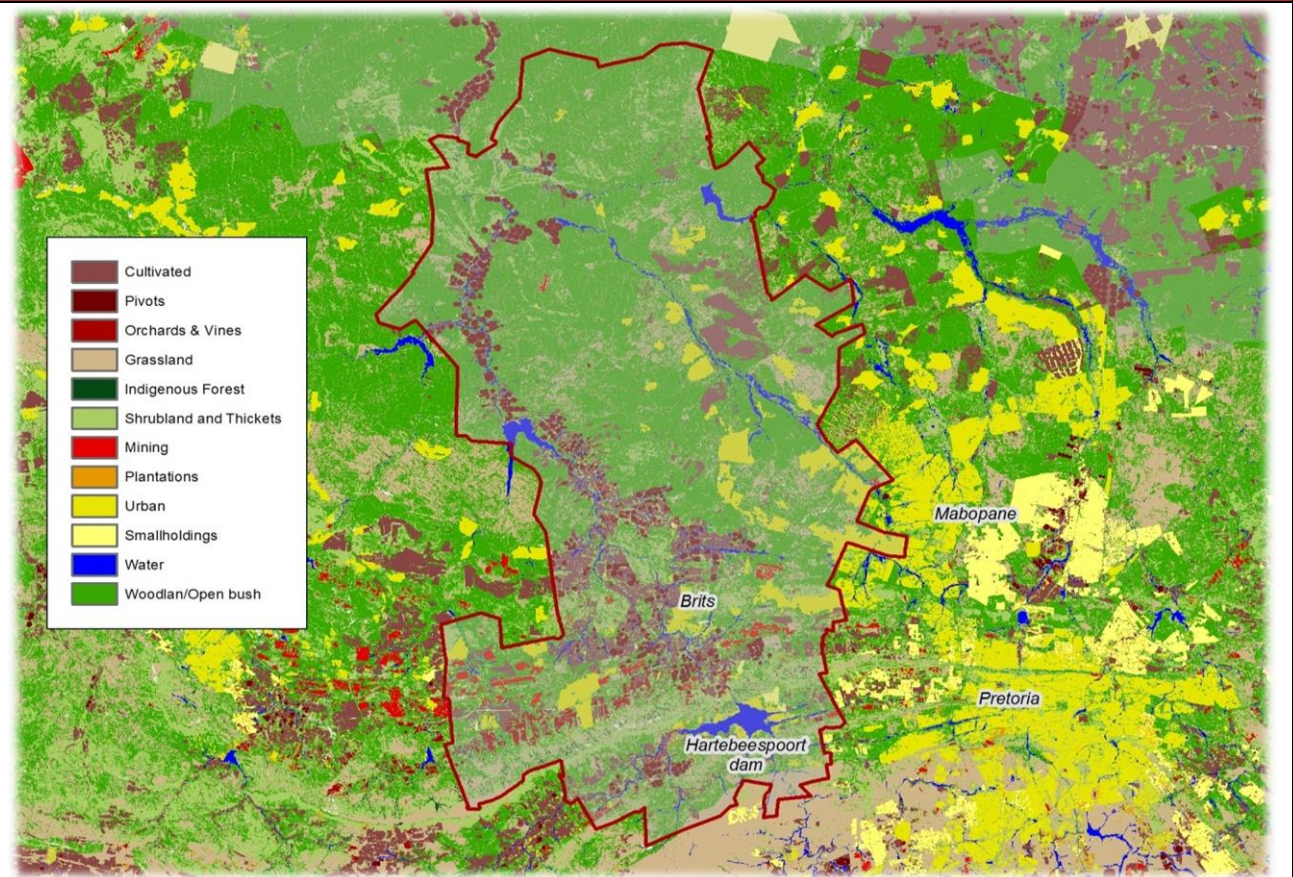


Description of the study area

The Madibeng Local Municipality (MLM) covers an area of approximately 3,800 km² and is one of five local municipalities in the Bojanala District Municipality, the most eastern district municipality in the North West Province. The MLM shares part of its eastern and southern borders with the Gauteng Province while in the north it is bordered by the Limpopo Province. The MLM features urban as well as rural developments with the towns of Brits, Hartbeespoort and Kosmos being the most renowned settlements. Other settlements are spread throughout the area. The Hartbeespoort dam, which was constructed in the 1920s, and the Magaliesberg are both very prominent features in the area attracting various kinds of developments. The Hartbeespoort dam especially is experiencing severe pressures from both local developments in its riparian zone and up-stream pollution that is making its way into its waters. A small section of the Cradle of Humankind World Heritage Site is also located in the municipality just south of the Hartbeespoort dam. To the north the MLM is characterised by game farms as well as intensive agriculture along the Crocodile River which is used for irrigation purposes. Other important rivers in the area are the Tolwane, Pienaars, Rosespruit and Magalies rivers, some of which are used for irrigation purposes and all of which are in a critical state. Large sections of the MLM are in a near-natural state and covered by woodlands and open bush (especially northern sections). The town of Brits is located on the Merensky Reef offering rich reserves of platinum and chromate and therefore many areas in the southern part of the MLM are characterised by mining activities which are exploiting these reserves.

Name:	Madibeng EMF	Consultancy:	S.E.F.
Province:	North West Province	Scale:	Local Municipal EMF
Implementation year:	2011	Status:	Adopted and Gazetted

Study area character



Objectives/Purpose of the EMF

The MLM is experiencing severe development pressure in certain areas which are threatening the sustainability of the natural resources in the area (MLM, 2009a:1). According to the MLM EMF ‘Desired State of the Environment’ report, the vision of the EMF for the area is that (MLM, 2009b:2):

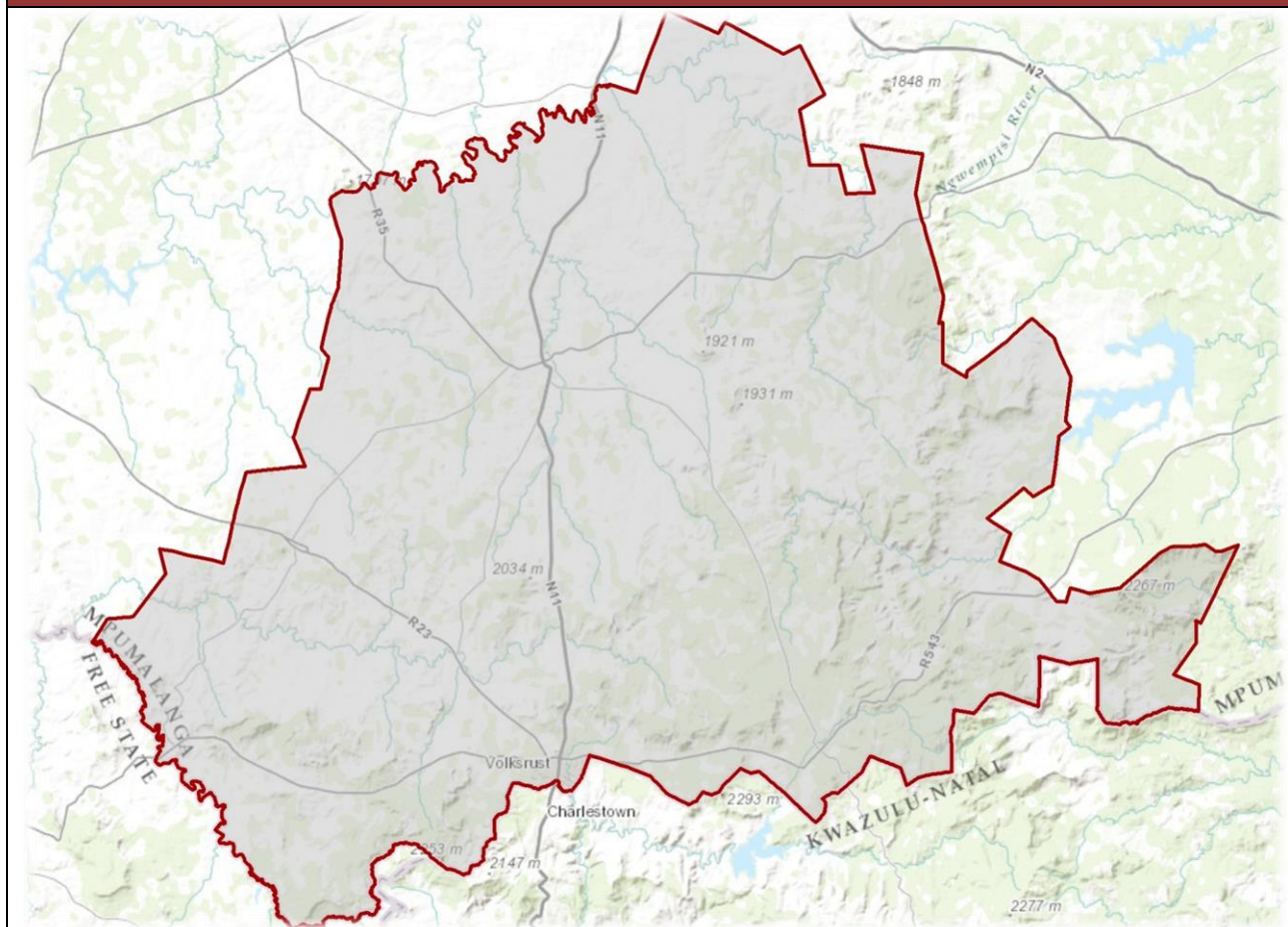
“The natural environment should be protected against unscrupulous and unsustainable development. This is important from an ecological, sustainability as well as from an image building point of view. The environmental assets are the natural capital on which sustainable tourism and ecological functioning are based. This capital base should be protected to ensure sustainable income and functioning. A balance should therefore be achieved between the ecological, the social and the economic needs and qualities of the municipal area.”

The purpose of the EMF then is to assist the MLM in identifying and managing the environmental limits within which development can occur. It serves as a decision support tool assisting decision making authorities in their task of making decisions in such a way as to ensure that sustainable development will be achieved in the MLM. Specific pressures that the EMF aims to address are (MLM, 2009a:29):

- Urban development (formal and informal);
- Agricultural activities;
- Mining and industrial related processes; and
- Any activities that impacts wetlands and sensitive biodiversity.

Table 4.5: Case 4

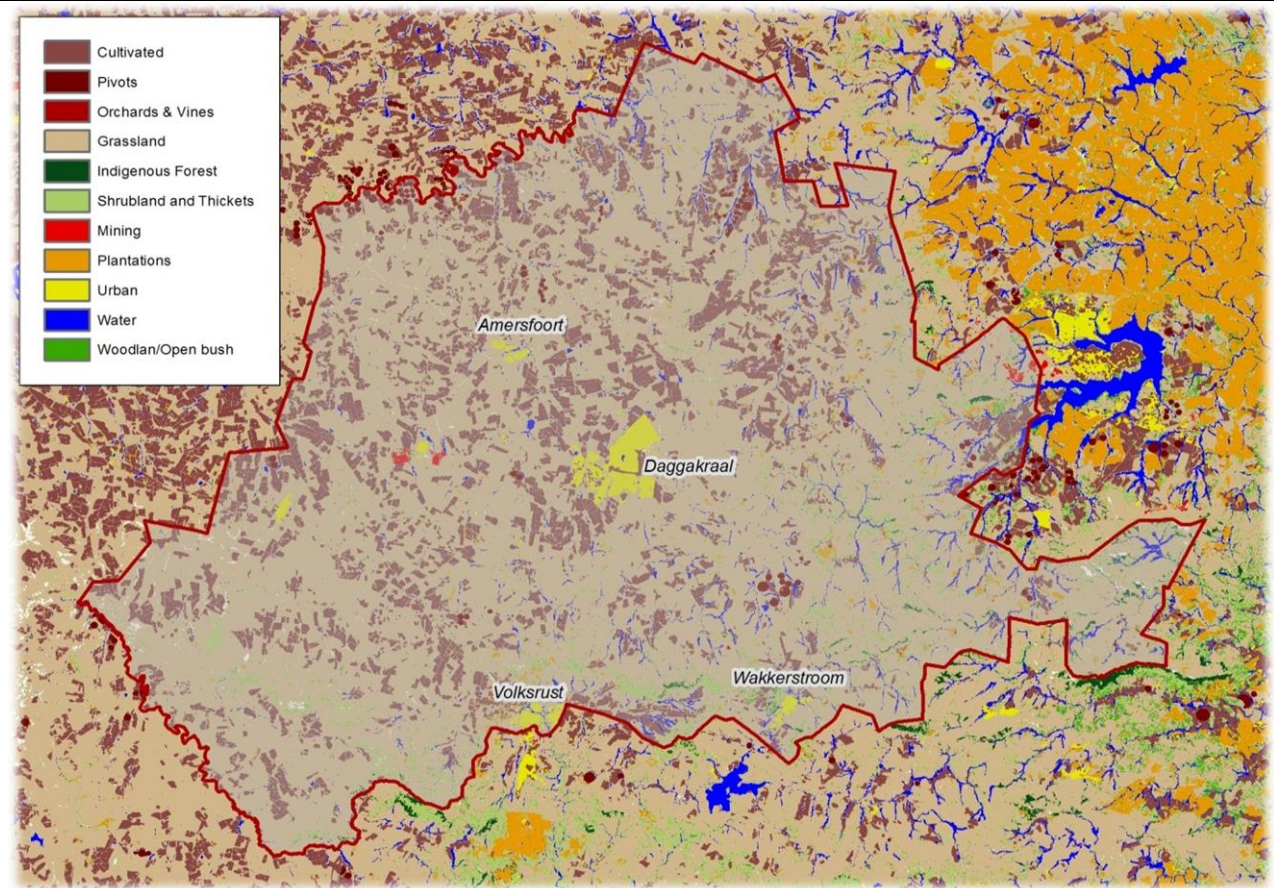
Name:	Dr Pixley Ka Seme LM EMF	Consultancy:	BKS Group and SRK Consulting
Province:	Mpumalanga Province	Scale:	Local Municipal EMF
Implementation year:	2012	Status:	Adopted and Gazetted

Extent of study area**Description of the study area**

The Pixley ka Seme Local Municipality (PKSLM) is located in the south-eastern part of the Mpumalanga Province and is one of seven local municipalities in the Gert Sibande District Municipality. It is bordered by the Vaal River in the north and Kwa-Zulu Natal and the Free State in the South. The PKSLM has a mostly rural character with Volksrust being the only medium sized urban settlement in the area. Other settlements include Wakkerstroom, Amersfoorts and Daggakraal. In terms of population numbers Daggakraal is the largest settlement in the area with close to 33% of the total population residing there. It is however poorly serviced in terms of basic infrastructure (SRK Consulting, 2010a:20). The approximately 5,200 km² PKSLM is characterised by an intricate network of wetlands and pan systems and is regarded as an important water catchment area (SRK Consulting, 2011:3). It falls within the grassland biome and hosts a number of threatened grassland species as well as a number of other endemic species. The main economic driver in the municipality is the agricultural sector followed by mining, forestry and tourism (SRK Consulting, 2010a:47). Agriculture is mostly centred on maize, sunflower and sorghum production and is the sector that offers the most employment opportunities in the region (SRK Consulting, 2010a:47). The majority of the area is covered by grasslands that are fragmented by patches of cultivated fields dispersed throughout the area. Limited mining activities are present in the area with mostly only small scale coal mining (SRK Consulting, 2010a:48).

Name:	Dr Pixley Ka Seme LM EMF	Consultancy:	BKS Group and SRK Consulting
Province:	Mpumalanga Province	Scale:	Local Municipal EMF
Implementation year:	2012	Status:	Adopted and Gazetted

Study area character



Objectives/Purpose of the EMF

Although the PKSLM is not one of the most sensitive or complex regions in South Africa it has a strategic importance in terms of its status as an important water catchment area for the Gauteng Province and as one of the less transformed municipalities in Mpumalanga. The final EMF report states that (SRK Consulting, 2011:3):

“The purpose of the EMF is to serve as a management and decision-making tool that provides authorities with information about the ‘state of the environment’ and the associated planning parameters. It will identify and spatially represent areas of potential conflict between sensitive environments and development proposals thus assisting in integrating social, economic and environmental factors into planning.”

From the purpose statement it is clear that the EMF does not emphasise specific issues as many other EMFs do but is focussed on managing the general environment in such a way as to achieve a predetermined desired state. The EMF is not against development, but gives guidance on how developments should be managed as to ensure that they do not negatively impact on sensitive environments in the area. To achieve the aforementioned the EMF proposes management guidelines which are linked to geographically identified management zones. The guidelines give an indication of the desirability of certain activities within specific geographical areas and propose ways in which these areas should be managed to ensure sustainable development.

Table 4.6: Case 5

Name:	Garden Route EMF	Consultancy:	Earth-Inc Consulting
Province:	Western Cape Province	Scale:	Regional EMF
Implementation year:	2011	Status:	Adopted and Gazetted

Extent of study area

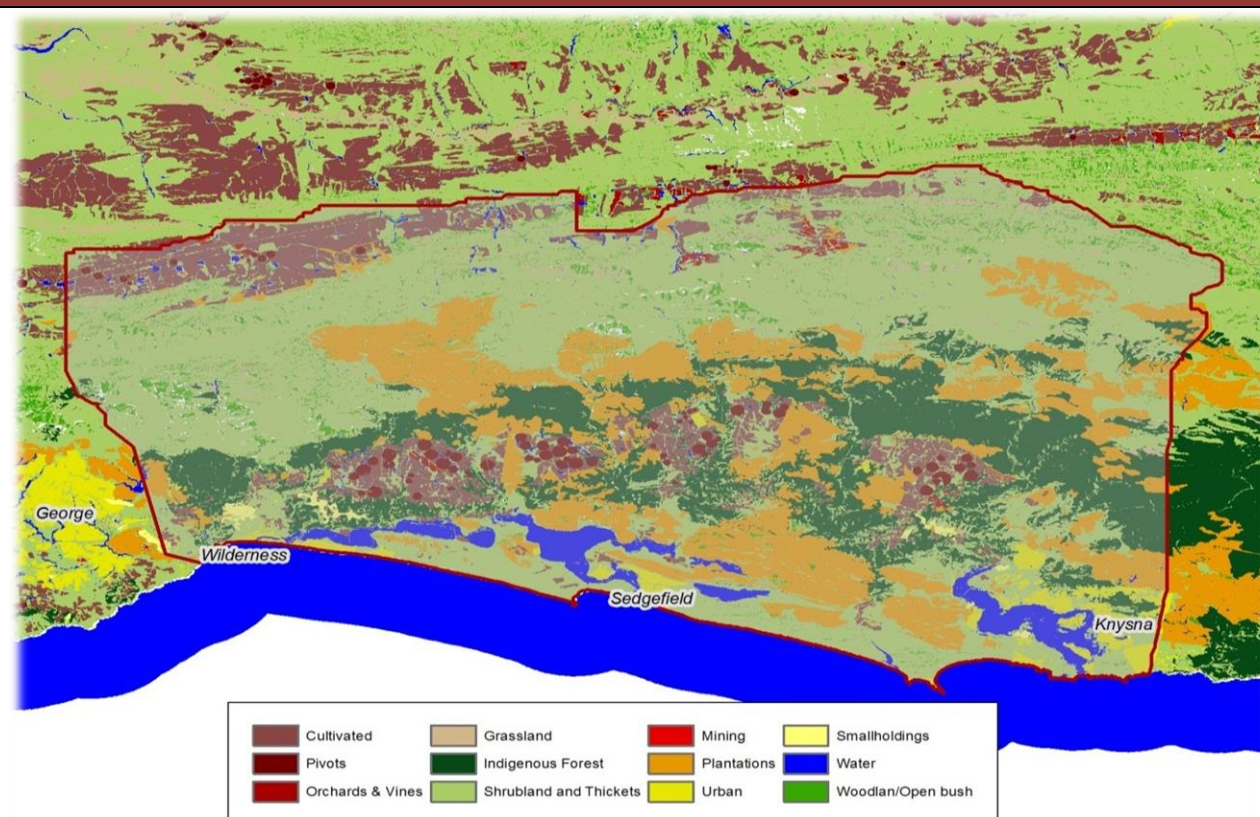


Description of the study area

The Garden Route is considered one of the most scenic areas in South Africa stretching from Mossel Bay in the Western Cape to the Storms River Mouth in the Eastern Cape. The Garden Route (GR) EMF does not cover the totality of the Garden Route but focuses on a 1,600 km² region between Wilderness on the west to Knysna on the east and the Qutiniqua mountain range on the north. This section of the Garden Route is referred to as the ‘National Lakes Area’ due to the unique coastal lake system that is characteristic of this area. The coastal lake system stretches from Wilderness to Knysna and consists of six main lakes of which only one – Groenvlei – is a freshwater lake. Two significant lakes are the Wilderness lake which is classified as a Ramsar site and the Knysna estuary which is ranked as the most important estuary from a conservation perspective in South Africa (Earth Inc, 2010b:7). Except for the lake system the area is characterised by large tracts of natural vegetation and indigenous forests of which some are formally protected. Some sections of natural forest have been transformed into plantations which are a big driver of the economy in the area. The central section of the study area is mostly characterised by pasture lands with numerous dairy farms. Urban development is mostly concentrated along the coast and the N2 coastal route exploiting the scenic beauty of the area. Some settlements are found inland but they tend to be small. The largest urban development is around Knysna adding pressure on the Knysna Estuary which along with a few other lakes in the system houses the endangered Knysna Sea Horse. Mining consists of a few small sand mines and quarries in the region.

Name:	Garden Route EMF	Consultancy:	Earth-Inc Consulting
Province:	Western Cape Province	Scale:	Regional EMF
Implementation year:	2011	Status:	Adopted and Gazetted

Study area character



Objectives/Purpose of the EMF

The EMF was developed as a direct response to development pressures in the area and in an attempt to contribute to the management and conservation of the sensitive environments in the area. The scenic beauty of the area – which can be attributed to its coastline, mountains, indigenous forests and lake system – serves as a pull factor for residential development within its sensitive landscapes which must be managed. The final EMF report states that Earth Inc (2010a:8):

“The core purpose and functioning of this EMF is to establish a framework and mechanism to support informed environmental decision making for the purposes of environmental impact management”.

To assist decision makers in their decision making processes, the EMF proposes management guidelines and objectives for the following environmental attributes (Earth Inc, 2010c:28-82):

- Vegetation;
- Lakes;
- Estuaries;
- All natural watercourses and their riparian habitat;
- Wetlands; and finally
- Coastlines and associated marine areas.

The guidelines are aimed at informing decision makers on the sensitivity of these environments to developments.

Table 4.7: Case 6

Name:	Cannon Rocks to Great Kei River Mouth EMF	Consultancy:	SRK Consulting
Province:	Eastern Cape Province	Scale:	Regional EMF
Implementation year:	2010	Status:	Adopted by DEA and Provincial department

Extent of study area

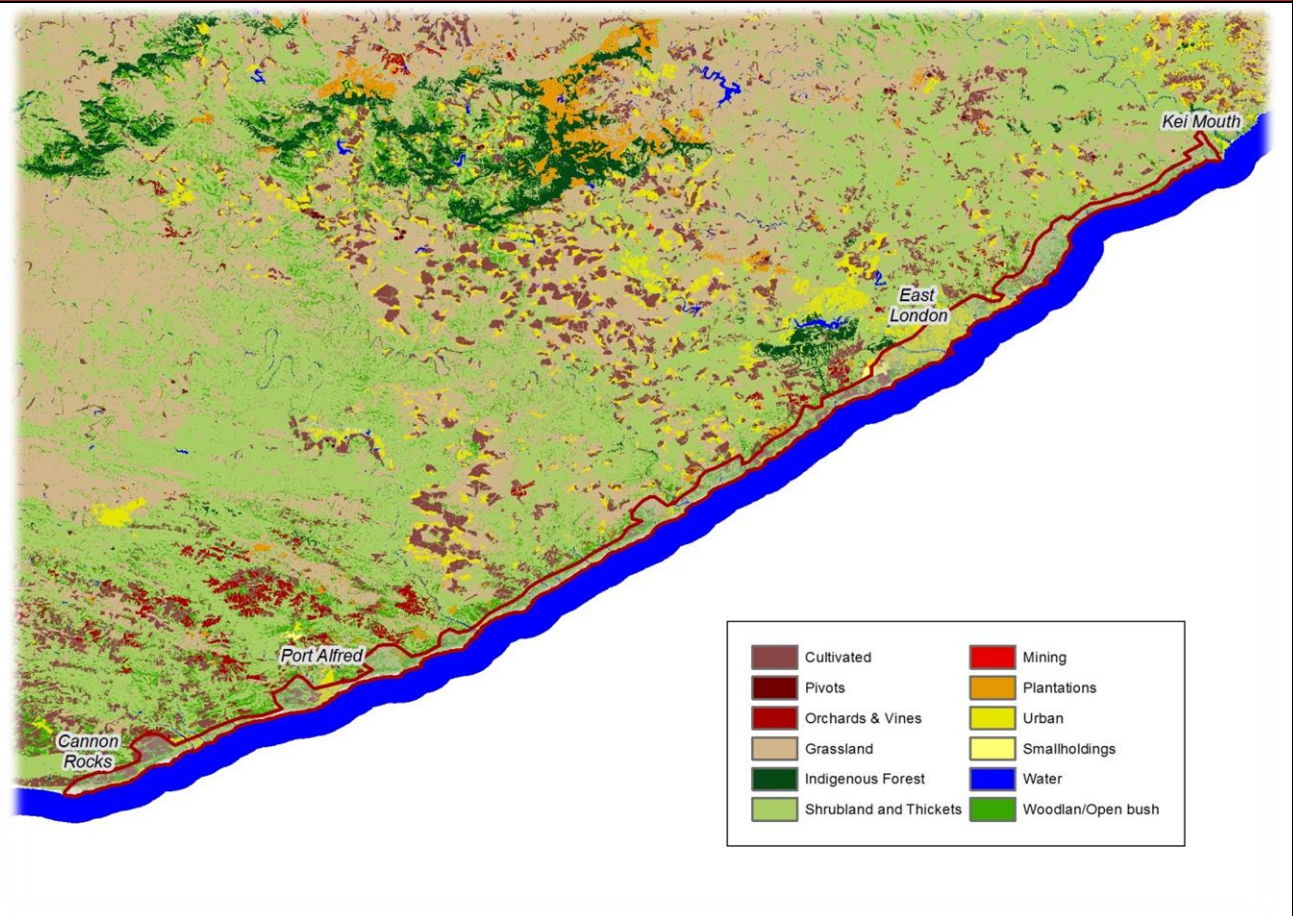


Description of the study area

The Cannon Rocks to Great Kei EMF is a regional EMF that covers a 220 km long coastal strip along the Eastern Cape coastline that includes a section of the Wild Coast. The area stretches from Cannon Rocks in the west to the Great Kei river mouth in the east. The inland boundary of the study area is delineated 1.5 km inland from the high water mark and between 3 and 5 km inland from the high water mark defined for high priority estuaries (SRK Consulting, 2008:3-4). The area transects the boundaries of four local municipalities and two district municipalities. Small towns and hamlets are scattered throughout the study area with the largest settlements being East London and Port Alfred. East London is one of the largest industrial centres in the Eastern Cape with a well renowned motor industry. Overall, residential development within the coastal strip is the biggest threat to the environment in the area impacting on features such as natural vegetation and estuaries. There are a total of 53 estuaries in the study area, many of which are in urgent need of protection and rehabilitation (SRK Consulting, 2008:134). Agricultural activities are present in some sections of the study area and are most prominent around Cannon Rocks to the west and East London to the east. Large sections of the area are still in a natural or near-natural state consisting mainly of sections of thickets, indigenous forest, woodlands and dune fields. These sections of natural landscape contribute to the scenic wilderness character for which the area is well-known.

Name:	Cannon Rocks to Great Kei River Mouth EMF	Consultancy:	SRK Consulting
Province:	Eastern Cape Province	Scale:	Regional EMF
Implementation year:	2010	Status:	Adopted by DEA and Provincial department

Study area character



Objectives/Purpose of the EMF

The EMF was developed to assist decision makers in dealing with the growing land use pressures experienced on the coastal zone between Cannon Rocks and the Great Kei River (SRK Consulting, 2008:1). The final EMF report states that (SRK Consulting, 2010c:1):

“The primary objective of the EMF is to facilitate the conservation of important natural resources (e.g. biodiversity, prima agricultural land etc.) and rapid development within designated geographical areas”.

The EMF aimed to achieve this by demarcating the EMF study area into smaller ‘geographical areas’ or ‘environmental control zones’ in which (SRK Consulting, 2010c:1):

- Certain activities may be allowed without further investigation;
- Certain activities may be allowed subject to an environmental authorisation; and
- Certain activities should not be considered for development at all.

The EMF provides guidelines to facilitate decision makers in the different areas of jurisdiction covered by the EMF in the management of the coastal zone.

4.5. Final remarks

Chapter four addressed the question:

“What is the status and extent of environmental management frameworks in South Africa?”

The discussion showed that EMFs are regarded as popular environmental management tools considering that they are still being developed all across South Africa. The analysis revealed that EMFs have a legal standing if they are developed in line with the requirements set out in the EMF Regulations and Guidelines and if they are formally adopted and published. However it was found that the lack of formal adoption and publication is also one of the weaknesses of EMFs and that it will most likely hamper the effective use of the tool. The duration of EMF development processes and the further extensive time-lapse between EMF finalisation and EMF adoption and publication was also identified as possible pitfalls to effective EMF implementation and use. Various characteristics of EMFs were further discussed and finally the six case studies selected for further analysis were discussed. **Chapter 5** discusses the quality findings for the six cases.

Research Question	Method	Phase	Chapter
Q1 - What is an environmental management framework?	Literature review	Phase 2-1: Clarify the purpose and objectives of EMFs in South Africa	Chapter 3: Literature review
		Phase 2-2: Understanding EMF	
Q2 - What is the status and extent of Environmental management frameworks in South Africa?	Survey	Phase 3-1: Determine the status and extent of EMFs in South Africa	Chapter 4: The status and extent of Environmental management frameworks in South Africa
Q3 – What is the quality of EMFs?	Case study reviews: - Documentation reviews - Data and methodology review	Phase 4-1: Determine the data and methodological requirements for developing an EMF	Chapter 5: Case study analysis: EMF quality
Q4 – What is the effectiveness of EMFs?	- Interviews	Phase 4-2: Assess the ‘real world’ effect that EMFs are having	Chapter 6: Case study analysis: EMF effectiveness
Q5 – What are the factors influencing the quality and effectiveness of EMFs?	Case study reviews: - Within-case analysis - Cross case analysis	Phase 4-3: Critically evaluate the <i>status quo</i> of EMFs in South Africa	Chapter 7: Cross case analysis
Research Aim			
To evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice		Phase 5-1: Synthesis and conclusion	Chapter 8: Synthesis and conclusions

CHAPTER FIVE

CASE STUDY ANALYSIS: EMF QUALITY

5.1. Introduction

It is expected that the quality of an EMF will affect its successful use and implementation. This chapter presents the quality results for the six EMFs that were evaluated through the application of the review protocol and addresses the research question:

What is the quality of EMFs?

- Research question3 -

The quality findings for each case study are discussed below.

5.2. Quality of Case 1 - Waterberg District Municipality EMF

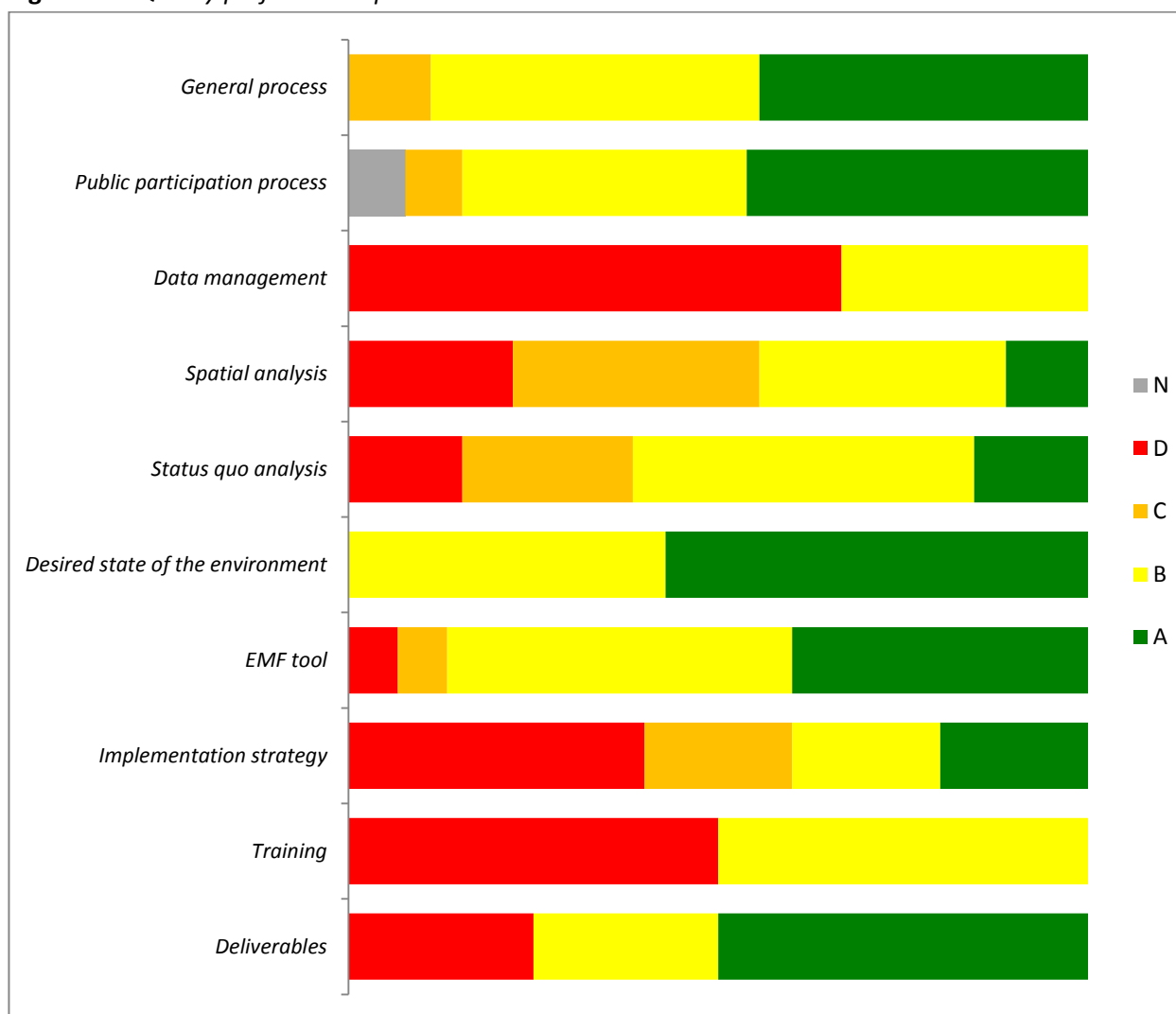
From the 86 quality indicators that were evaluated for the Waterberg DM EMF (WDM EMF) 26 conformed to expectations while 34 partially conformed and 10 did not conform. A total of 15 were not attempted at all and the status of one indicator could not be determined. The findings are presented and illustrated in **Table 5.1** and **Figure 5.1**. The detailed findings for each review area is discussed in the section to follow.

Table 5.1: Quality scores – Case 1

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)				
Quality indicators						
Review area 1: General process	KPA 1.1: Context	1.1.1	1.1.2	1.1.3		
	KPA 1.2: Need	1.2.1				
	KPA 1.3: Requirements and objectives	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5
Review area 2: Public participation process	KPA 2.1: Structuring and execution	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5
	KPA 2.2: Stakeholder involvement	2.2.1	2.2.2	2.2.3		
	KPA 2.3: Accessibility	2.3.1	2.3.2			
	KPA 2.4: Consideration of comments	2.4.1	2.4.2	2.4.3		
Review area 3: Data management	KPA 3.1: Gap analysis	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5
	KPA 3.2: Data use	3.2.1	3.2.2			
	KPA 3.3: Metadata	3.3.1	3.3.2			
Review area 4: Spatial analysis	KPA 4.1: Sensitivity analysis	4.1.1	4.1.2	4.1.3	4.1.4	
	KPA 4.2: Delineation of environmental management zones	4.2.1	4.2.2	4.2.3	4.2.4	4.2.5
Review area 5: Content – Status quo analysis	KPA 5.1: Description of the bio-physical environment	5.1.1				
	KPA 5.2: Description of the socio-economic environment	5.2.1				
	KPA 5.3: Description of the legal context	5.3.1	5.3.2			
	KPA 5.4: Description of the strategic planning context	5.4.1	5.4.2	5.4.3	5.4.4	
	KPA 5.5: Analysis of environmental attributes	5.5.1	5.5.2	5.5.3	5.5.4	5.5.5

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)					
Review area 6: Content – Desired state of the environment	KPA 6.1: Strategic objectives	6.1.1	6.1.2	6.1.3			
	KPA 6.2: Describing the desired state of the environment	6.2.1	6.2.2	6.2.3			
	KPA 6.3: Priorities (issues, challenges and opportunities)	6.3.1					
Review area 7: Content – EMF tool	KPA 7.1: Identification of impacts	7.1.1	7.1.2	7.1.3			
	KPA 7.2: Desirable and undesirable land uses	7.2.1	7.2.2	7.2.3			
	KPA 7.3: Thresholds, limits and cumulative impacts	7.3.1	7.3.2	7.3.3			
	KPA 7.4: Management zones guidelines	7.4.1	7.4.2	7.4.3	7.4.4	7.4.5	7.4.6
Review area 8: Content – Implementation strategy	KPA 8.1: Planning for implementation	8.1.1	8.1.2	8.1.3			
	KPA 8.2: Revision schedule	8.2.1	8.2.2				
Review area 9: Training	KPA 9.1: Training	9.1.1	9.1.2				
Review area 10: Deliverables	KPA 10.1: Documentation	10.1.1					
	KPA 10.2: Spatial product	10.2.1	10.2.2	10.2.3			
		Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined	

Figure 5.1: Quality performance per review area – Case 1



5.2.1. General process

From the nine quality indicators evaluated as part of the general process review area, four were awarded 'conformance' ratings, four 'partial conformance ratings' and only one received a 'non-conformance' rating. It was found that issues and priorities applicable to the study area were generally well documented in the EMF and that they were discussed within the context of the area ^{KPA 1.1}. Although objectives were clearly defined for the EMF ^{KPI 1.3.1} one concern was that the need for the EMF ^{KPI 1.2.1} was not well articulated and that the purpose statement was rather vague. Another major issue from the start of the project was that the scope ^{KPI 1.3.2} of the EMF, the operational scale ^{KPI 1.3.4} at which the EMF was to operate, the technical requirements ^{KPI 1.3.3} against which the EMF was to be developed and the expected deliverables ^{KPI 1.3.5} were not agreed upon before the project commenced and were only determined as the EMF developed (pers. comm. Jansen van Vuuren, 2015). The reason for this uncertainty could be attributed to the project terms of reference (ToR) which were most likely based on a generic EMF ToR which was developed without considering the context of the study area and without involving the key stakeholders that would be responsible for the eventual implementation and use of the EMF (pers. comm. Jansen van Vuuren, 2015).

5.2.2. Public participation

Altogether thirteen indicators were evaluated as indicative of the public participation process. Of these six conformed to expectations while five only partially conformed. One indicator did not conform at all and another one could not be determined. Overall the public participation process was well planned ^{KPI 2.1.1} and performed moderately well with most of the indicators either conforming or partially conforming to expectations. The EMF project team succeeded in identifying ^{KPI 2.1.2} and involving ^{KPI 2.1.4, KPA 2.2} relevant stakeholder groups and other members of the public in the EMF process but failed to effectively communicate mechanisms through which these stakeholders could participate in the early stages of the project ^{KPI 2.1.3}. The manner in which stakeholders participated is also not well discussed and the final findings of the process not presented ^{KPI 2.1.5}. In the latter stages however, good effort was made to notify interested parties of opportunities to comment on documentation resulting from key project phases. Comments were however not always considered in the final EMF ^{KPI 2.4.1} and although a comments and response report was generated ^{KPI 2.4.2} as part of the final EMF, reasons for not considering some comments were not provided ^{KPI 2.4.3}. In addition to commenting on documents however, stakeholders were invited to workshops in which they were asked to help identify and map areas of importance in the study area (pers. comm. Jansen van Vuuren, 2015). These workshops greatly improved the involvement of stakeholders in the process and allowed the EMF development team to access local knowledge that was not available from any other sources. Although accessibility to the draft EMF report was made effective through the use of a dedicated project website and other media such as CDs (pers. comm. Jansen van Vuuren, 2015) access to the final EMF

documents was very poor ^{KPI 2.3.2}. Spatial data for the EMF was not readily available and had to be sourced from key personnel in government departments. The extent to which the EMF project team took steps to ensure that illiterate and disabled persons could also participate could not be determined objectively ^{KPI 2.3.1}.

5.2.3. Data management

The EMF performed very poorly in terms of data management. Of the nine indicators that were assessed only three indicators partly complied with expectations while six indicators were not addressed at all. The project team did not initiate a systematic gap analysis through which the quality, scale, accuracy and custodianship of available datasets were determined ^{KPI 3.1.2–3.1.5}. They instead opted for an approach of relying on existing expert knowledge and investigating datasets as they became available (pers. comm. Jansen van Vuuren, 2015) which did assist in identifying some information gaps ^{KPI 3.1.1} but ignored some key considerations such as scale and credibility of datasets. The lack of a thorough gap analysis resulted in the inclusion of datasets of insufficient and mixed scales ^{KPI 3.2.1} and of questionable quality ^{KPI 3.2.2} in the analysis. Many of the datasets used were of a very coarse scale suitable for analysis at national or provincial level while other datasets were generated from high resolution aerial imagery at a very fine scale. These datasets were then combined into one spatial analysis process which raises questions pertaining to the accuracy and usable scale of the results. As a result of the aforementioned the scale at which the EMF results were generated and suitable for interpretation was not given. Another serious shortfall in terms of data management was the lack of metadata ^{KPI 3.3.1} and supporting documentations on data capturing procedures ^{KPI 3.3.2}. Metadata describes the characteristics of spatial datasets giving information on, amongst others things, the scale, accuracy and source of the dataset. This information along with detail on how new datasets were captured is very important as they will determine the manner in which a dataset could be used for further analysis. Although some datasets were obtained from national data custodians with some metadata defined (although not always complete) this metadata was not accompanied in the EMF database or discussed anywhere.

5.2.4. Spatial analysis

Any spatial analysis is just as good as the data being analysed. The results from the spatial analyses process was therefore affected by the issues of scale and data quality. The spatial analysis section however focussed on the methods and approaches that was used and did not again consider the data issues discussed in the previous section. Nonetheless the spatial analysis component did not perform very well either with only one indicator conforming to expectations, while three only partially conformed, three did not conform at and two others were not attempted at all. Some issues were found with the sensitivity analysis starting with a lack of a definition of the term 'sensitivity' ^{KPI 4.1.3}. Sensitivity can be interpreted in many different ways and it is

crucial that the manner in which it was interpreted during analysis is explained as it affects the way in which the results should be interpreted. The approach that was followed to arrive at sensitivity was further not adequately documented ^{KPI 4.1.2} and was only partially discussed for some attributes ^{KPI 4.1.4}. The exact scientific method that was used to generate the sensitivity maps was therefore very difficult to determine and assess ^{KPI 4.1.1}. The same lack of methodological detail prevailed for the delineation of the environmental management zones ^{KPI 4.2.4} and the scientific validity of the methods used to delineate them was doubtful ^{KPI 4.2.3} and seemed to rely on coarse scale digitizing rather than spatial analysis. Although the management zone classes fitted the context of the study area ^{KPI 4.2.5} they were informed mostly by constraints ^{KPI 4.2.1} in the environment with very little reference to opportunities ^{KPI 4.2.2} being made. From a sustainable development perspective it is important that the EMF discuss and evaluate the development opportunities in the area and evaluate them against environmental constraints in an effort to determine reasonable environmental management zones. Although the management zones did reflect some elements of opportunities it was not clear where they were analysed in terms of their relative importance in the study area.

5.2.5. Content – Status quo analysis

The *status quo* was generally well documented although some gaps did exist. From the thirteen indicators that were evaluated only two fully conformed to expectations while six partially conformed. Three indicators did not conform at all and two were not attempted. In terms of the description of the biophysical environment ^{KPI 5.1.1} the EMF only partially conformed to expectations. Although some aspects of the biophysical environment were well addressed some were not discussed in full. For instance, although groundwater is mentioned it is not analysed or discussed in any detail. The same goes for water pollution which is discussed but not spatially reflected and fauna which is discussed but not analysed in terms of possible habitat distribution and the sensitivity of habitat. The description of the socio-economic environment ^{KPI 5.2.1} showed similar performance. A major concern was that although the economic and demographic characteristics of the area were thoroughly discussed they were never spatially reflected. Considering the large size of the WDM the variance in socio-economic criteria across space would have influenced the management of the area but could not be considered. The scale at which land uses was discussed was further not sufficient and development trends were not discussed in line with the spatial development frameworks applicable to the area. A final issue with the analysis of the socio-economic environment was the lack of a discussion on noise pollution which is only briefly referenced in the final EMF report. The *status quo* report also did not reflect on the legal mandate ^{KPI 5.3.1} within which the EMF was to operate and gave little consideration ^{KPI 5.3.2} to the laws, policies and other plans applicable to the EMF study area and the EMF itself. No national ^{KPI 5.4.1} or provincial ^{KPI 5.4.2} strategic plans or initiatives were discussed ignoring important documents such as the National Spatial Biodiversity Assessment of 2004 and the Limpopo

Provincial Spatial Development Framework. At the local level the integrated development plans (IDPs) and spatial development frameworks (SDFs) for the WDM and its local municipalities ^{KPI 5.4.3} were not adequately discussed. The IDPs and SDFs contain crucial information on the development vision for the area and should have been considered in detail to assist in the identification of development pressures and opportunities. Although not all available strategic environmental management plans and frameworks were discussed, some were considered ^{KPI 5.4.4}. In conclusion the *status quo* report effectively illustrated and discussed the interrelationship ^{KPI 5.5.3} and conservation status ^{KPI 5.5.5} of discussed environmental attributes but the sensitivity ^{KPI 5.5.1}, extent ^{KPI 5.5.2} and significance ^{KPI 5.5.4} of all attributes were not adequately addressed.

5.2.6. Content – Desired state of the environment

The DSoE was the best performing review area in terms of quality. From the seven indicators that were investigated four received ‘conformance ratings’ while the remainder received ratings of ‘partially conformance’. The DSoE was generally well discussed ^{KPI 6.2.3} and reflected on the information contained in the *status quo* report ^{KPI 6.2.1} to arrive at a desired state for each attribute. Furthermore, inputs obtained through the public participation process were considered in the drafting of DSoE objectives ^{KPI 6.2.2}. Although one clearly formulated vision for the area was not presented ^{KPI 6.1.1} various statements and sections collaboratively sketch the vision for the area supported by a set of detailed objectives ^{KPI 6.1.2}. The DSoE report further discussed ways in which some environmental resources, such as water, should be managed to maintain or improve their status ^{KPI 6.1.3}. The only real shortfall in the DSoE report was the lack of the identification of priorities related to the legal and institutional framework ^{KPI 6.3.1} in the area. This gap can be linked to absence of a discussion on legal and institutional issues in the *status quo* report.

5.2.7. Content – EMF tool

Fifteen indicators were assessed in an effort to assess the quality of the final EMF tool. Six indicators were found to conform to expectations while seven only partially conformed. Of the remainder, one did not conform while one was not attempted. In terms of the identification of impacts related to environmental attributes identified through the *status quo* analysis, the EMF performed moderately. The impacts that were identified ^{KPI 7.1.1, 7.1.2} were identified in terms of desirable or undesirable land uses per management zone ^{KPI 7.2.1, 7.2.2} and was not assessed in terms of specific attributes. As a result the EMF also did not specifically state which types of specialist studies (ecology, water, air quality etc.) would be required for specific activities within specific areas ^{KPI 7.1.3}. The concept of listing and de-listing was partially addressed in places but not to the extent that wide ranging changes to the application of existing EA listing notices was proposed ^{KPI 7.2.3}. The changes that were recommended acknowledged that a separate process would be needed to eventually de-list activities within certain management zones as proposed by the EMF. Some development thresholds ^{KPI}

7.3.1 and management targets ^{KPI 7.3.3} were proposed for certain environmental attributes but cumulative impacts ^{KPI 7.3.2} were not considered. Cumulative impacts were regarded as something that should be considered through a detailed site and activity specific analysis and was considered to be beyond the scope of an EMF (pers. comm. Jansen van Vuuren, 2015). The EMF management guidelines were generally well developed and were clearly linked to the objectives identified through the DSoE process ^{KPI 7.4.1, 7.4.2}. The management guidelines further provided guidance on the manner in which developments should be managed ^{KPI 7.4.3} within the different management zones and made a very good attempt at promoting development opportunities ^{KPI 7.4.4} within applicable management zones. The lack of a comprehensive discussion on thresholds resulted in limited detail on thresholds in the management guidelines ^{KPI 7.4.5}. The management guidelines further discussed the interaction between the EMF and some other strategic plans such as the Waterberg Biosphere Reserve but neglected to address the full spectrum of applicable plans and policies ^{KPI 7.4.6}.

5.2.8. Content – Implementation strategy

The EMF implementation strategy did not perform very well with two indicators not being attempted at all, one not conforming, one partially conforming and only one fully conforming to expectations. The EMF was successful in involving representatives from all the government departments that would eventually be involved in the implementation of the EMF ^{KPI 8.1.3} but failed to clarify the roles and responsibilities for each of these role-players during eventual implementation ^{KPI 8.1.2}. Some sectorial functions were discussed but not in a manner that would guide the EMF implementation. As previously noted the EMF did consider the EMF/Biosphere relationship but it did not adequately assess the relationship between the EMF and other spatial planning tools ^{KPI 8.1.1} and their effect on its implementation. The lack of a thorough understanding of the strategic context within which the EMF was to function is regarded as a serious concern. Finally, no reference was made to either the revision ^{KPI 8.2.1} of the EMF or the monitoring ^{KPI 8.2.2} of the EMF. It was expected that the EMF would propose a revision schedule and a monitoring guideline to assist the relevant authorities in the successful management of the EMF.

5.2.9. Training

Training the users of the EMF on how to use it is paramount to its success. Although some training was provided to the relevant users of the EMF ^{KPI 9.1.1} no training material was developed ^{KPI 9.1.2}. The EMF team argued that training was not a necessity and that in order for them to understand the tool:

“...stakeholders should rather be involved in the [EMF development] process”
(pers. comm. Jansen van Vuuren, 2015)

This is however not a fair argument as stakeholders, even when involved in the process and understanding the fundamentals of the EMF, does not necessarily possess the skills required to operate the GIS component of an EMF. This skill must be established through training.

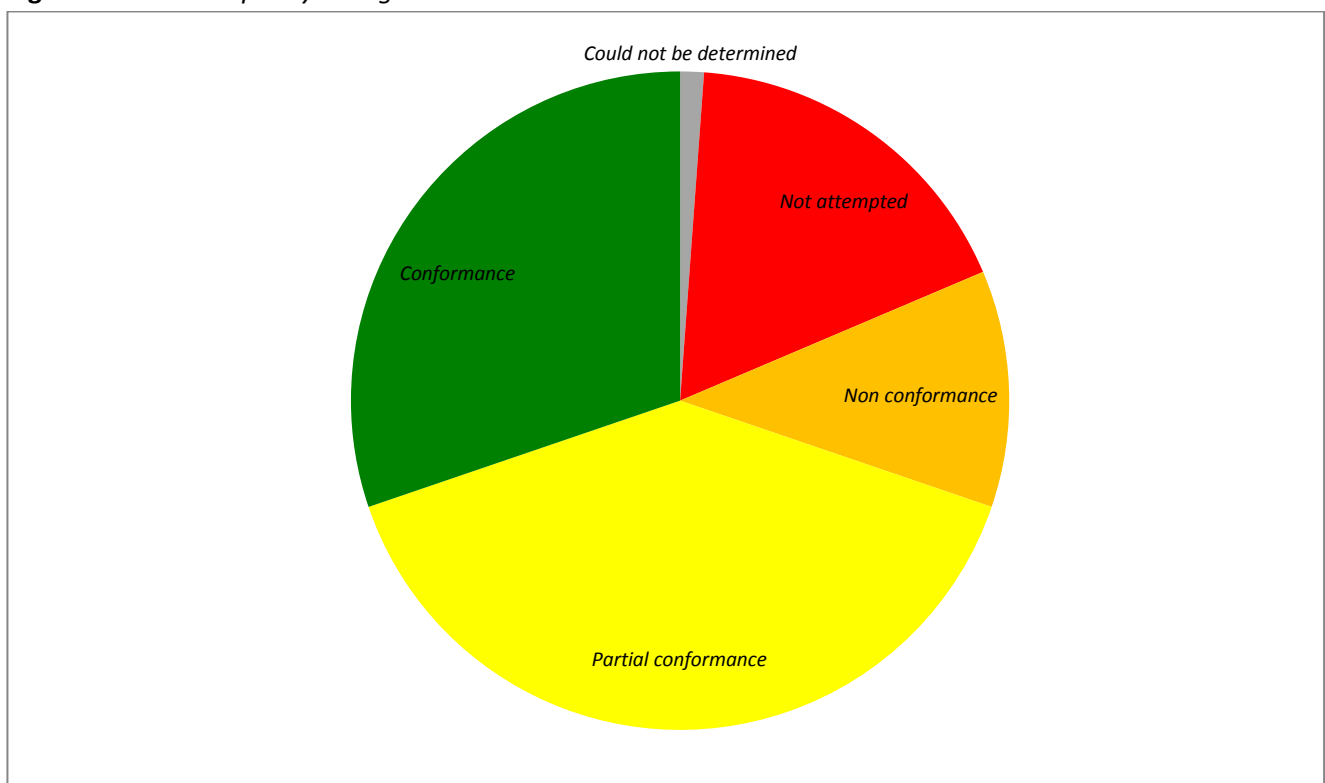
5.2.10. Deliverables

In terms of the quality of deliverables the EMF received mixed results. Of the four indicators that were evaluated two conformed while one only partially conformed and one was not attempted at all. A comprehensive set of EMF documentation ^{KPI 10.1.1} and a spatial information database ^{KPI 10.2.1} was submitted to government for approval. But although the spatial data was in a suitable GIS format it was made available through a software interface that would require some expert GIS knowledge ^{KPI 10.2.2} to operate. Something that further complicated the use of the EMF GIS database was the absence of any documentation describing the tool and the data ^{KPI 10.2.3}. In order for someone to use the information it's expected that they will understand how to operate a GIS system, something that is not the case in all government departments.

5.2.11. Concluding remarks

The overall quality of the WDM EMF was regarded as 'poor to average' with most indicators only partially conforming to expectations and a large percentage not conforming as seen in **Figure 5.2**.

Figure 5.2: Overall quality ratings – Case 1



Although some components were very well executed some gaps in the EMF was identified. The biggest concerns were the lack of a thorough discussion on the strategic and legal context in which the EMF was to operate and the manner in which spatial data was used in the EMF. The lack of training was also considered a problem as it is expected that training will have a direct influence on the eventual use and implementation of the EMF. Areas where the EMF performed well were the planning and execution of the public participation process and the assessment of the desired state of the environment. The quality findings for the West Rand District Municipality (WRDM) EMF are now discussed.

5.3. Quality of Case 2 – West Rand District Municipality EMF

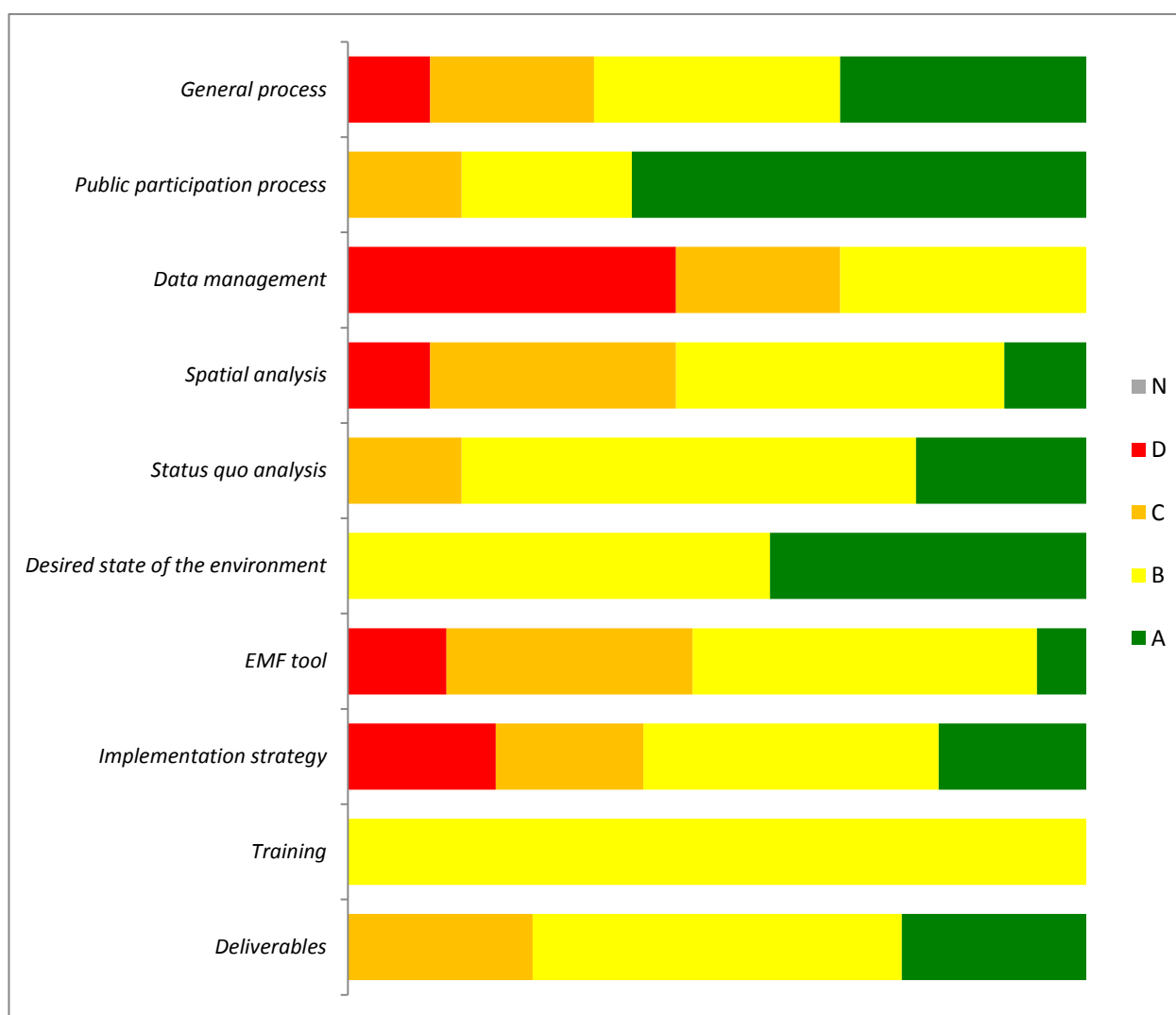
From the 86 quality indicators evaluated for the West Rand District Municipality (WRDM) EMF 21 received a ‘conformance’ rating, 38 a ‘partial conformance’ rating, 18 a ‘non-conformance’ rating and nine a ‘not attempted at all’ rating as indicated in **Table 5.2** and **Figure 5.3**. The quality performance of the EMF is discussed below.

Table 5.2: Quality scores – Case 2

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)				
Quality indicators						
Review area 1: General process	KPA 1.1: Context	1.1.1	1.1.2	1.1.3		
	KPA 1.2: Need	1.2.1				
	KPA 1.3: Requirements and objectives	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5
Review area 2: Public participation process	KPA 2.1: Structuring and execution	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5
	KPA 2.2: Stakeholder involvement	2.2.1	2.2.2	2.2.3		
	KPA 2.3: Accessibility	2.3.1	2.3.2			
	KPA 2.4: Consideration of comments	2.4.1	2.4.2	2.4.3		
Review area 3: Data management	KPA 3.1: Gap analysis	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5
	KPA 3.2: Data use	3.2.1	3.2.2			
	KPA 3.3: Metadata	3.3.1	3.3.2			
Review area 4: Spatial analysis	KPA 4.1: Sensitivity analysis	4.1.1	4.1.2	4.1.3	4.1.4	
	KPA 4.2: Delineation of environmental management zones	4.2.1	4.2.2	4.2.3	4.2.4	4.2.5
Review area 5: Content – Status quo analysis	KPA 5.1: Description of the bio-physical environment	5.1.1				
	KPA 5.2: Description of the socio-economic environment	5.2.1				
	KPA 5.3: Description of the legal context	5.3.1	5.3.2			
	KPA 5.4: Description of the strategic planning context	5.4.1	5.4.2	5.4.3	5.4.4	
	KPA 5.5: Analysis of environmental attributes	5.5.1	5.5.2	5.5.3	5.5.4	5.5.5
Review area 6: Content – Desired state of the environment	KPA 6.1: Strategic objectives	6.1.1	6.1.2	6.1.3		
	KPA 6.2: Describing the desired state of the environment	6.2.1	6.2.2	6.2.3		
	KPA 6.3: Priorities (issues, challenges and opportunities)	6.3.1				
Review area 7: Content – EMF tool	KPA 7.1: Identification of impacts	7.1.1	7.1.2	7.1.3		
	KPA 7.2: Desirable and undesirable land uses	7.2.1	7.2.2	7.2.3		
	KPA 7.3: Thresholds, limits and cumulative impacts	7.3.1	7.3.2	7.3.3		
	KPA 7.4: Management zones guidelines	7.4.1	7.4.2	7.4.3	7.4.4	7.4.5
Review area 8: Content – Implementation strategy	KPA 8.1: Planning for implementation	8.1.1	8.1.2	8.1.3		
	KPA 8.2: Revision schedule	8.2.1	8.2.2			
Review area 9: Training	KPA 9.1: Training	9.1.1	9.1.2			

Review areas	Key performance areas (KPA)		Key performance indicators (KPIs)		
Review area 10: Deliverables	KPA 10.1: Documentation		10.1.1		
	KPA 10.2: Spatial product		10.2.1	10.2.2	10.2.3
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined	

Figure 5.3: Quality performance per review area – Case 2



5.3.1. General process

From the nine indicators that were evaluated as part of the general process review area, three conformed and three partially conformed to expectations while two did not conform to expectations and one was not attempted at all. Overall the review area showed a moderate performance. The necessity of the EMF was

clearly discussed ^{KPI 1.2.1} and reasons for its development presented. The need for the EMF was further clarified through the listing of a number of objectives ^{KPI 1.3.1} that the EMF aimed to achieve while the scope ^{KPI 1.3.2} was clearly established at the onset of the project as being a review of a previous version of the EMF. Some of the aims were however not achieved in the final EMF as the:

“EMF failed to achieve some of the objectives in the initial terms of reference document.”

(pers. comm. Stoffberg, 2015)

Some requirements that were not agreed upon at the onset of the project included the technical requirements for the EMF ^{KPI 1.3.3} and expected deliverables ^{KPI 1.3.5}. The reason was the lack of consensus between the Provincial Department, the National DEA and the WRDM on these requirements (pers. comm. Liversage, 2015). Furthermore, no consideration was given to the operational scale ^{KPI 1.3.4} at which the EMF was to function and according the consultant:

“The operational scale was never even defined for the project.”

(pers. comm. Liversage, 2015)

The EMF succeeded in discussing and contextualising the issues and priorities relating to the study area ^{KPI 1.1.1} but failed to effectively contextualise the environmental goals identified for the area ^{KPI 1.1.2}. Little attention was given to the analysis and discussion of development trends and pressures ^{KPI 1.1.3} in the area.

5.3.2. Public participation

The public participation process for the EMF performed relatively well with eight of the thirteen indicators scoring a ‘conformance’ rating while three scored ‘partially conformance’ and only two a ‘non-conformance’ rating. The public participation process was thoroughly planned ^{KPI 2.1.1} and stakeholders were identified and invited to public meetings ^{KPI 2.1.2}. To account for possible stakeholders that might have been overlooked initially, notices inviting possible stakeholders to participate in the process were placed in local newspapers. The effectiveness of these notices however was challenged by the project leader who stated that:

“...the newspaper notices did not really have any effect as no new parties registered as a result of them.”

(pers. comm. Liversage, 2015)

The project team used questionnaires distributed during public meetings to gain an understanding of the concerns and desires of the public and to help develop a vision and mission statement ^{KPI 2.1.4} for the EMF. The only real issue with the structuring of the public participation process was that a background information

document ^{KPI 2.1.3} informing stakeholders on the, which was circulated only after the *status quo* phase and not during the early stages of the project. The public participation process was extensively documented ^{KPI 2.1.5} as part of the final EMF and provided detail on the questionnaires, minutes of meetings and responses to comments and concerns raised by stakeholders.

5.3.3. Data management

Data management performed poorly with four indicators not being addressed at all while two were found to not conform to expectations. The remaining three indicators were rated as ‘partial conformance’. The EMF documents showed no evidence of a gap analysis ever being conducted ^{KPI 3.1.1} and rather made the assumption that the data sourced from the relevant departments and data custodians:

“...were the most up-to-date, accurate and [were] adequately comprehensive.”
(BKS, 2013:7)

As a result very little evidence was presented on the quality and credibility of datasets ^{KPI 3.1.2} and no evidence was presented on data scale ^{KPI 3.1.4} and accuracy ^{KPI 3.1.5}. Except for referencing the sources ^{KPI 3.1.3} for the final data layers no metadata ^{KPI 3.3.1} describing the individual datasets was created. The EMF did however reflect on the limitations of some datasets but also argued that it was the responsibility of the data custodians to ensure that the data was of good quality and therefore did not explore the issue any further (BKS, 2013:7-8). It was found that in some cases older versions of datasets were used while newer updated versions should have been available. The EMF further noted that an updated land cover dataset developed for a different project could not be made available for use in the EMF (BKS, 2013:8) resulting in an older, less detailed and less accurate dataset being used. In one case the EMF applied extrapolation methods to generate data from limited data points and although the approach is not questioned here, the actual methodology, its limitations and the accuracy of the results were never adequately discussed ^{KPI 3.3.2} casting doubts on the accuracy of the eventual result. Many of the datasets used in the EMF were at a coarse scale and only meant for use at national or provincial levels. These datasets were applied along with datasets that were of acceptable scale resulting in ‘mixed scale’ analysis being conducted ^{KPI 3.2.1, 3.2.2}. The issue of data scale is further accentuated when the EMF report argues that by:

“...using a Geographic Information System (GIS) platform, the EMF enables its application at various scales.”
(BKS, 2013:4)

This is a flawed argument which suggests that the spatial scale of datasets and their effects on spatial analysis results were never really viewed as an important consideration. The manner in which spatial data were managed in the EMF is therefore problematic.

5.3.4. Spatial analysis

The spatial analysis process applied in the EMF did not perform very well either with only one indicator conforming to expectations. From the remaining eight, four partially conformed while three did not conform and one was not attempted. The data issues discussed above resulted in uncertainties pertaining to the sensitivity analysis methodology and results ^{KPI 4.1.1, 4.1.4}. Although the ratings that were applied to different datasets were discussed (BKS, 2013: 136-143) the manner in which the datasets were weighed, conflicts were addressed and final sensitivity classifications were made, were not revealed ^{KPI 4.1.2}. The EMF further failed to define the term 'sensitivity' and did not explain the manner or the context in which it was applied in the EMF ^{KPI 4.1.3}. The methodology applied for the delineation of management zones ^{KPI 4.2.3, 4.2.4} was even less clear than the one that was used for the sensitivity analysis and although the approach was discussed in principle, the key arguments underlying the approach was never revealed. These arguments would include for example the rationale as to why areas rated as highly sensitive biodiversity areas would be considered more important than areas rated as highly sensitive agricultural areas during the delineation of management zones. Other examples would be the lack of distinction made between peri-urban and urban areas and the reason for grouping mining and industry into one management zone. The delineation process further had a stronger focus towards environmental constraints ^{KPI 4.2.1} and did not consider opportunities ^{KPI 4.2.2} in the environment to the same extent. The study area was furthermore delineated into only four management zones resulting in some key issues such as water, tourism and heritage not being sufficiently reflected ^{KPI 4.2.5}.

5.3.5. Content – Status quo analysis

The *status quo* report showed a moderate performance with three of the thirteen indicators conforming to expectations, eight partially conforming and only two not conforming. Both the bio-physical ^{KPI 5.1.1} and socio-economical ^{KPI 5.2.1} environments were relatively well discussed although some shortcomings were identified. Some bio-physical features such as soil and topography were not discussed in adequate detail while others such as groundwater and fauna were discussed but not spatially reflected. In one case data was misinterpreted when the EMF presented data on the ecological status of riparian habitats around rivers as the water quality of rivers (see BKS, 2013:24-25). The analysis further failed to map possible sources of water and air pollution and only discussed the potential sources in general. In terms of the socio-economic analysis some aspects such as cultural heritage were thoroughly discussed while others such as land use and development trends lacked some detail. Land use was confused with land cover and consequently not

thoroughly discussed (see BKS, 2013:15) while the discussion on development trends failed to reflect on the development visions proposed in existing local development ^{KPI 5.4.3} plans such as IDPs and SDFs. Other strategic level plans such as national ^{KPI 5.4.1} level plans, provincial ^{KPI 5.4.2} level plans and other relevant environmental ^{KPI 5.4.4} frameworks and plans were however covered relatively well along with a discussion on the legal mandate ^{KPI 5.3.1} within which the EMF would operate. A final concern in terms of the discussion on the socio-economic environment was that most attributes were discussed at the local municipal scale and not at the ward or sub-place scales. The EMF further failed to reflect on the sensitivity ^{KPI 5.5.1} of all environmental attributes while the analysis of the extent ^{KPI 5.5.2}, interrelationship ^{KPI 5.5.3} and significance ^{KPI 5.5.4} of attributes were often hampered by the coarse scale of the data that was used. Where applicable the EMF did however succeed in discussing the conservation status of attributes ^{KPI 5.5.5}.

5.3.6. Content – Desired state of the environment

The analysis of the desired state of the environment performed somewhat better than the discussion on the *status quo* with three of the seven indicators conforming to expectations and four partially conforming. The EMF succeeded – with the assistance of stakeholders ^{KPI 6.2.2} – in identifying and describing a desired state for the area ^{KPI 6.2.3}. One shortcoming however, was the failure of the EMF to spatially reflect the desired state through linking it to environmental attributes ^{KPI 6.2.1} discussed in the *status quo* phase. Although a vision ^{KPI 6.1.1} for the area was presented in support of the desired state it was obtained from the IDP for the WRDM and not specifically tailored to the EMF. It did however reflect on most of the priorities in the area ^{KPI 6.3.1} and subsequently identified strategic objectives to guide the management of the area towards the identified desired state ^{KPI 6.1.2, 6.1.3}.

5.3.7. Content – EMF tool

The EMF tool showed an average performance with only one of the fifteen indicators conforming to expectations. Seven partially conformed while five did not conform and two were not attempted at all. The EMF failed to discuss the impacts that specific activities and land uses might have on the different environmental attributes ^{KPI 7.1.1, 7.1.2} discussed in the *status quo* report. Impacts were discussed in general and subsequently information requirements ^{KPI 7.1.3} – in terms of specialist study requirements – were also not thoroughly addressed. As a result of the above the description of desirable ^{KPI 7.2.1} and undesirable ^{KPI 7.2.2} land uses was also not discussed in detail and no specific criteria for land uses ever discussed. In terms of listing and de-listing ^{KPI 7.2.3} the coastal activities, which is not applicable to the area in any case, were the only activities recommended for de-listing with no real consideration of other activities. Some consideration was given to pre-determined targets ^{KPI 7.3.3} for amongst others biodiversity management and water management but the extent to which the environmental media could actually cope with impacts were not adequately

discussed ^{KPI 7.3.1, 7.5.5} while the issue of cumulative impacts ^{KPI 7.3.2} were not considered at all. Management guidelines were presented to assist in the achievement of the desired state of the environment but the management zones linked to the guidelines did not always align ^{KPI 7.4.1} with the objectives identified for the DSoE making it difficult to give effect to the DSoE vision ^{KPI 7.4.2}. An example of this misalignment was when the guidelines allowed for some development on high potential agricultural land while the DSoE objective called for no development on high potential land (see BKS, 2013:133). Except for these occasional conflicts, the management guidelines were clear on the types of development that should be allowed in different management zones ^{KPI 7.4.3}. An aspect in which the guidelines failed was the promotion of development opportunities ^{KPI 7.4.4} in the area. Overall the management guidelines do not seem to encourage development and little opportunity was given to developments types such as 'industrial development' within the urban development zone. While the guidelines did reflect on some policies and plans ^{KPI 7.4.6} applicable to the area (such as the Cradle of Humankind World Heritage Site EMF) and how the WRDM EMF should interact with them, many policies and plans such as the SDFs were not considered.

5.3.8. Content – Implementation strategy

The implementation strategy also showed a moderate performance with only one of the five indicators conforming to expectations while two partially conformed. One expectation did not conform while another was not attempted at all. As alluded to earlier the management guidelines did consider some strategic planning tools but failed to address the local SDFs and IDPs. This resulted in the implementation strategy also failing to address all the relevant strategic plans ^{KPI 8.1.1}. The roles and responsibilities of different government departments in the implementation of the EMF was further not clarified ^{KPI 8.1.2} even though they were well represented during the development phases of the EMF ^{KPI 8.1.3}. The implementation strategy noted the importance of the review of the EMF but failed to suggest timelines ^{KPI 8.2.1} for this. No reference was made to the need for the monitoring ^{KPI 8.2.2} of the EMF or how this task could be conducted.

5.3.9. Training

Both of the indicators evaluated for training were found to only partially conform to expectations. The EMF documentation provided no proof on training material or plans for training but according to the service provider some training ^{KPI 9.1.1} on the querying of information was provided and a basic guideline document ^{KPI 9.1.2} developed (pers. comm. Liversage, 2015). Training was conducted in-house and focussed on key government officials that would be involved in the implementation and use of the EMF.

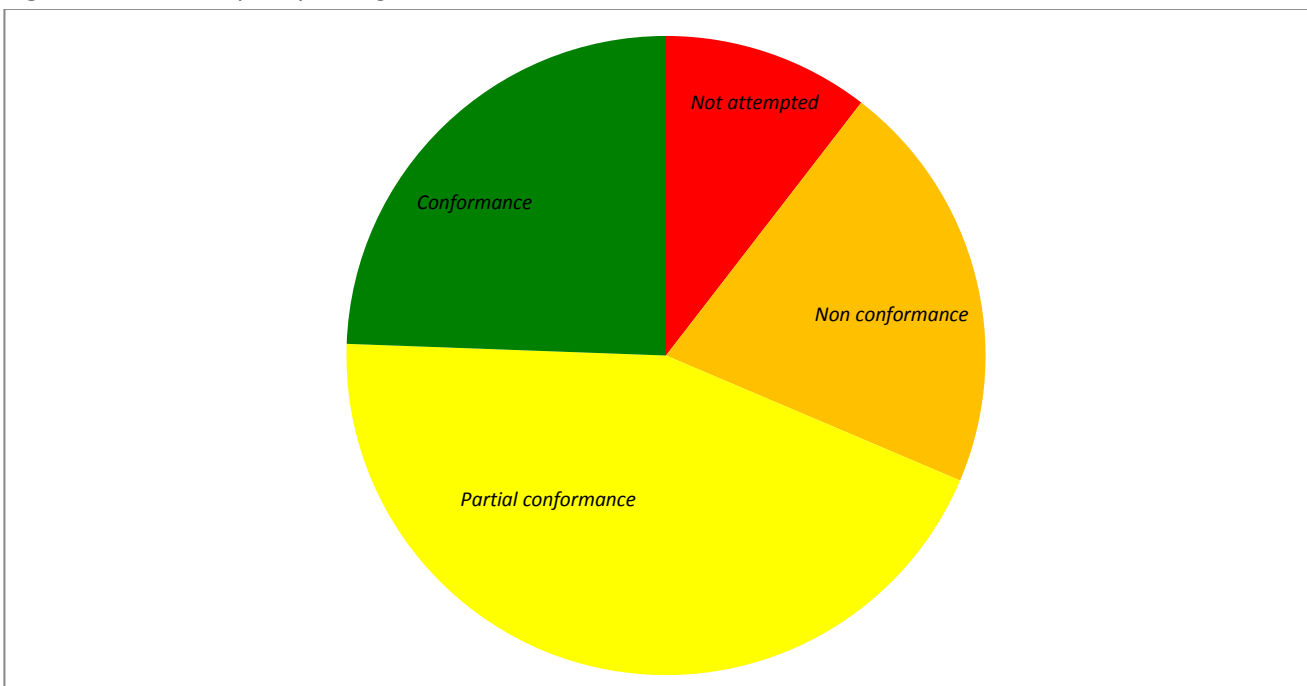
5.3.10. Deliverables

Of the four indicators evaluated to establish the quality of the WRDM EMF deliverables one conformed to expectations while two partially conformed and one did not conform. The documentation that was submitted as part of the final EMF was found to be comprehensive and sufficient ^{KPI 10.1.1} but the spatial database presented some issues. Although the data was submitted in an acceptable GIS format ^{KPI 10.2.1} supporting information ^{KPI 10.2.3} on data was lacking and technical GIS knowledge was still necessary to access and use the information ^{KPI 10.2.2}. The spatial data was very difficult to access and consisted of many directories of poorly organised data.

5.3.11. Concluding remarks

The overall quality of the WRDM EMF was rated as 'poor to average'. Most indicators only partially conformed to expectations while a large percentage did not conform as shown in **Figure 5.4**. The EMF boasted a very good public participation process and also performed well in terms of the general process that was followed for the development of the EMF. Data management was the worst performer with many issues identified in terms of the quality and management of spatial data in the EMF. The data issues further influenced the spatial analysis phase of the project resulting in some issues with the accuracy and acceptability of analysis techniques. The final EMF tool generally performed well but some shortcomings were identified in terms of the management zones and guidelines and the manner in which the EMF would be implemented. The quality findings for the Madibeng Local Municipality are now discussed.

Figure 5.4: Overall quality ratings – Case 2



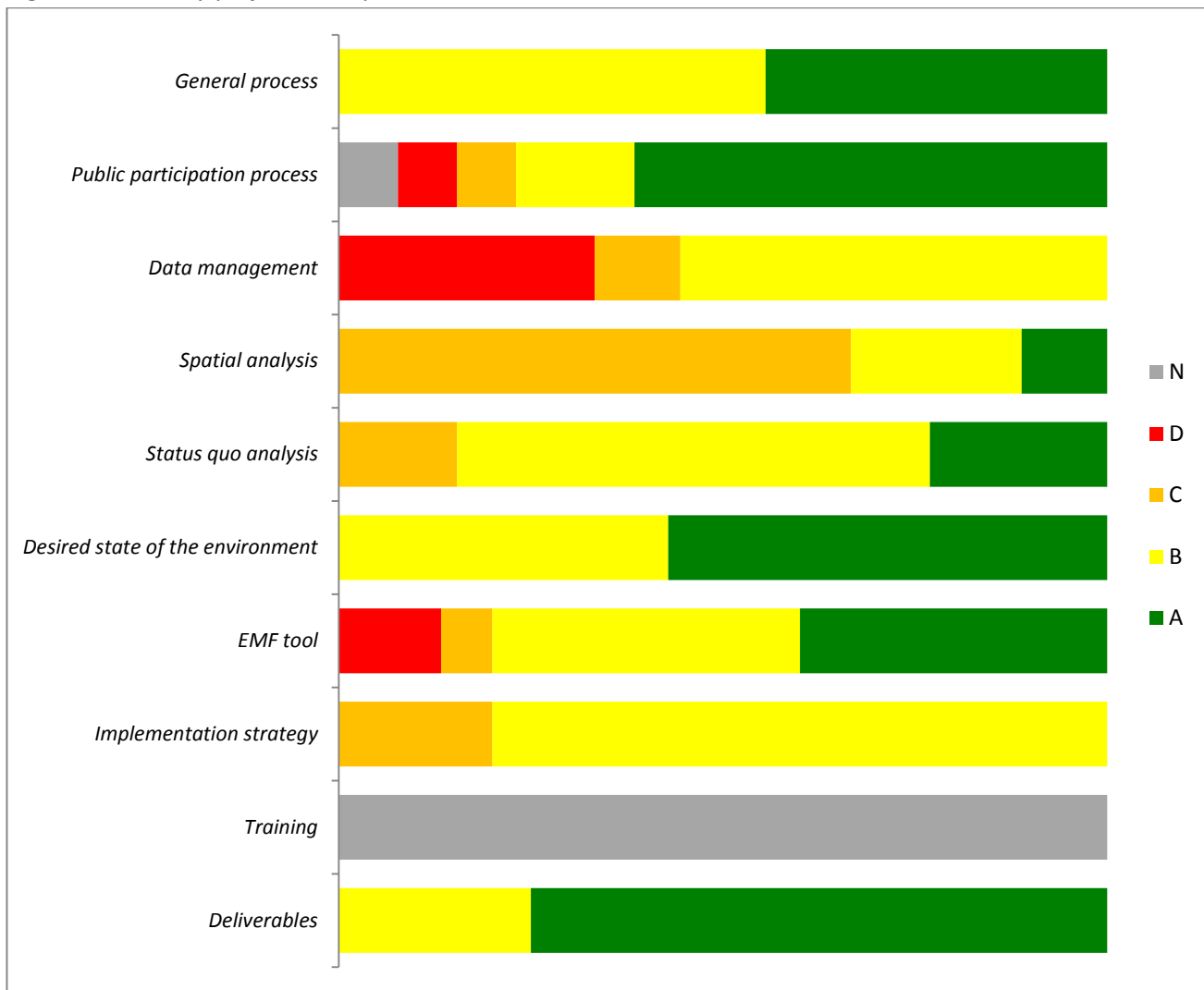
5.4. Quality of Case 3 – Madibeng Local Municipality EMF

Of the 86 quality indicators (Table 5.3 and Figure 5.5) that were evaluated for the Madibeng Local Municipality (MLM) EMF 29 received a ‘conformance’ rating while 36 received a ‘partial conformance’ rating. Only 12 indicators received a ‘non-conformance’ rating and only six a ‘not attempted at all’ rating. The service provider responsible for the development of the EMF could not be reached for comment and as a result the status of three indicators could not be determined objectively and were awarded ratings of ‘could not be determined’. In the section to follow, the quality performance of the EMF is discussed.

Table 5.3: Quality scores – Case 3

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)																	
Quality indicators																			
Review area 1: General process	KPA 1.1: Context	1.1.1	1.1.2	1.1.3															
	KPA 1.2: Need	1.2.1																	
	KPA 1.3: Requirements and objectives	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5													
Review area 2: Public participation process	KPA 2.1: Structuring and execution	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5													
	KPA 2.2: Stakeholder involvement	2.2.1	2.2.2	2.2.3															
	KPA 2.3: Accessibility	2.3.1	2.3.2																
	KPA 2.4: Consideration of comments	2.4.1	2.4.2	2.4.3															
Review area 3: Data management	KPA 3.1: Gap analysis	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5													
	KPA 3.2: Data use	3.2.1	3.2.2																
	KPA 3.3: Metadata	3.3.1	3.3.2																
Review area 4: Spatial analysis	KPA 4.1: Sensitivity analysis	4.1.1	4.1.2	4.1.3	4.1.4														
	KPA 4.2: Delineation of environmental management zones	4.2.1	4.2.2	4.2.3	4.2.4	4.2.5													
Review area 5: Content – Status quo analysis	KPA 5.1: Description of the bio-physical environment	5.1.1																	
	KPA 5.2: Description of the socio-economic environment	5.2.1																	
	KPA 5.3: Description of the legal context	5.3.1	5.3.2																
	KPA 5.4: Description of the strategic planning context	5.4.1	5.4.2	5.4.3	5.4.4														
	KPA 5.5: Analysis of environmental attributes	5.5.1	5.5.2	5.5.3	5.5.4	5.5.5													
Review area 6: Content – Desired state of the environment	KPA 6.1: Strategic objectives	6.1.1	6.1.2	6.1.3															
	KPA 6.2: Describing the desired state of the environment	6.2.1	6.2.2	6.2.3															
	KPA 6.3: Priorities (issues, challenges and opportunities)	6.3.1																	
Review area 7: Content – EMF tool	KPA 7.1: Identification of impacts	7.1.1	7.1.2	7.1.3															
	KPA 7.2: Desirable and undesirable land uses	7.2.1	7.2.2	7.2.3															
	KPA 7.3: Thresholds, limits and cumulative impacts	7.3.1	7.3.2	7.3.3															
	KPA 7.4: Management zones guidelines	7.4.1	7.4.2	7.4.3	7.4.4	7.4.5	7.4.6												
Review area 8: Content – Implementation strategy	KPA 8.1: Planning for implementation	8.1.1	8.1.2	8.1.3															
	KPA 8.2: Revision schedule	8.2.1	8.2.2																
Review area 9: Training	KPA 9.1: Training	9.1.1	9.1.2																
Review area 10: Deliverables	KPA 10.1: Documentation	10.1.1																	
	KPA 10.2: Spatial product	10.2.1	10.2.2	10.2.3															
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Conformance	Partial conformance	Non conformance	Not attempted at all																
			Could not be determined																

Figure 5.5: Quality performance per review area – Case 3



5.4.1. General process

From the nine indicators that were evaluated as part of the ‘general process’ review area four were found to conform to expectations while the remaining five were found to only partially conform. The EMF report stated that:

“The municipality [was] experiencing development pressure, especially along the south through to the eastern boundaries, which [was] threatening the sustainability of its natural resources.”

(MLM, 2009a:1)

This EMF was developed in an effort to pro-actively address ^{KPI 1.2.1} these development pressures ^{KPI 1.1.3} and any other issues and priorities ^{KPI 1.1.1} in the area through sustainability orientated management objectives and guidelines. To inform the development of objectives and guidelines the EMF first identified broad goals for environmental management. These goals however were not always discussed within the context of the

study area and were sometimes only relevant at provincial or national scales ^{KPI 1.1.2}. Objectives were developed to give effect to the goals and the overall need for the EMF and were established at the onset of the project ^{KPI 1.3.1}. It was however found that the extent ^{KPI 1.3.2} to which the EMF would deal with environmental management within the MLM was not always clear and that the operational scale ^{KPI 1.3.4} at which the EMF would be implemented was also not clearly defined. Issues such as technical requirements ^{KPI 1.3.3} and expected deliverables ^{KPI 1.3.5} was also not clearly stipulated in the documentation and only agreed upon as the project developed (pers. comm. Mathebula, 2015).

5.4.2. Public participation

The public participation process performed relatively well and was thoroughly documented. Eight of the thirteen public participation indicators conformed to expectations while two partially conformed. Only one indicator did not conform while another was not attempted and a final indicator could not be objectively evaluated. Overall the public participation process was thoroughly planned and well executed ^{KPA 2.1}. Good effort was made to ensure that all possible stakeholders had the opportunity to participate in the EMF development process. Background information documents explaining the EMF development process and the manner in which stakeholders could participate were distributed and several public meetings through which stakeholders could raise concerns were advertised and conducted (see MLM, 2009d:3). Notices ^{KPI 2.2.2} inviting stakeholders to comment on draft documents ^{KPI 2.2.1} were further published in local newspapers. The timeframes in which stakeholders had to comment during different phases however were not always sufficient ^{KPI 2.2.3} and ranged from only one week to four weeks. The acceptable standard for commenting periods as described in South African EIA regulations is around four weeks. Another shortfall was the inability of the EMF to provide for the participation of those individuals not able to participate in the normal process ^{KPI 2.3.1} due to disadvantages such as illiteracy or disabilities. Although many comments were still received and considered in the final EMF some issues were raised with regards to the contribution of key stakeholders ^{KPI 2.4.1}. According to Van Straaten (pers. comm. 2015) one such issue was that:

“The capacity in local government was not sufficient and therefore the comments and inputs obtained from the local authority were inadequate and not up to standard.”

This is important when considering that the local municipality would be one of the main users of the final EMF tool. Where comments were considered the project team did however succeed in indicating through a ‘comments and response report’ the extent to which they were included in the final EMF ^{KPI 2.4.2}. Whether stakeholders were informed about this report and the manner in which their comments were considered could however not be determined ^{KPI 2.2.2}. A final deficit was that the final EMF documentation was not readily

accessible to people outside government ^{KPI 2.3.2}. Only draft documents were available and had to be sourced from key individuals in government departments, making it difficult for the public to interact with the EMF.

5.4.3. Data management

Data management performed poorly with three indicators not being attempted at all while one did not conform to expectations and five only partially conformed. Although some reference was made to sources of data ^{KPI 3.1.3} and the credibility of some datasets ^{KPI 3.1.2} a comprehensive analysis of all datasets was not conducted ^{KPI 3.1.1}. As a result, key dataset characteristics such as scale ^{KPI 3.1.4} and quality ^{KPI 3.1.5} were not considered at all. Data scale and quality are fundamental concepts in any spatial analysis and the negligence thereof is concerning. In the case of the MLM EMF it resulted in datasets at inadequate scales ^{KPI 3.2.1} and of questionable quality ^{KPI 3.2.2} being used in analysis. Scales were frequently mixed during analysis resulting in questions surrounding the accuracy of analysis results. It was therefore also not surprising that no metadata was presented ^{KPI 3.3.1} for the datasets used in the EMF. Where new data were captured from scratch some information was provided to describe the basic methodology that was followed ^{KPI 3.3.2}. Overall the management of spatial data in the EMF was not sufficient and not up to standard.

5.4.4. Spatial analysis

The spatial analysis component of the EMF also performed poorly with six of the nine indicators not conforming to expectations while two partially conformed and only one conformed. The bad performance of the spatial analysis indicators could partially be ascribed to the data management issues that were discussed. Other issues that contributed to the bad performance was the lack of detail on the approach that was followed to assess sensitivity ^{KPI 4.1.1, KPI 4.1.2} and the manner in which ‘sensitivity’ was understood and interpreted during analysis ^{KPI 4.1.3}. The combination of these issues resulted in concerns over the correctness in which sensitivity is portrayed and uncertainties as to how it should be interpreted ^{KPI 4.1.4}.

In terms of the delineation of management zones the EMF failed to clearly distinguish and map management zones ^{KPI 4.2.5}. The EMF opted to use generalized constraint areas for management purposes, while the rationale for this decision was not explained and very little detail provided on how the analysis was conducted ^{KPI 4.2.3, 4.2.4}. As a consequence of relying on constraints in the area for management purposes, spatial constraints ^{KPI 4.2.1} were well represented but opportunities ^{KPI 4.2.2} were largely ignored. Overall the spatial analysis approaches applied throughout the EMF was not adequately described and defended and left many questions pertaining to the scientific acceptability of the approaches that were used.

5.4.5. Content – Status quo analysis

The *status quo* analysis performed moderately with three of the thirteen indicators scoring ratings of ‘conformance’ while eight were rated as ‘partial conformance’ and only two were rated as ‘non-conformance’. The biophysical environment was relatively well discussed ^{KPI 5.1.1} although some gaps in the analysis were identified. Some environmental attributes such as topography, visual character, geology and threatened species habitat were not discussed in adequate detail while others such as groundwater, air pollution and the spatial representation of water quality were largely ignored. The level of detail at which environmental attributes were assessed was problematic in some cases where attributes were discussed only at the national level as was the case for agriculture. The same trend was found for the analysis of the socio-economic environment ^{KPI 5.2.1} where some attributes such as land use was discussed but not in adequate detail and others such as economic characteristics were not represented spatially. In extreme cases issues such as noise pollution were not addressed at all. Overall the sensitivity, extent, interrelationship and significance of environmental attributes were not always clearly expressed ^{KPI 5.5.1-5.5.4} due to issues such as data scales, the understanding of sensitivity and thoroughness of analysis, e.g. sensitivity analysis was not conducted for all environmental attributes. The conservation status of environmental attributes was however, where applicable, adequately indicated ^{KPI 5.5.5}. The legal context within which the EMF would operate was very poorly discussed ^{KPI 5.3.1} and limited reference was made to laws and policies applicable to the MLM ^{KPI 5.3.2}. As a result the strategic planning context within which the EMF would operate was also not effectively discussed with nothing being said about national strategies ^{KPI 5.4.1} and some key local level plans such as the IDPs and the district municipal SDF not being discussed either ^{KPI 5.4.3}. Provincial plans ^{KPI 5.4.2} and other existing environmental management tools ^{KPI 5.4.4} such as the Magaliesberg Protected Environment EMF (which takes prominence over the MLM EMF in the areas where they overlap) were adequately discussed. Overall the *status quo* analysis was acceptable although the gaps discussed, if addressed, would have resulted in a higher quality report.

5.4.6. Content – Desired state of the environment

The desired state of the environment (DSoE) performed relatively well with four of the seven indicators conforming to expectations while the remaining three partially conformed. The DSoE report successfully discussed the desired state ^{KPI 6.2.3} for the area and presented a vision coupled with objectives and management guidelines for each objective ^{KPA 6.1} that if adhered to would assist in achieving the DSoE. Some shortfalls were that the information contained in the *status quo* report ^{KPI 6.2.1} and some comments resulting from the public participation process ^{KPI 6.2.2} were not always reflected in the assessment of the desired state. Although overall the DSoE succeeded in identifying and discussing environmental management priorities in

the area the biophysical environment was addressed in more detail than the socio-economic environment ^{KPI 6.3.1}.

5.4.7. Content – EMF tool

The EMF tool showed a moderate performance with only six of the fifteen indicators conforming to expectations and six partially conforming. From the remainder, one did not conform to expectations and two were not attempted at all. The EMF succeeded in identifying possible impacts and relating them – within the context of the area – to specific environmental attributes ^{KPA 7.1} but failed to further evaluate these impacts thoroughly in terms of their desirability and un-desirability within specific management zones ^{KPI 7.2.1, 7.2.2}. As a result the EMF did not attempt to consider specific activities for listing or de-listing within specific management zones ^{KPI 7.2.3}. The extent to which environmental attributes could withstand impacts ^{KPI 7.3.1, 7.3.3} was only discussed in some cases and then from national or provincial perspectives. The assessment of thresholds and limits at the local level was therefore not adequately addressed and also not dealt with thoroughly in the management guidelines ^{KPI 7.4.5}. Mathebula (pers. comm. 2015) argued that the reason for this was because:

“Thresholds were very difficult to identify during development of the EMF and only became clear as the EMF was being used.”

The same might be said for cumulative impacts which were not addressed in the EMF at all ^{KPI 7.3.2}. The EMF provided relatively clear guidelines for environmental management within the different environmental management zones ^{KPI 7.4.1 - 7.4.3} but gave little attention to the development opportunities ^{KPI 7.4.4} offered by the area and how they could be unlocked in a sustainable manner. Another issue with the management guidelines was that they referred to details that could not be obtained from the actual management zones, *i.e.* constraint zones, making it difficult to accurately interpret an area spatially in line with the guidelines. The existing legal and management context was finally also not sufficiently addressed in the management guidelines ^{KPI 7.4.6}.

5.4.8. Content – Implementation strategy

The implementation strategy did not perform very well with four of the five indicators only partially conforming to expectations and one not conforming at all. Although an implementation strategy was included in the final EMF document it failed to effectively clarify the roles of the different government departments in the implementation of the EMF ^{KPI 8.1.2}. Except for the Department of Mineral Resources (DMR) all other relevant government departments ^{KPI 8.1.3} were involved in the development of the EMF (pers.

comm. Mathebula, 2015) but according to Van Straaten (pers. comm. 2015) the allocation of roles and responsibilities were complicated as a result of power struggles and:

“A complicated working relationship between government departments.”

The implementation strategy further also failed to address the relationship between the EMF and the broader strategic planning context ^{KPI 8.1.1}. Some reference was made to the monitoring and revision of the EMF but no schedules or guidelines were given to inform these processes ^{KPI 8.2.1 - 8.2.2}.

5.4.9. Training

The extent to which training conducted could not be determined objectively. The role-players in provincial and local government could not recall the manner in which training was conducted. This might serve as anecdotal evidence to suggest that thorough training was not conducted ^{KPA 9.1}. No training material could be obtained from any sources.

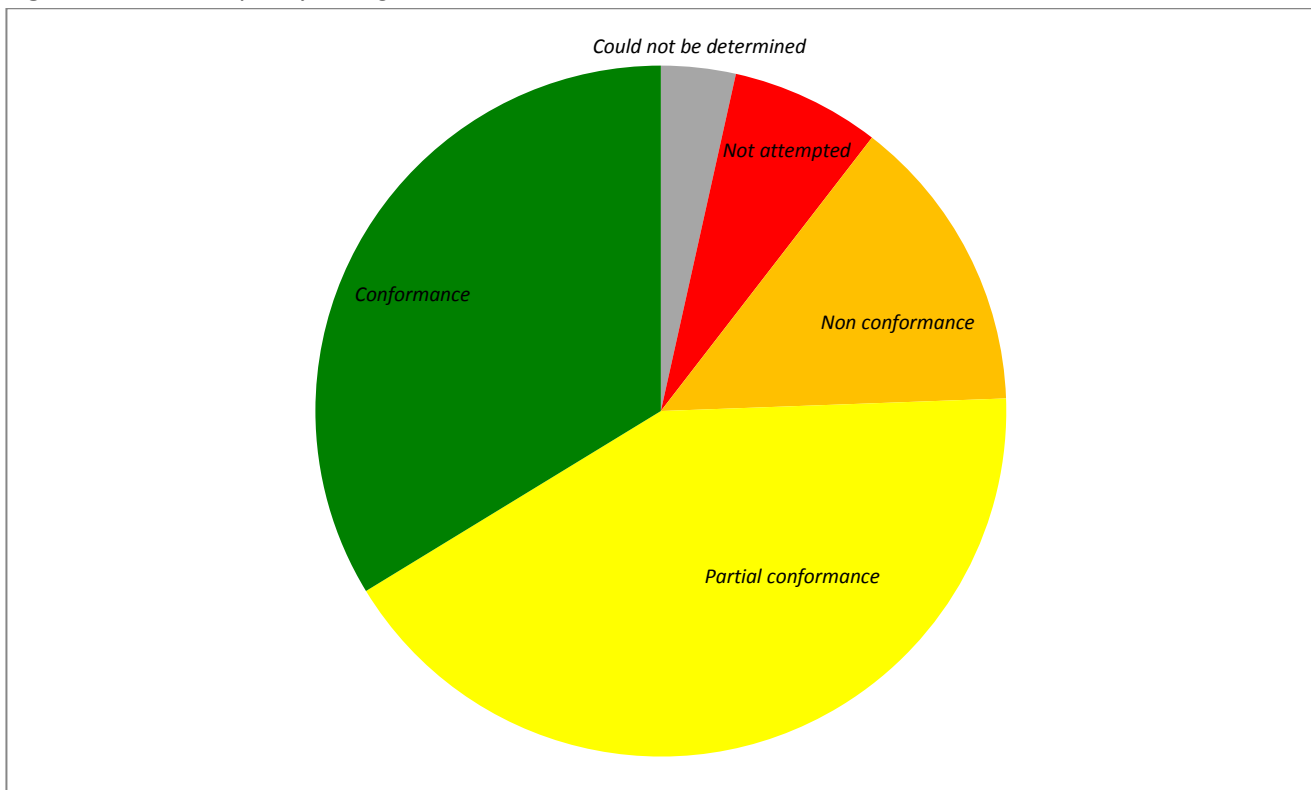
5.4.10. Deliverables

In terms of deliverables, the EMF performed relatively well. Three of the four indicators were awarded ‘conformance’ ratings while only one was awarded a ‘partially conformance’ rating. A comprehensive set of final EMF documentation were submitted to the relevant authorities for consideration and adoption ^{KPI 10.1.1}. While the spatial data was submitted along with documentation in a suitable GIS format ^{KPI 10.2.1} and accompanied by explanatory documentation ^{KPI 10.2.3} the format in which it was submitted would still require the user to have some technical GIS knowledge ^{KPI 10.2.2} to access the information. The format of the final product was therefore not easily accessible and would be inaccessible to some prospective users.

5.4.11. Concluding remarks

Overall the EMF was of ‘average’ quality with most of the indicators only partially conforming to expectations as shown in **Figure 5.6**. The public participation process performed very well and the positive influence of this good performance on the drafting of the desired state of the environment was clear. The EMF struggled in terms of data management and subsequently also spatial analysis with major shortfalls in data use and the description of analysis methodologies. The extent to which knowledge were transferred to the intended EMF users could not be established. The quality findings for the Dr Pixley ka Seme Local Municipality EMF are now discussed.

Figure 5.6: Overall quality ratings – Case 3



5.5. Quality of Case 4 – Dr Pixley ka Seme Local Municipality EMF

From the 86 quality indicators that were evaluated for the Dr Pixley ka Seme Local Municipality (DPKSLM) EMF 31 conformed to expectations while 34 partially conformed. From the remainder, six did not conform while ten were not attempted at all. The status of two indicators could not be determined objectively. The rating for each indicator is shown in Table 5.4 while Figure 5.7 presents a summary for each review area. Below, the findings for each review area are discussed.

Table 5.4: Quality scores – Case 4

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)				
<i>Quality indicators</i>						
Review area 1: General process	KPA 1.1: Context	1.1.1	1.1.2	1.1.3		
	KPA 1.2: Need	1.2.1				
	KPA 1.3: Requirements and objectives	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5
Review area 2: Public participation process	KPA 2.1: Structuring and execution	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5
	KPA 2.2: Stakeholder involvement	2.2.1	2.2.2	2.2.3		
	KPA 2.3: Accessibility	2.3.1	2.3.2			
	KPA 2.4: Consideration of comments	2.4.1	2.4.2	2.4.3		
Review area 3: Data management	KPA 3.1: Gap analysis	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5
	KPA 3.2: Data use	3.2.1	3.2.2			
	KPA 3.3: Metadata	3.3.1	3.3.2			
Review area 4: Spatial	KPA 4.1: Sensitivity analysis	4.1.1	4.1.2	4.1.3	4.1.4	

Review areas	Key performance areas (KPA)	Key performance indicators (KPIs)																	
analysis	KPA 4.2: Delineation of environmental management zones	4.2.1	4.2.2	4.2.3	4.2.4	4.2.5													
Review area 5: Content – Status quo analysis	KPA 5.1: Description of the bio-physical environment	5.1.1																	
	KPA 5.2: Description of the socio-economic environment	5.2.1																	
	KPA 5.3: Description of the legal context	5.3.1	5.3.2																
	KPA 5.4: Description of the strategic planning context	5.4.1	5.4.2	5.4.3	5.4.4														
	KPA 5.5: Analysis of environmental attributes	5.5.1	5.5.2	5.5.3	5.5.4	5.5.5													
Review area 6: Content – Desired state of the environment	KPA 6.1: Strategic objectives	6.1.1	6.1.2	6.1.3															
	KPA 6.2: Describing the desired state of the environment	6.2.1	6.2.2	6.2.3															
	KPA 6.3: Priorities (issues, challenges and opportunities)	6.3.1																	
Review area 7: Content – EMF tool	KPA 7.1: Identification of impacts	7.1.1	7.1.2	7.1.3															
	KPA 7.2: Desirable and undesirable land uses	7.2.1	7.2.2	7.2.3															
	KPA 7.3: Thresholds, limits and cumulative impacts	7.3.1	7.3.2	7.3.3															
	KPA 7.4: Management zones guidelines	7.4.1	7.4.2	7.4.3	7.4.4	7.4.5	7.4.6												
Review area 8: Content – Implementation strategy	KPA 8.1: Planning for implementation	8.1.1	8.1.2	8.1.3															
	KPA 8.2: Revision schedule	8.2.1	8.2.2																
Review area 9: Training	KPA 9.1: Training	9.1.1	9.1.2																
Review area 10: Deliverables	KPA 10.1: Documentation	10.1.1																	
	KPA 10.2: Spatial product	10.2.1	10.2.2	10.2.3															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> </tr> <tr> <td style="background-color: #008000; color: white; text-align: center;">Conformance</td> <td style="background-color: #ffff00; text-align: center;">Partial conformance</td> <td style="background-color: #ffa500; text-align: center;">Non conformance</td> <td style="background-color: #ff0000; text-align: center;">Not attempted at all</td> </tr> <tr> <td colspan="4" style="text-align: center;">Could not be determined</td> </tr> </table>												Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			
Conformance	Partial conformance	Non conformance	Not attempted at all																
Could not be determined																			

5.5.1. General process

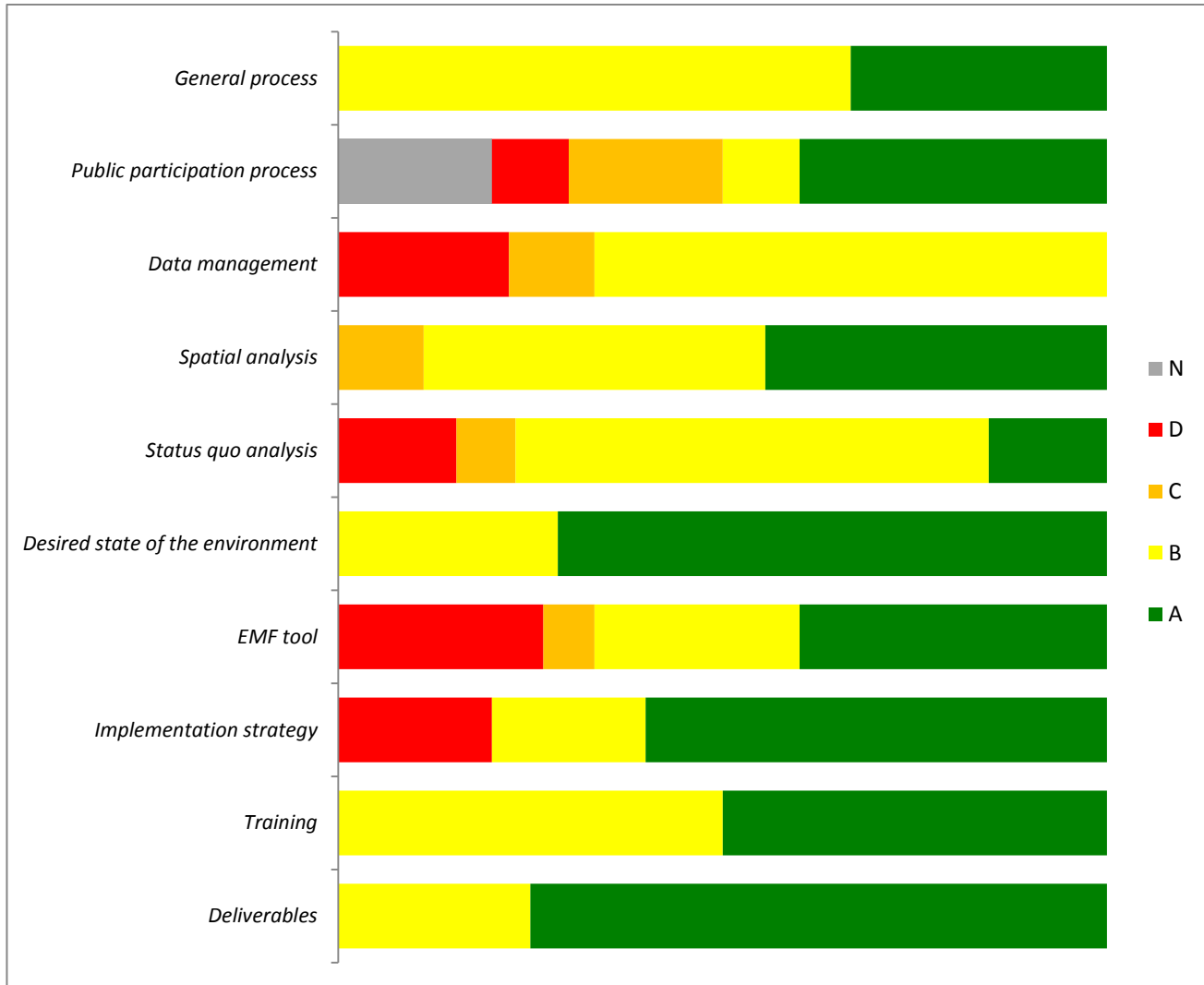
From the nine indicators that were assessed as part of the general process three were found to conform to expectations while six only partially conformed. The EMF was customized to the context of the DPKSLM and successfully reflected and addressed most of the issues and objectives relevant to the area ^{KPI 1.1.1, 1.1.2, 1.1.3}. Although the need for the EMF was never explicitly stated, elements thereof were presented through an EMF purpose statement and through the EMF objectives ^{KPI 1.2.1}. The EMF objectives were however found to be too general and not efficiently tailored to the context of the DPKSLM ^{KPI 1.3.1}. This could be ascribed to the fact that the terms of reference document which was the key document communicating the expectations for the EMF was:

“...rather generic and very similar to terms of reference documents used in other EMF projects.”
(pers. comm. Kilian, 2015).

Except for the expected deliverables at the end of the project ^{KPI 1.3.5}, other expectations such as the desired scope of the project, the technical requirements for the final EMF and the operational scale at which it was to function were also not clearly communicated ^{KPI 1.3.2 – 1.3.4}. The only scale requirement for instance was that the EMF should be usable at the local municipal scale (pers. comm. Kilian, 2015) which in terms of the scale requirements for data and analysis is not explicit at all but rather vague. Many of these shortfalls or gaps

could be ascribed to the generic nature of the terms of reference report which was not necessarily tailored to fit the needs of the DPKSLM.

Figure 5.7: Quality performance per review area – Case 4



5.5.2. Public participation

The public participation process performed moderately with only five of the thirteen indicators conforming to expectations and one partially conforming. Two of the indicators did not conform while three were not attempted at all. Two indicators could not be objectively evaluated and were excluded from the analysis. Overall the public participation process was found to be well planned and thoroughly executed ^{KPI 2.1.1 – 2.1.4}. The process mostly adhered to the requirements for public participation as described in the EMF Guidelines and care was taken to ensure that stakeholders were informed of the project. Although no special steps were taken to facilitate the involvement of disabled or disadvantaged individuals ^{KPI 2.3.1} all other stakeholders were

presented with ample opportunities to partake in the process. According to Kilian (pers. comm. 2015) the active involvement of stakeholders in the process was beneficial to project team as they:

“...were responsible for giving the project team access to data such as mining rights applications which were not readily available from the relevant government departments.”

One of the only major shortfalls of the public participation process was a failure of the project team to give notice of the availability of the draft EMF for commenting ^{KPI 2.2.2}. The manner in which the draft EMF were made available and the timeframes that were allowed for commenting was further not documented and could also not be recalled by any interviewees ^{KPI 2.2.1 - 2.2.3}. Although the review found that most of the concerns that were raised through the public participation process were considered in the final EMF ^{KPI 2.4.1} the extent to which concerns were addressed and feedback was provided to stakeholders were not documented ^{KPI 2.4.2, 2.4.3}. The rest of the process, however, was sufficiently documented and presented in the final EMF ^{KPI 2.1.5}. Some issues aroused pertaining to the availability of the final EMF for use by the general public. Although the EMF was published and should be available it was found to be highly inaccessible and that the consultant was often contacted by the general public for copies of the EMF ^{KPI 2.3.2}.

5.5.3. Data management

The data management review area performed poorly with not one indicator conforming to expectations and six only partially conforming. From the remaining three indicators one did not conform to expectations while the other two were never attempted. Although a formal gap analysis was not conducted many of the aspects expected to be addressed in a gap analysis were discussed in the EMF. Reference was sometimes made to issues such as data gaps, data quality, data sources, and data scale and data accuracy ^{KPA 3.1}. Most of these attributes were however not discussed in adequate detail or were only discussed for some datasets. In general it was found that datasets used in the EMF were not of adequate detail and mostly at very coarse scales with very few datasets at scales of 1:50 000 or finer ^{KPI 3.2.1}. The EMF report further stated that no ground truthing was ever conducted and that secondary datasets were used without further investigation (SRK Consulting, 2010a:16). The quality of many datasets was therefore found to be questionable or undetermined ^{KPI 3.2.2}. Lastly, no attempt was made to develop metadata for any of the datasets and the methods used to describe the management and capturing of new data was never discussed ^{KPA 3.3}.

5.5.4. Spatial analysis

The spatial analysis review area performed somewhat better than the data management review area with four out of nine indicators conforming to expectations and four more partially conforming. Only one indicator did not conform to expectations. The methodology used to assess the sensitivity of environmental attributes was well discussed ^{KPI 4.1.2} and considered to be scientifically acceptable and defensible ^{KPI 4.1.1}. The manner in which sensitivity was interpreted in the EMF was adequately defined as ^{KPI 4.1.3}:

“...a measure of value or importance [of environmental attributes] in the opinion of specialists and environmental practitioners.”

(SRK Consulting, 2010b:38).

Sensitivity was therefore assessed as the importance of features and not their vulnerability to changes or impacts. The only gap in terms of the sensitivity analysis was that not all environmental attributes were analysed in terms of their sensitivity ^{KPI 4.1.4}. The analysis techniques that were used to delineate management zones were not discussed in the same detail as was done for the sensitivity analysis ^{KPI 4.2.4}. It was established that the results from the sensitivity analysis were used as inputs to determine the management zones, but the exact manner in which this was done was not clearly discussed ^{KPI 4.2.3}. The management zones further tended to focus on the environmental constraints ^{KPI 4.2.1} in the area and did not really reflect environmental opportunities such as development potential ^{KPI 4.2.2, 4.2.5}.

5.5.5. Content – Status quo analysis

From the thirteen indicators that were evaluated as part of the status quo analysis review area only two conformed to expectations while eight partially conformed. One indicator did not conform and two were never attempted. Both the description of the bio-physical environment ^{KPI 5.1.1} and the description of the socio-economic environment ^{KPI 5.2.1} only partially conformed to expectations. In terms of the bio-physical environment it was found that some environmental attributes such as topography, soil and species habitat were not discussed in adequate detail while others such as visual character and erosion potential were not discussed at all. Other attributes such as surface hydrology and groundwater again were found to be discussed in adequate detail. In terms of the socio-economic environment many attributes such as infrastructure and population distribution were not spatially reflected and only discussed in general terms. Average income and economic activity were only discussed at the local municipal scale and not analysed in finer detail. Other concerns were the portrayal of land cover as land use (see SRK Consulting, 2010a:80) and the coarse scale at which heritage features and mining, which was derived from land cover, were assessed. The legal context within which the EMF would operate was relatively well discussed ^{KPI 5.3.1, 5.3.2} but the

strategic planning context was largely ignored. National level strategic plans ^{KPI 5.4.1} and other environmental management tools ^{KPI 5.4.4} were ignored while provincial level policies and plans ^{KPI 5.4.2} were only referenced and not discussed in the context of the EMF. In terms of the local level plans ^{KPI 5.4.3} the IDPs and SDFs were briefly discussed but not adequately analysed to inform the EMF on possible future development patterns and trends. In terms of the analysis of environmental attributes the interrelationship between attributes were well discussed ^{KPI 5.5.3} while aspects such as sensitivity ^{KPI 5.5.1}, extent ^{KPI 5.5.2}, significance ^{KPI 5.5.4} and conservation status ^{KPI 5.5.5} were not always adequately addressed. The scale and accuracy of datasets often resulted in aspects like the extent and significance of attributes not being effectively reflected.

5.5.6. Content – Desired state of the environment

The desired state of the environment (DSoE) review area performed relatively well with five of the seven indicators conforming to expectations and two partially conforming. The DSoE was generally well described ^{KPI 6.1.1} and documented ^{KPI 6.2.3} and adequately reflected the information discussed in the *status quo* phase ^{KPI 6.2.1}. Although some aspects of the desired state were spatially reflected, one shortcoming was the lack of an integrated spatial representation of the DSoE. The DSoE did however succeed in identifying the key priorities in the area ^{KPI 6.3.1} and translating them into strategic objectives ^{KPI 6.1.2}. The objectives further provided some detail on how environmental attributes were to be managed in order to achieve the DSoE vision for the area ^{KPI 6.1.3}. In terms of the extent to which inputs obtained through the public participation phase were considered in the drafting of the DSoE, it was found that some comments were considered while others were ignored ^{KPI 6.2.2}. No detail was presented as to why some comments were not considered.

5.5.7. Content – EMF tool

The EMF tool review area showed a moderate performance with only six of the fifteen indicators conforming to expectations. From the remainder, four indicators partially conformed while one did not conform and another four were not attempted at all. The EMF successfully considered the impacts that specific activities might have on different environmental attributes but mainly focussed on activities with significant impacts ^{KPI 7.1.1} while activities with less significant impacts were largely ignored ^{KPI 7.1.2}. In some cases cumulative impacts were briefly considered although not adequately ^{KPI 7.3.2}. For the activities that were assessed, the information needs required to inform decision makers on their acceptability within specific areas were reflected ^{KPI 7.1.3} but the extent to which environmental attributes could absorb change was not considered or adequately discussed ^{KPI 7.3.1, 7.3.3, 7.4.5}. In the same sense as with impacts, the EMF tended to focus on the identification and description of undesirable activities ^{KPI 7.2.2} within specific areas and did not give attention to possible desirable or compatible activities ^{KPI 7.2.1} within the same areas. The assessment of development opportunities in the area were therefore largely ignored in the EMF ^{KPI 7.4.4}. Partly due to the

fact that the whole spectrum of impacts was not adequately assessed and development opportunity was not reflected, listing and de-listing of activities within specific areas were not considered ^{KPI 7.2.3}. Management guidelines were developed to guide development within the different management zones ^{KPI 7.4.3, 7.4.6}. The guidelines aligned well with the objectives identified in the DSoE phase and attempted to give effect to the vision established for the area through the DSoE ^{KPI 7.4.1, 7.4.2}. The application of the management guidelines to the management zones however, were not always clear and in some instances the management guidelines referred to detail reflected on a secondary spatial layer called the 'consolidated environmental attributes map' *i.e.* sensitivity map, which complicated the interpretation of the guidelines.

5.5.8. Content – Implementation strategy

From the five indicators evaluated as part of the implementation strategy review area, three were found to conform to expectations while one partially conformed and one did not conform at all. The implementation strategy successfully described the roles and responsibilities that the different government departments involved in the EMF ^{KPI 8.1.3} had to play in its eventual implementation ^{KPI 8.1.2} and also detailed the process that had to be followed to approve, publish and finally implement the EMF. One shortfall of the implementation strategy was that it did not adequately discuss the manner in which the EMF would interact with other spatial plans once implemented ^{KPI 8.1.1} except that the strategy called for the EMF to be reviewed two months before the review of the SDF ^{KPI 8.2.1}. The rationale for this was that the EMF would become the so-called 'environmental layer' that would be used to inform the SDF on environmental sensitivities and issues. No reference was made on the monitoring of the EMF and how it should be done ^{KPI 8.2.2}.

5.5.9. Training

Of the two indicators evaluated in terms of the training review area, one conformed to expectations while the other one only partially conformed. Although training was conducted ^{KPI 9.1.1} on the use of the final EMF tool it was done through a one day workshop which according to Methiba (pers. com. 2015) was not enough time for officials to get thoroughly acquainted with the EMF. This issue was confirmed by Kilian (pers. comm. 2015) who noted that:

“...many of the officials were rather out of their depth due to challenges with ‘spatial thinking’ and spatial orientation using maps.”

Although a training manual ^{KPI 9.1.2} was developed to guide users of the EMF the lack of experience with GIS and spatial thinking hampered the effective training of the prospective EMF users.

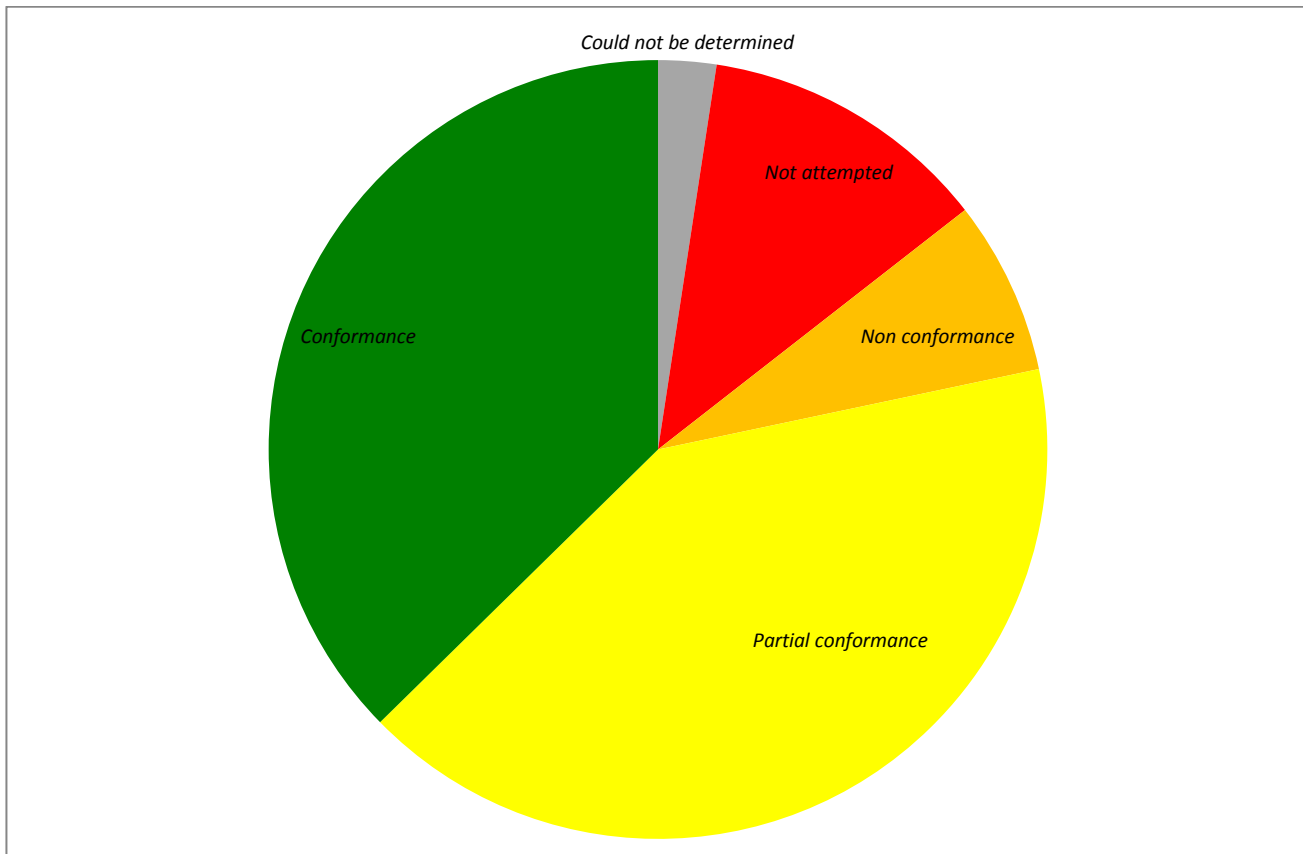
5.5.10. Deliverables

The EMF deliverables review area performed relatively well with three of the four indicators conforming to expectations and one partially conforming. The final EMF consisted of a comprehensive set of documents which was submitted to the relevant authorities for adoption and implementation ^{KPI 10.1.1}. Although the spatial data was provided in the widely used ‘ESRI Shapefile’ format ^{KPI 10.2.1} and accompanied by some documentation describing the use of the tool ^{KPI 10.2.3} the datasets were designed to be opened in the ArcMap environment. This environment is only accessible to individuals and organizations with the necessary software licences. As a result the final EMF tool was only accessible to certain users ^{KPI 10.2.2}.

5.5.11. Concluding remarks

Although many indicators did conform to expectations just as many only partially conformed to expectations as seen in **Figure 5.8** and the EMF showed an ‘average’ performance in terms of quality considerations. The biggest concerns with regard to the quality of the DPKSLM EMF were the data issues that were experienced and the lack of detail describing some of the spatial analysis processes. The EMF had some very strong points as well such as the description of the DSoE. The quality of the Garden Route regional EMF is now discussed.

Figure 5.8: Overall quality ratings – Case 4



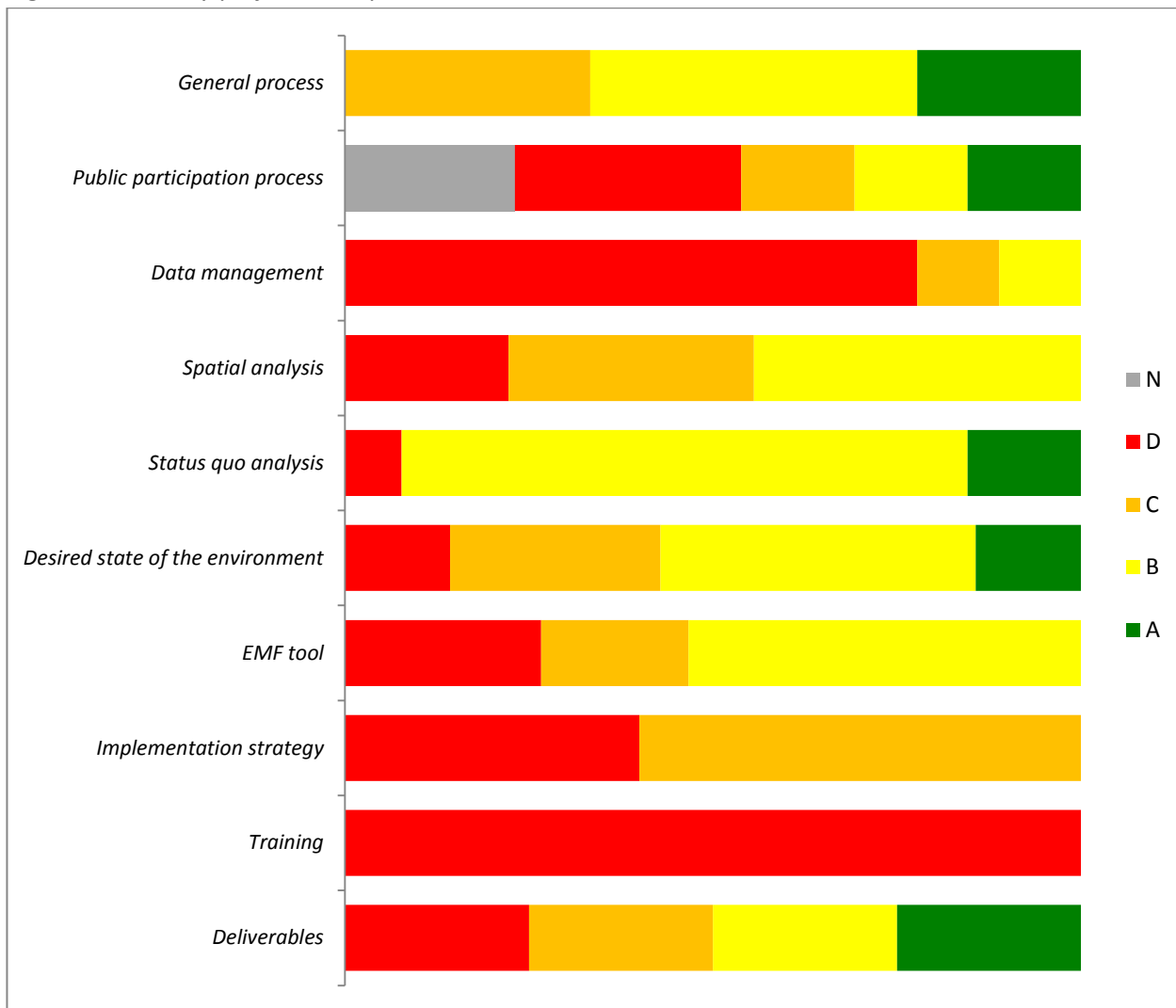
5.6. Quality of Case 5 – Garden Route EMF

From the 86 indicators that were evaluated to determine the quality of the Garden Route EMF 8 conformed to expectations while 33 partially conformed. A total of 18 indicators did not conform and 24 were never attempted. Three indicators could not be evaluated objectively and had to be excluded from the analysis. The findings for the Garden Route EMF quality evaluation is shown in **Table 5.5** and **Figure 5.9** and are discussed for each of the ten review areas.

Table 5.5: Quality scores – Case 5

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)					
Quality indicators							
Review area 1: General process	KPA 1.1: Context	1.1.1	1.1.2	1.1.3			
	KPA 1.2: Need	1.2.1					
	KPA 1.3: Requirements and objectives	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5	
Review area 2: Public participation process	KPA 2.1: Structuring and execution	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5	
	KPA 2.2: Stakeholder involvement	2.2.1	2.2.2	2.2.3			
	KPA 2.3: Accessibility	2.3.1	2.3.2				
	KPA 2.4: Consideration of comments	2.4.1	2.4.2	2.4.3			
Review area 3: Data management	KPA 3.1: Gap analysis	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	
	KPA 3.2: Data use	3.2.1	3.2.2				
	KPA 3.3: Metadata	3.3.1	3.3.2				
Review area 4: Spatial analysis	KPA 4.1: Sensitivity analysis	4.1.1	4.1.2	4.1.3	4.1.4		
	KPA 4.2: Delineation of environmental management zones	4.2.1	4.2.2	4.2.3	4.2.4	4.2.5	
Review area 5: Content – Status quo analysis	KPA 5.1: Description of the bio-physical environment	5.1.1					
	KPA 5.2: Description of the socio-economic environment	5.2.1					
	KPA 5.3: Description of the legal context	5.3.1	5.3.2				
	KPA 5.4: Description of the strategic planning context	5.4.1	5.4.2	5.4.3	5.4.4		
	KPA 5.5: Analysis of environmental attributes	5.5.1	5.5.2	5.5.3	5.5.4	5.5.5	
Review area 6: Content – Desired state of the environment	KPA 6.1: Strategic objectives	6.1.1	6.1.2	6.1.3			
	KPA 6.2: Describing the desired state of the environment	6.2.1	6.2.2	6.2.3			
	KPA 6.3: Priorities (issues, challenges and opportunities)	6.3.1					
Review area 7: Content – EMF tool	KPA 7.1: Identification of impacts	7.1.1	7.1.2	7.1.3			
	KPA 7.2: Desirable and undesirable land uses	7.2.1	7.2.2	7.2.3			
	KPA 7.3: Thresholds, limits and cumulative impacts	7.3.1	7.3.2	7.3.3			
	KPA 7.4: Management zones guidelines	7.4.1	7.4.2	7.4.3	7.4.4	7.4.5	7.4.6
Review area 8: Content – Implementation strategy	KPA 8.1: Planning for implementation	8.1.1	8.1.2	8.1.3			
	KPA 8.2: Revision schedule	8.2.1	8.2.2				
Review area 9: Training	KPA 9.1: Training	9.1.1	9.1.2				
Review area 10: Deliverables	KPA 10.1: Documentation	10.1.1					
	KPA 10.2: Spatial product	10.2.1	10.2.2	10.2.3			
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			

Figure 5.9: Quality performance per review area – Case 5



5.6.1. General process

From the nine indicators that were assessed as part of the general process review area, two conformed to expectations while four partially conformed and three did not conform. Although the need ^{KPI 1.2.1} for the development of the EMF was relatively well articulated in terms of the relationship between development pressures ^{KPI 1.1.3} and environmental management priorities and goals ^{KPI 1.1.1, 1.1.2} in the area, details on the actual expectations for the EMF were lacking. According to Jansen van Vuuren (pers. comm. 2015):

“The project was not well conceptualised and there wasn’t adequate guidance during the EMF development process.”

It is therefore not surprising that the scope ^{KPI 1.3.2} and detailed objectives ^{KPI 1.3.1} of the EMF was not clearly defined and that technical requirements ^{KPI 1.3.3}, scale considerations ^{KPI 1.3.4} and detail on the expected

deliverables ^{KPI 1.3.5} were never really agreed upon. The requirements for many of these aspects were only determined as the project went along and sometimes were not determined at all.

5.6.2. Public participation

The public participation process performed poorly with only two of the 13 indicators conforming to expectations and only two partially conforming. From the remaining eight indicators two did not conform while four were never attempted and the final three could not be determined and had to be excluded from the analysis. Although a public participation process was planned ^{KPI 2.1.1} and background information documents informing stakeholders on the project were circulated ^{KPI 2.1.3} some key stakeholders, such as officials from the Western Cape Department of Environmental Affairs and Development Planning, were not adequately involved in the process ^{KPI 2.1.2}. Evidence on the manner in which stakeholders were actively involved in the development of a strategy and vision for the area and the extent to which stakeholder inputs were considered in the final EMF were either sketchy or non-existent ^{KPI 2.1.4, KPA 2.4}. Furthermore, no evidence was found suggesting that an effort was made to ensure the involvement of disabled or disadvantaged individuals in the public participation process ^{KPI 2.3.1}. Finally, the extent to which stakeholders were presented with an opportunity to comment on the draft versions of the EMF, could not be objectively assessed as interviewees recalled conflicting experiences ^{KPA 2.2} and details were not well documented ^{KPI 2.1.5}. A last concern was that the final EMF was inaccessible ^{KPI 2.3.2} as noted by a key role-player who stated that:

“It was very difficult to access the Gazetted version of the EMF that would be used for comments.”

(pers. comm. Naudé, 2015)

This comment, made by a representative from a government department that would partially be tasked with the implementation and use of the EMF, stresses the seriousness of many of the issues that were experienced with the public participation process. It should be noted here that the EMF was initiated by the National DEA but that the Provincial Department felt that they were not adequately informed of the process.

5.6.3. Data management

The EMF performed very poorly in terms of data management with seven of the nine indicators not being attempted at all while one did not conform and another only partially conformed. No gap analysis was conducted and subsequently no information was presented on aspects such as the quality, accuracy and scale of spatial datasets ^{KPA 3.1}. Not surprisingly no metadata were developed for any of the datasets used in the EMF either ^{KPA 3.3}. An assessment of the datasets used in the EMF concluded that some datasets were at a suitable scale while others were at inadequate and sometimes very coarse scales ^{KPI 3.2.1}. These mixed-scale

datasets were combined during analysis, resulting in final EMF layers being developed at scales ranging from approximately 1:100, 000 to 1:250, 000 or beyond. In terms of the quality of datasets it was found that – in addition to the lack of information on quality – some datasets were inaccurately mapped ^{KPI 3.2.2}. Examples of mapping errors included developed land that was mapped as natural vegetation and plantations that were mapped as natural woodlands. A serious concern was that a key role-player involved in the development and use of the EMF considered the information (at the mentioned scales) to be ‘fine-scaled’ and of high accuracy and therefore usable at property boundary level.

5.6.4. Spatial analysis

The spatial analysis review area performed poorly with none of the nine indicators conforming to expectations and four only partially conforming. Of the remaining four, three did not conform to expectations while two were not attempted at all. The approach that was followed to evaluate the sensitivity of environmental attributes was not discussed and its scientific validity not defended ^{KPI 4.1.1, 4.1.2}. Although an attempt was made to define the term ‘sensitivity’ ^{KPI 4.1.3} the exact manner in which it was applied to assess environmental attributes was unclear ^{KPI 4.1.4}. The methodology used to delineate environmental management zones were not described well either ^{KPI 4.2.4} and many of the steps that were applied during analysis were unclear ^{KPI 4.2.3}. What was clear was that the delineation of the management zones seemed to focus on environmental constraints ^{KPI 4.2.1} and did not give reference to development opportunities in the area ^{KPI 4.2.2}. As a result the EMF did not offer a consolidated environmental management zones map but rather presented a dataset of the constraints present in the environment. Existing uses such as ‘Agriculture’ and ‘Plantations’ were subsequently not reflected as part of the management zones and were often reflected as ‘Natural Vegetation’ or other undisturbed classifications ^{KPI 4.2.5}.

5.6.5. Content – Status quo analysis

Of the thirteen indicators that were assessed as part of the *status quo* review area two were given ‘conformance’ ratings and ten ‘partial conformance’ ratings while the final indicator was not attempted at all. Both the bio-physical ^{KPI 5.1.1} and socio-economic ^{KPI 5.2.1} environments were found to partially conform to expectations. Many environmental attributes discussed as part of the bio-physical environment were not spatially reflected and only discussed in general terms. Examples of such attributes included soil types, red data species habitat and water pollution sources. Other attributes such as geohydrology and water quality again were not discussed in adequate detail. The same pattern was seen in the discussion on the socio-economic environment where attributes such as heritage value, physical infrastructure, demography and sources of noise pollution was only partially discussed and not spatially reflected. A major concern was that most socio-economic variables were only discussed for the Knysna municipal area – which makes up the

biggest section of the Garden Route EMF area – while the section falling within the George local municipality was totally ignored. As a result many of the socio-economic variables discussed were discussed for the Knysna Municipal area and not for the Garden Route EMF study area. Although the legal context ^{KPA 5.3} within which the EMF was to operate was thoroughly discussed the strategic context did not receive adequate attention. National strategic plans ^{KPI 5.4.1} were not considered at all while some provincial and local level plans such as the District Municipal SDF and the George Local Municipal SDF were excluded from the analysis ^{KPI 5.4.2 - 5.4.4}. Partly as a result of the data scale issues and the shortcomings in spatial analysis techniques all attributes were not effectively assessed in terms of their sensitivity, extent, interrelationship, significance and conservation status ^{KPA 5.5}.

5.6.6. Content – Desired state of the environment

The desired state of the environment review area did not perform well with only one indicator conforming to expectations and three partially conforming. From the remaining three two did not conform while one was not attempted at all. The EMF failed to present a comprehensive desired state of the environment (DSoE) ^{KPI 6.2.3} or even a vision for the area ^{KPI 6.1.1}. No evidence was found suggesting that stakeholders were involved in the developing of a desired state vision for the area ^{KPI 6.2.2}. Management objectives ^{KPI 6.1.2} aimed at the sustainable management ^{KPI 6.1.3} of some of the environmental attributes discussed in the *status quo* report ^{KPI 6.2.1} was all that was presented. The objective however tended to focus on bio-physical issues and gave little attention to socio-economic variables ^{KPI 6.3.1}.

5.6.7. Content – EMF tool

From the fifteen indicators evaluated to determine the quality of the final EMF tool none were found to conform to expectations. Eight indicators partially conformed while three did not conform and four were never attempted. The EMF failed to analyse environmental attributes in terms of the impacts that specific activity types or land-uses might or might not have on them ^{KPI 7.1.1 - 7.1.2} and consequently provided very little guidance on the information that would be required to make informed decisions on specific activities within specific geographical areas ^{KPI 7.1.3}. Furthermore, no attempt was made to identify desirable or undesirable activities or land uses within demarcated areas ^{KPA 7.2}. Consequently the EMF failed to identify and discuss opportunities for development or environmental protection within ^{KPI 7.4.4} specific zones. The EMF guidelines did consider generic thresholds ^{KPI 7.3.1, 7.4.5} and management goals ^{KPI 7.3.3} for some environmental attributes but neglected to address the issue of cumulative impacts in any way ^{KPI 7.3.2}. Some objectives pertaining from the DSoE phase were discussed in the management guidelines although the manner in which these objectives were to be applied was never clarified ^{KPI 7.4.1 - 7.4.2}. Recommendations guiding the manner in which development should occur within specific zones were not clear, partly because management guidelines could

not be clearly linked to delineated management zones, an issue which complicating their interpretation ^{KPI 7.4.3}. An example of this issue was where the management guidelines described management requirements for specific vegetation types requiring the user to query primary datasets in order to determine the boundaries to which the guideline was applicable. The management guidelines did to some extent reflect on the existing legal context within which it would operate although some crucial plans and policies such as the George SDF were not considered ^{KPI 7.4.6}.

5.6.8. Content – Implementation strategy

The implementation strategy review area performed badly with three of the five indicators not conforming to expectations and two not being attempted at all. The EMF failed to present an implementation strategy describing the implementation process and as a result the roles and responsibilities of different government departments in the implementation process were never clarified and discussed ^{KPA 8.1}. As a result the Provincial department was never actively involved in the implementation of the EMF even though they are a key user of the project. The aforementioned shortcoming could partly be ascribed to the fact that:

“Provincial officials were only asked to comment on EMF documents but were not actively involved in the management of the project as part of the project steering committee or project management team.”

(pers. comm. Naudé, 2015)

The EMF further failed to propose a revision schedule ^{KPI 8.2.1} or a monitoring plan ^{KPI 8.2.2} that could be used to assess the effect of the EMF.

5.6.9. Training

Of the two indicators evaluated as part of the training review area neither one was attempted. No formal training was conducted ^{KPI 9.1.1} and subsequently no training manuals developed ^{KPI 9.1.2}. This could be partly ascribed to a lack of budget (pers. comm. Jansen van Vuuren, 2015) but also to the implementation issues described earlier as the training responsibility was most likely never clearly defined. It was also the opinion of one of the consultants that:

“It is more important to constantly use the EMF than to have a user manual and stakeholders should rather be involved in the EMF development process instead of receiving training afterwards.”

(pers. comm. Jansen van Vuuren, 2015)

Whatever the reasons for the lack of training and training manuals the absence thereof is a serious concern with definite effects on the implementation of the EMF.

5.6.10. Deliverables

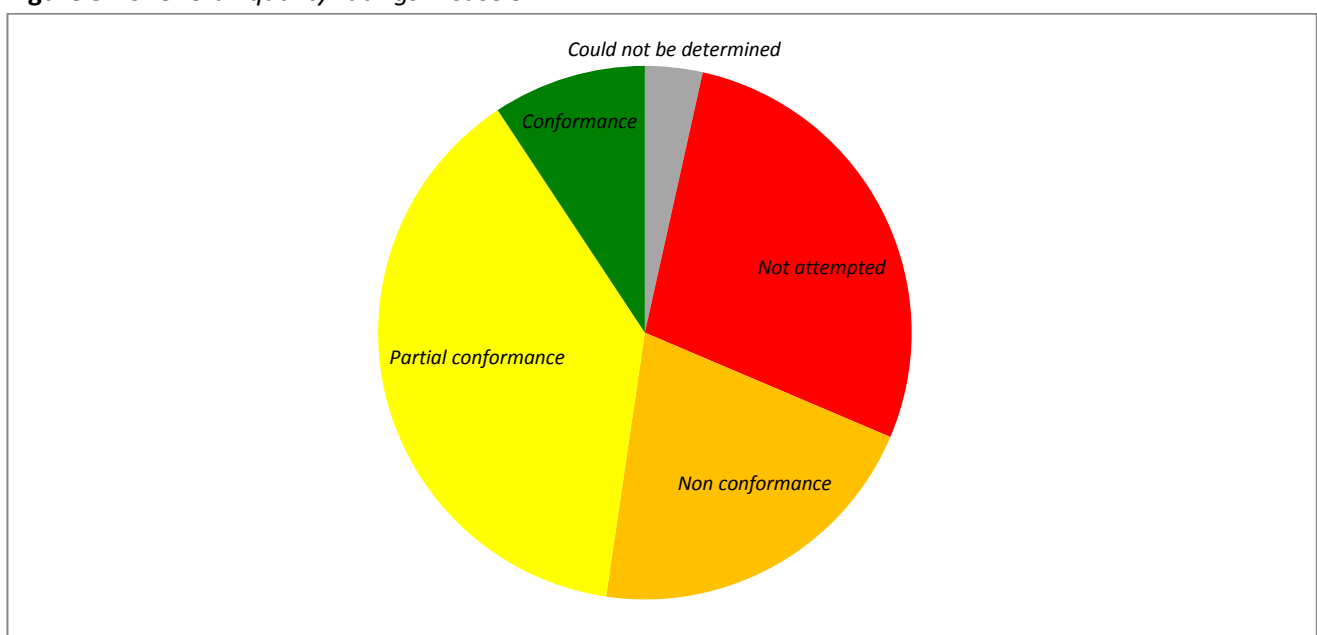
In terms of deliverables the EMF showed an average performance with one indicator conforming to expectations, one partially conforming to expectations, one not conforming and one not attempted at all. A comprehensive set of documentation were presented to the National Department of Environmental Affairs for consideration and adoption ^{KPI 10.1.1}. In terms of the spatial data however some issues aroused. Although the EMF was made available in a suitable GIS format ^{KPI 10.2.1} it had to be accessed via the ArcReader software suite. Although the software was freely available for download from the internet, the manner in which the data was presented was not easily accessible and required some GIS skills ^{KPI 10.2.2} rendering the EMF data inaccessible to many prospective users especially when considering the fact that no training or training manual was provided ^{KPI 10.2.3}.

5.6.11. Concluding remarks

The Garden Route EMF showed a ‘poor’ performance in terms of quality with a large number of indicators either not conforming to expectations or not being attempted at all (**Figure 5.10**). The EMF performed very poorly in terms of data management and spatial analysis. The issues with the delineation of environmental management zones further negatively affected the manner in which the management guidelines could be applied. Overall the EMF was not well developed with too many gaps identified in terms of procedures and content.

The quality findings for the Cannon Rocks to Great Kei River Mouth EMF are now discussed.

Figure 5.10: Overall quality ratings – Case 5



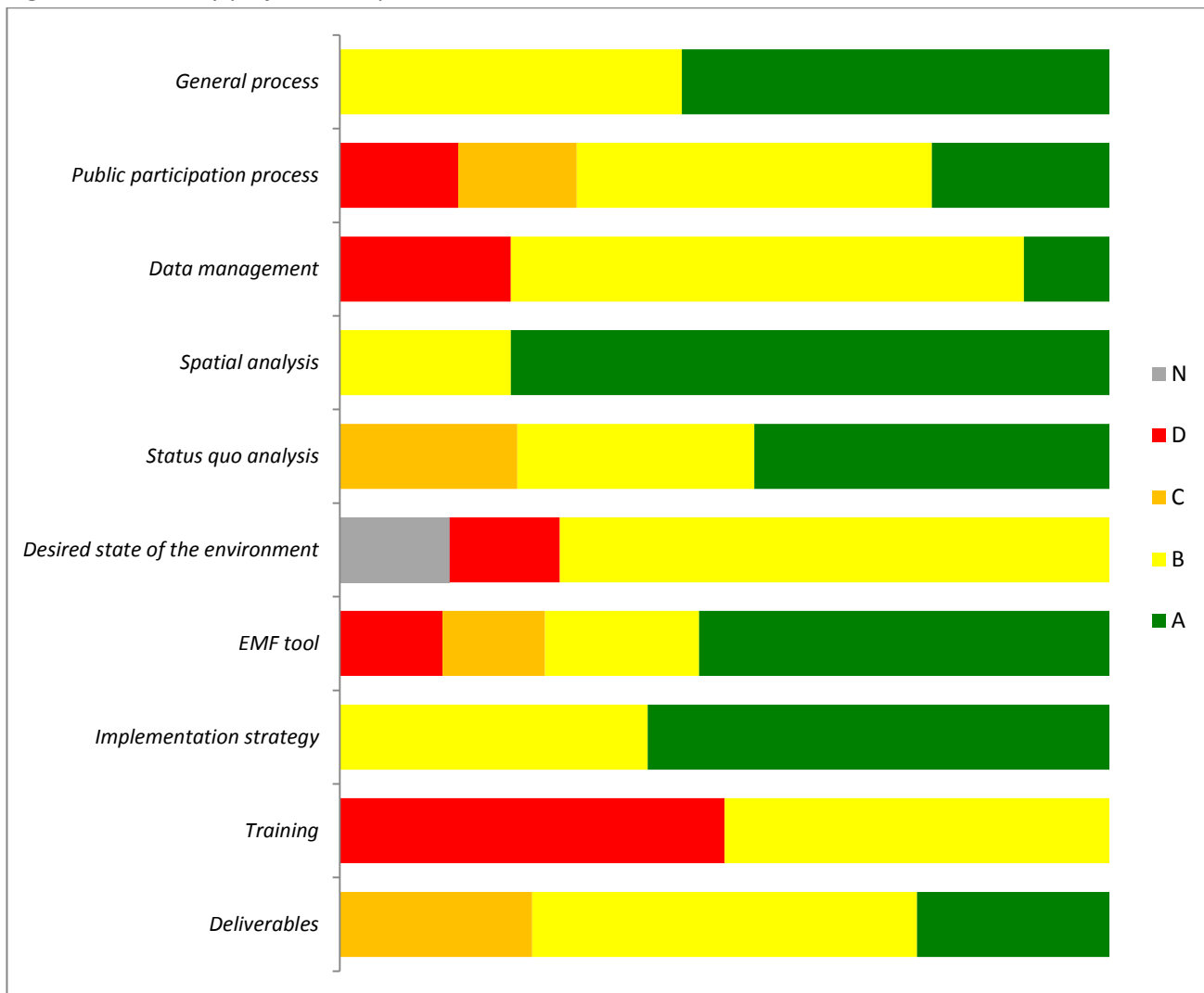
5.7. Quality of Case 6 – Cannon Rocks to Great Kei River Mouth EMF

Of the 86 indicators that were evaluated as part of the Cannon Rocks to Great Kei River EMF, hereafter referred to as the Cannon Rocks EMF, 34 conformed to expectations while 35 partially conformed. Only eight indicators did not conform while another eight were not attempted. One indicator could not be determined objectively and were excluded from the analysis. The quality ratings for the Cannon Rocks EMF are presented in **Table 5.6** and **Figure 5.11** and are discussed for each review area.

Table 5.6: Quality scores – Case 6

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)															
Quality indicators																	
Review area 1: General process	KPA 1.1: Context	1.1.1	1.1.2	1.1.3													
	KPA 1.2: Need	1.2.1															
	KPA 1.3: Requirements and objectives	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5											
Review area 2: Public participation process	KPA 2.1: Structuring and execution	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5											
	KPA 2.2: Stakeholder involvement	2.2.1	2.2.2	2.2.3													
	KPA 2.3: Accessibility	2.3.1	2.3.2														
	KPA 2.4: Consideration of comments	2.4.1	2.4.2	2.4.3													
Review area 3: Data management	KPA 3.1: Gap analysis	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5											
	KPA 3.2: Data use	3.2.1	3.2.2														
	KPA 3.3: Metadata	3.3.1	3.3.2														
Review area 4: Spatial analysis	KPA 4.1: Sensitivity analysis	4.1.1	4.1.2	4.1.3	4.1.4												
	KPA 4.2: Delineation of environmental management zones	4.2.1	4.2.2	4.2.3	4.2.4	4.2.5											
Review area 5: Content – Status quo analysis	KPA 5.1: Description of the bio-physical environment	5.1.1															
	KPA 5.2: Description of the socio-economic environment	5.2.1															
	KPA 5.3: Description of the legal context	5.3.1	5.3.2														
	KPA 5.4: Description of the strategic planning context	5.4.1	5.4.2	5.4.3	5.4.4												
	KPA 5.5: Analysis of environmental attributes	5.5.1	5.5.2	5.5.3	5.5.4	5.5.5											
Review area 6: Content – Desired state of the environment	KPA 6.1: Strategic objectives	6.1.1	6.1.2	6.1.3													
	KPA 6.2: Describing the desired state of the environment	6.2.1	6.2.2	6.2.3													
	KPA 6.3: Priorities (issues, challenges and opportunities)	6.3.1															
Review area 7: Content – EMF tool	KPA 7.1: Identification of impacts	7.1.1	7.1.2	7.1.3													
	KPA 7.2: Desirable and undesirable land uses	7.2.1	7.2.2	7.2.3													
	KPA 7.3: Thresholds, limits and cumulative impacts	7.3.1	7.3.2	7.3.3													
	KPA 7.4: Management zones guidelines	7.4.1	7.4.2	7.4.3	7.4.4	7.4.5	7.4.6										
Review area 8: Content – Implementation strategy	KPA 8.1: Planning for implementation	8.1.1	8.1.2	8.1.3													
	KPA 8.2: Revision schedule	8.2.1	8.2.2														
Review area 9: Training	KPA 9.1: Training	9.1.1	9.1.2														
Review area 10: Deliverables	KPA 10.1: Documentation	10.1.1															
	KPA 10.2: Spatial product	10.2.1	10.2.2	10.2.3													
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Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined													

Figure 5.11: Quality performance per review area – Case 6



5.7.1. General process

From the nine indicators that were evaluated as part of the general process review area five conformed to expectations while the remainder partially conformed. The need for the EMF was clearly defined ^{KPI 1.2.1} and supported by a set of EMF objectives ^{KPI 1.3.1}. Although the terms of reference was considered to be reasonably clear on the EMF expectations (pers. comm. Stewart, 2015), requirements pertaining to the scope of the EMF ^{KPI 1.3.2}, technical requirements ^{KPI 1.3.3} and the expected EMF deliverables ^{KPI 1.3.5} were not always clearly discussed. According to Stewart (pers. com. 2015) many of these requirements were only refined as the project progressed. An example of this is the EMF study area boundary which was amended as the project progressed to include larger buffer zones around sensitive features. The EMFs desired operational scale however was agreed upon before the project commenced ^{KPI 1.3.4}. The EMF successfully identified issues and priorities applicable to the study area ^{KPI 1.1.1, 1.1.3} and partly dealt with them through the formulation of environmental goals for the area ^{KPI 1.1.2}.

5.7.2. Public participation

Thirteen indicators were assessed as part of the quality evaluation of the public participation review area. Three of these were awarded 'conformance' ratings while six were awarded ratings of 'partial conformance'. Of the remaining four, two were rated as 'non-conformance' while the other two were never attempted and rated as 'not attempted at all'. Although the public participation process was planned ^{KPI 2.1.1, 2.1.3} limited detail was provided on the actual execution of the process ^{KPI 2.1.5}. One minor shortfall of the public participation process was that it was ^{KPI 2.1.2}:

“...designed to target stakeholders that have an interest in land use planning issues at a strategic level, and not the general public...”
(SRK Consulting, 2007:8)

This approach to stakeholder involvement might have excluded some key stakeholder that might have offered valuable input into the process. Nonetheless, stakeholders that were involved were provided with ample opportunity to partake in the EMF development process ^{KPA 2.2 & KPI 2.1.4}. The extent to which stakeholder inputs were actually considered in the final EMF was difficult to establish. Although some proof was found that at least some comments were addressed ^{KPI 2.4.1} a 'comments and response' report detailing the manner in which all comments were considered and addressed was never drafted ^{KPI 2.4.2}. Some feedback was however given to stakeholders during workshops in the earlier phases of the project, but these did not cover feedback on comments submitted during the final phases of the EMF ^{KPI 2.4.3}. No evidence could be found of attempts that were made to ensure that disabled or disadvantage members of the public could participate in the public participation process ^{KPI 2.3.1}. The final EMF was initially made available via CDs but was very difficult to access afterwards ^{KPI 2.3.2}.

5.7.3. Data management

The data management review area showed an average performance with only one of the nine indicators conforming to expectations and six partially conforming while the remaining two indicators were not attempted at all. The fact that issues such as data scale and data accuracy were discussed for most datasets suggested that a gap analysis – or at least something similar – was conducted even though it was not formally documented ^{KPA 3.1}. The issue of scale was treated in a responsible manner and were applicable, scale deficiencies were acknowledged or datasets were refined to meet the EMFs scale requirements as was the case for the vegetation map ^{KPI 3.2.1}. However, the methods that were used to refine these datasets or create new data were not revealed ^{KPI 3.3.2} and metadata was not included ^{KPI 3.3.1}. The quality of many datasets could therefore not be determined ^{KPI 3.2.2}.

5.7.4. Spatial analysis

The spatial analysis review area performed relatively well with seven of the nine indicators conforming to expectations and two partially conforming. The sensitivity analysis was thoroughly documented and a well described, scientifically sound approach followed to determine the sensitivity of all environmental attributes considered in the study ^{KPA 4.1}. The sensitivity analysis employed a scenario based approach through which various sensitivity analysis permutations were used to derive final sensitivity. The approach that was followed to delineate the environmental management zones however was not as extensively documented ^{KPI 4.2.4} but was still considered to be of acceptable scientific standard ^{KPI 4.2.3}. One drawback was that the delineation of management zones tended to favour the mapping of environmental constraints ^{KPI 4.2.1} in the area while possible development opportunities received less attention ^{KPI 4.2.2}. Nonetheless, the management zones suited the context of the study area ^{KPI 4.2.5}.

5.7.5. Content – Status quo analysis

From the thirteen indicators that were assessed in the *status quo* review area six were found to conform to expectations while four only partially conformed. The remaining three indicators did not conform to expectations. The discussion on the bio-physical environment did not conform to expectations ^{KPI 5.1.1}. Although the sensitivity of all attributes was discussed the actual status and extent of the features was neither reflected nor mapped ^{KPI 5.5.2}. Some important attributes such as water quality, topography and geo-hydrology was further not discussed at all. The description of the socio-economic environment performed better with more detailed discussions ^{KPI 5.2.1} although some aspects such as heritage were also not addressed in adequate detail. The legal mandate in which the EMF would operate was referenced but not discussed in any real detail ^{KPA 5.3} while the strategic planning context ^{KPI 5.4.2 - 5.4.4} was generally well discussed except for the national level plans and strategies ^{KPI 5.4.1} which were not covered. Sensitivity ^{KPI 5.5.1}, significance ^{KPI 5.5.4} and the conservation status ^{KPI 5.5.5} of environmental attributes were thoroughly discussed while interrelationship between variables was partly addressed ^{KPI 5.5.3}. Overall, the *status quo* analysis review area performed average.

5.7.6. Content – Desired state of the environment

The desired state of the environment (DSoE) review area performed poorly with none of the seven indicators conforming to expectations. Five indicators partially conformed to expectations while one was never attempted and another could not be established. The DSoE report was not clear on the vision ^{KPI 6.1.1} and strategic objectives ^{KPI 6.1.2} for the area and only referred to objectives that were drafted for existing plans such as IDPs and SDFs. The information contained in the SDFs was further used to derive a desired state ^{KPI 6.2.3} and not the input from stakeholders as is usually the case, although this could not be confirmed beyond

any doubt^{KPI 6.2.2}. What was however clear was that the information contained in the *status quo* report was not always considered in the process of deriving a desired state^{KPI 6.2.1, 6.3.1} and as a result no guidance were presented on how environmental attributes could be managed to achieve the so-called DSoE^{KPI 6.1.3}. The fact that the study area covered a 220km long coastal strip intersecting various local authorities in which access to the public would have been challenging, might explain the decision to rely on existing knowledge contained in IDPs and SDFs. However, the DSoE still had many shortcomings which could have been addressed nonetheless.

5.7.7. Content – EMF tool

The EMF tool performed somewhat better than the DSoE with eight of the fifteen indicators conforming to expectations and three partially conforming. From the remaining four, two did not conform while two were not attempted at all. The EMF considered the impacts that certain activities might have on specific environmental attributes^{KPI 7.1.1 - 7.1.2} but failed to describe the information needs that would arise when the impacts of these activities were to be assessed^{KPI 7.1.3}. The analysis of impacts were further used to describe the desirability^{KPI 7.2.1} and undesirability^{KPI 7.2.2} of specific land uses within the delineated management zones and also used to propose the de-listing of some activities^{KPI 7.2.3}. The EMF failed to consider thresholds^{KPI 7.3.1}, existing targets^{KPI 7.3.3} and cumulative impacts^{KPI 7.3.2}. According to Stewart (pers. comm. 2015) the only way in which cumulative impacts could be considered in an EMF would be if:

“Scenario planning is used through which different combinations of impacts are evaluated.”

This would mean that assumptions would be made on the spatial extent of impacts but it would still be very difficult to generalise for application in an EMF. Due to the shortcomings of the DSoE phase the extent to which the management guidelines promoted the DSoE was difficult to determine^{KPI 7.4.1, 7.4.2}. The management guidelines, although somewhat restrictive towards development^{KPI 7.4.4}, was generally clear on the manner in which the management zones should be managed^{KPI 7.4.3, 7.4.5, 7.4.6}.

5.7.8. Content – Implementation strategy

The implementation strategy review area performed relatively well with three of the five indicators conforming to expectations while the other two partially conformed. The implementation strategy described the roles and responsibilities^{KPI 8.1.2} of all government departments in the implementation of the EMF and also explained the relationship of the EMF to other existing spatial planning tools^{KPI 8.1.1}. One challenge however pertained to involvement of the relevant local government officials that would be involved in the implementation of the EMF^{KPI 8.1.3}. According to Stewart (pers. comm. 2015) the challenge was that:

“Many municipalities did not have the capacity to deal with the EMF and had no-one that was tasked with dealing with environmental issues.”

The lack of capacity would mean that someone without the necessary experience would be tasked to deal with the implementation of the EMF – a scenario that might lead to weak implementation at the local level. Although a revision schedule was not presented, the need for revision of the EMF was discussed ^{KPI 8.2.1}. A comprehensive monitoring and evaluation system was proposed indicating time frames and responsibilities of different stakeholders ^{KPI 8.2.2}.

5.7.9. Training

The training review area did not perform very well with one indicator partially conforming to expectations while the other was never attempted. No training material ^{KPI 9.1.2} was developed and although some training was offered ^{KPI 9.1.1} it was not effective due to:

“...bad attendance of the training workshop and the high turn-over rate of employees.”
(pers. comm. Pienaar, 2015)

The high mobility of employees meant that the officials that were trained in the use of the EMF were not with the relevant departments anymore leaving their replacements – who were not involved in the development of the EMF – with the tasks of implementing and using the EMF. The fact that no training material existed further complicated the issue meaning that new personnel would have to rely on colleagues to assist them in the use of the EMF.

5.7.10. Deliverables

From the four indicators that were evaluated as part of the deliverables review area only one conformed to expectations while two partially conformed and one did not conform. Although a comprehensive set of documentation ^{KPI 10.1.1} were submitted with the final EMF the many maps and the large physical size of the final documents:

“...made for a ‘user-unfriendly’ product hampering its effective use.”
(pers. comm. Pienaar, 2015)

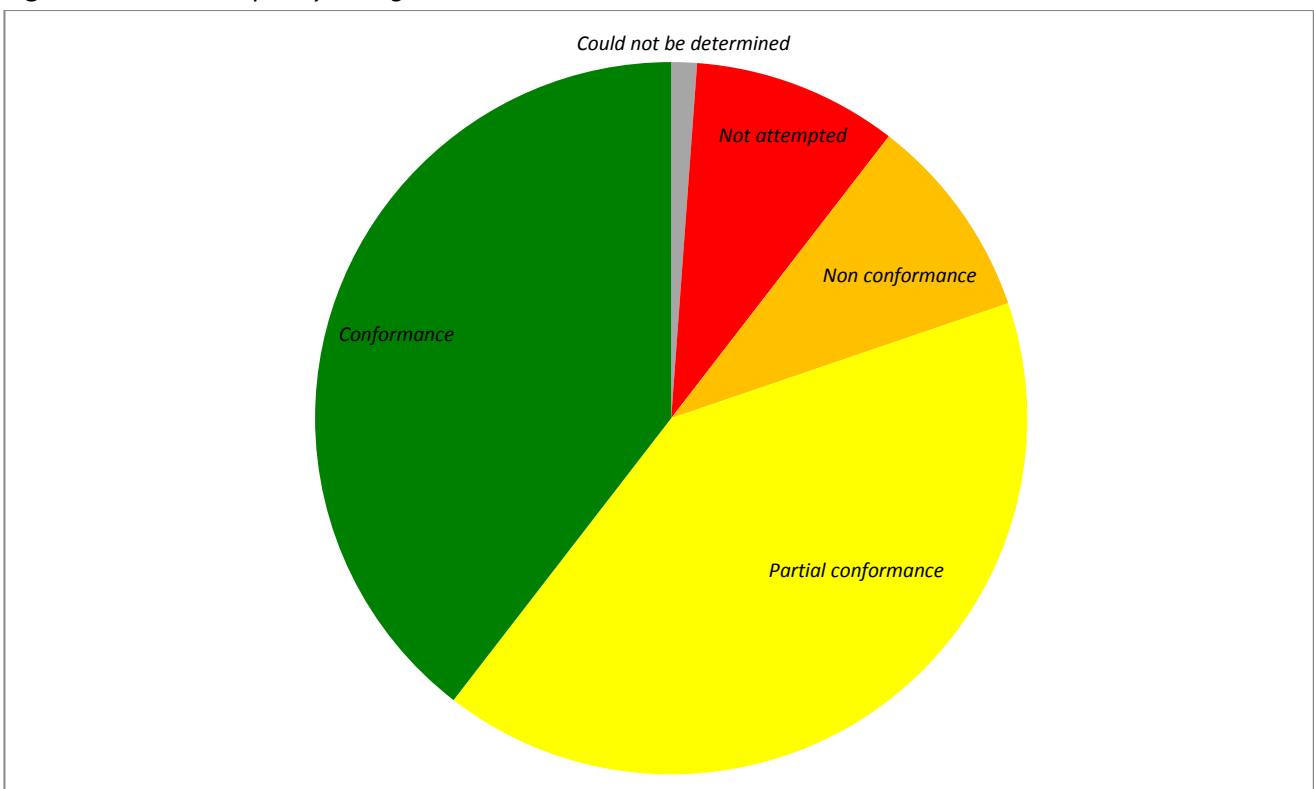
The spatial data were made available through interactive PDF documents and a GIS viewer ^{KPI 10.2.1}. No documentation describing the use of the data was however presented ^{KPI 10.2.3} and some technical skills were

still required to allow users to access the data ^{KPI 10.2.2}. Although the use of interactive PDFs was a novel idea it lacked the ability to locate specific properties or coordinates and also limited the extent to which datasets could be investigated.

5.7.11. Concluding remarks

Overall the Cannon Rocks EMF showed an 'average' performance in terms of the quality evaluation. Although many indicators conformed to expectations, just as many only partially conformed, as illustrated in **Figure 6.12**. The EMF performed very well in terms of the general process that was applied, the spatial analysis techniques that were used and the drafting of the implementation strategy. The biggest issues in the EMF pertained to the manner in which the desired state of the environment was determined and the challenges with the training provided to relevant officials.

Figure 5.12: Overall quality ratings – Case 6

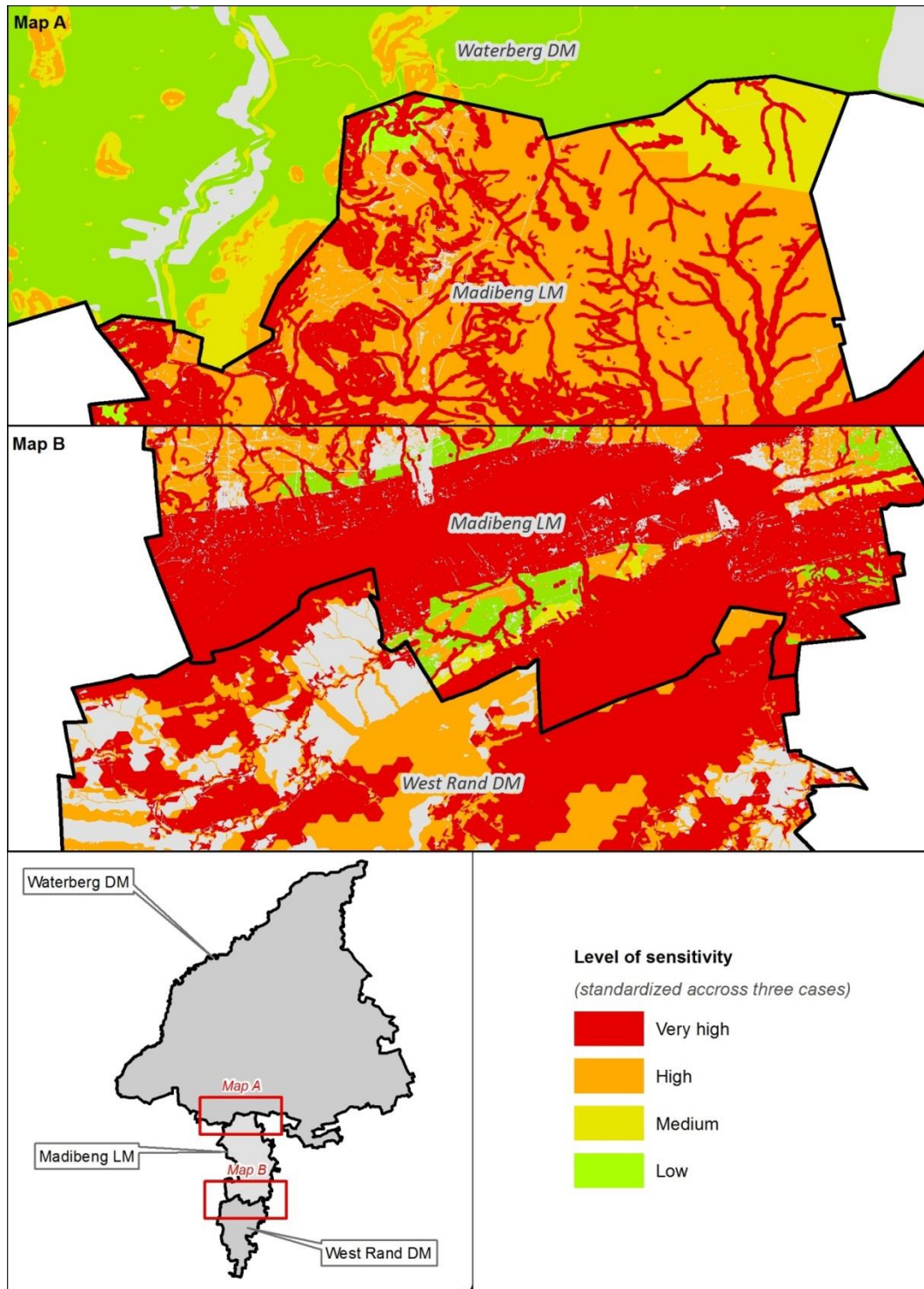


5.8. Spatial alignment

A final quality component that could only be considered for three of the six cases was the spatial alignment of EMFs. Spatial alignment refers to the manner in which EMFs that share the same geographical boundary align with one another. Spatial alignment was evaluated for two cases involving three EMFs. The first was the alignment between the Madibeng local municipality EMF and the Waterberg district municipality EMF and

the second the Madibeng local municipality EMF and the West Rand district municipality EMF. To enable comparison across cases, the combined sensitivity analysis results for all three EMFs were standardised to the same scale ranging from 'very high' sensitivity to 'low sensitivity'. The alignment results are illustrated in **Figure 5.13**.

Figure 5.13: EMF alignment



It was found that the Waterberg EMF and the Madibeng EMF did not align at all. Areas of 'very high' sensitivity in the Madibeng EMF become 'low sensitivity' once the border is crossed. Although it was established that some of the same datasets were used in both EMFs their sensitivity classification differed. Some variation could be expected considering that each EMF is developed within a specific context but the variation should not be as extreme as was found in **Figure 5.13, Map A**. The differences in the physical sizes of the study areas might have influenced the manner in which datasets were analysed (contextualised) contributing to the observed variation. This explanation is supported by the manner in which the Madibeng EMF aligned with the West Rand EMF, which is of similar size (**Figure 5.13, Map B**). Although some differences are observed the alignment in **Map B** is much better than in **Map A**. Anecdotal evidence suggests that very few EMF project teams really consult adjacent EMFs and reflect on their alignment. Differences in data, methodologies and understanding of 'sensitivity' all contribute to alignment issues

5.9. Final remarks

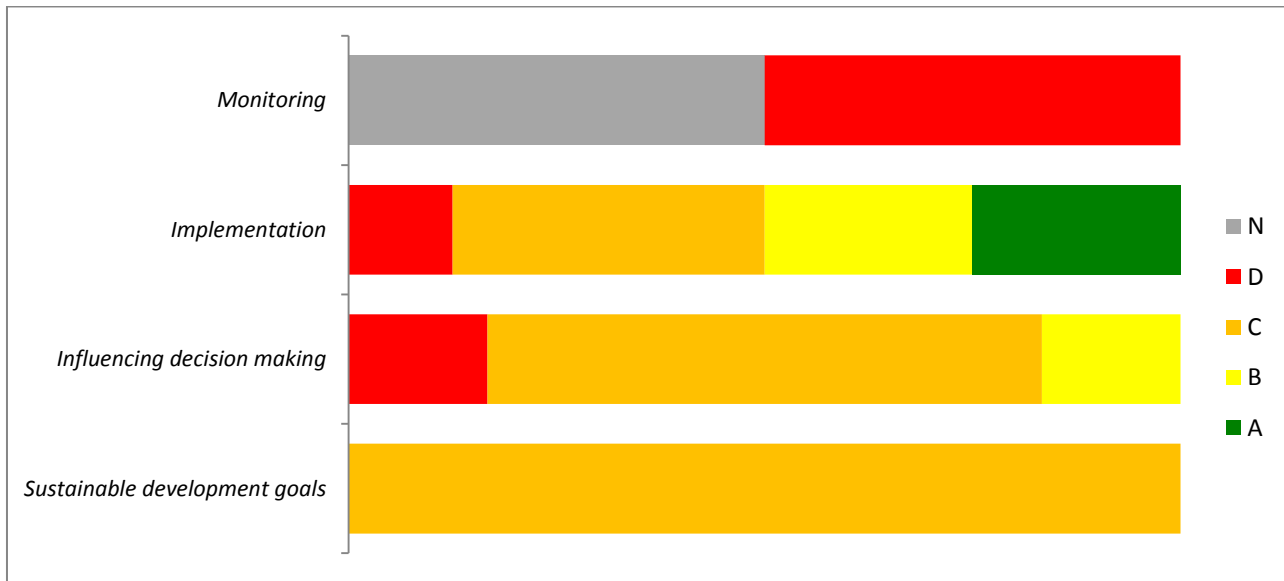
Chapter five described the quality findings for the six EMF case studies and addressed the research question:

“What is the quality of EMFs?”

The quality findings of the six cases are further analysed in **Chapter 7**, for possible patterns and relationships. However, the effectiveness findings for the six cases are first elaborated on in **Chapter 6**.

Research Question	Method	Phase	Chapter
Q1 - What is an environmental management framework?	Literature review	Phase 2-1: Clarify the purpose and objectives of EMFs in South Africa	Chapter 3: Literature review
		Phase 2-2: Understanding EMF	
Q2 - What is the status and extent of Environmental management frameworks in South Africa?	Survey	Phase 3-1: Determine the status and extent of EMFs in South Africa	Chapter 4: The status and extent of Environmental management frameworks in South Africa
Q3 – What is the quality of EMFs?	Case study reviews: - Documentation reviews - Data and methodology review - Interviews	Phase 4-1: Determine the data and methodological requirements for developing an EMF	Chapter 5: Case study analysis: EMF quality
Q4 – What is the effectiveness of EMFs?		Phase 4-2: Assess the ‘real world’ effect that EMFs are having	Chapter 6: Case study analysis: EMF effectiveness
Q5 – What are the factors influencing the quality and effectiveness of EMFs?	Case study reviews: - Within-case analysis - Cross case analysis	Phase 4-3: Critically evaluate the <i>status quo</i> of EMFs in South Africa	Chapter 7: Cross case analysis
Research Aim			
To evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice		Phase 4-1: Synthesis and conclusion	Chapter 8: Synthesis and conclusions

Figure 6.1: Effectiveness performance per review area – Case 1



6.2.1. Direct outputs

From the twelve indicators that were evaluated to determine the direct outputs of the EMF two conformed to expectations while two only partially conformed. Five indicators did not conform to expectations while two were not attempted at all and one could not be determined.

6.2.1.1. Implementation and monitoring

The EMF was gazetted ^{KPI 12.1.2} and formally adopted ^{KPI 12.1.1} through the prescribed adoption process driven by the Limpopo Provincial Government. It was however found that local government departments were not actively involved in the implementation of the EMF ^{KPI 12.2.1}. Their absence could be attributed to the failure of the implementation strategy to define the roles and responsibilities of different government departments with regard to implementation ^{KPI 12.2.2}. According to Mongwe (pers. comm. 2015) the necessary agreements to facilitate the development of the EMF were:

“...informally made between the different spheres of government.”

These agreements however did not cover the eventual implementation of the EMF. The lack of formalised agreements and clear understanding between the different spheres of government resulted in the EMF not being effectively implemented. The EMF was further not monitored ^{KPI 11.1.1} to evaluate its effect and as a result no official findings were available on the extent to which the EMF was reaching its goals and objectives

^{KPI 11.1.2}. Although the EMF adhered to legal requirements in terms of its formal adoption and publication its implementation partly failed in practice. The effect of these failures on its actual use is now discussed.

6.2.1.2. Influencing decision making

The EMF failed to effectively inform decision making. In terms of its influence on environmental management it was found that the EMF did not live up to expectations as:

“...it was believed that the EMF would be a tool that could be used to make decisions and exclude environmental assessments from some processes, [but] this however did not happen and it only gave broad guidance of what [activities] could be allowed in which area.”

(pers. comm. Mongwe, 2015)

Although some evidence suggested that the EMF was occasionally used as a screening ^{KPI 13.1.1} tool for EA applications no evidence was found that the EMF was actively used to inform EA decision-making processes ^{KPI 13.1.3} or to inform the requirements for specialist studies ^{KPI 13.1.2}. The EMF was further never used for the listing or de-listing of any activities even though the EMF made suggestions for this ^{KPI 13.1.4}. The EMF did also not influence spatial planning and decisions on land use change. Due to conflicting time-frames no SDFs were being reviewed at the time when the EMF was being developed and as a result they could not consider the EMF ^{KPI 13.2.1}. It might be considered in SDFs that will be updated in future though. In terms of the influence on land use decisions the EMF did not perform well either ^{KPI 13.2.2}. This could partly be ascribed to the lack of environmental officers in local government that could facilitate the use of the EMF in land-use decision making processes, as well as the general lack of implementation of the EMF at local governmental level.

6.2.2. Indirect outputs

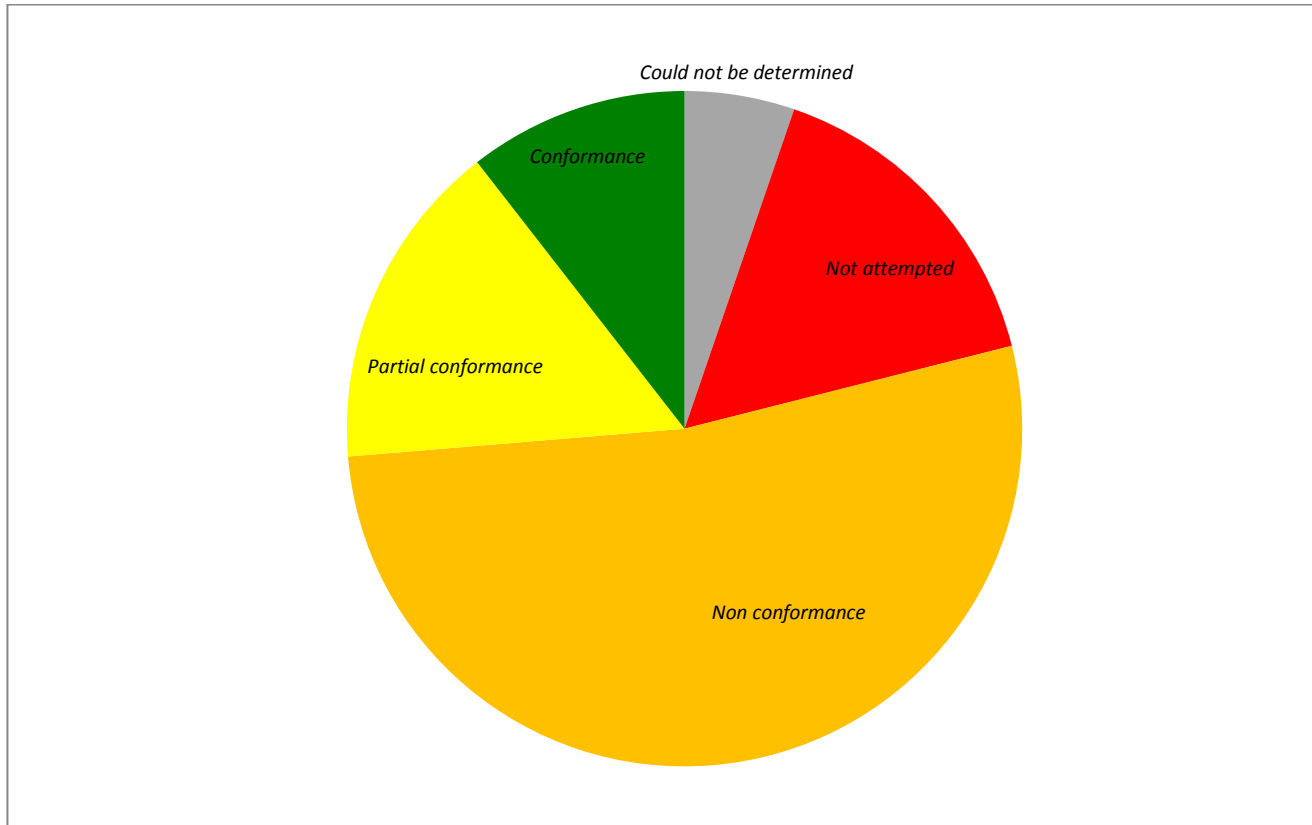
No proof was found to suggest that the EMF actively contributed to sustainable development and the protection of the environment ^{KPA 14.1}. The inability of the EMF to influence land use decisions and the limited extent to which it was used to guide decisions on environmental authorisations implied that its effect on sustainable development would be very small and almost insignificant.

6.2.3. Concluding remarks

The Waterberg District Municipal EMF performed ‘poorly’ in terms of the effectiveness review with most indicators not conforming to expectations (**Figure 6.2**). Although the EMF performed better in terms of quality, the failure of the implementation strategy to clearly define roles and responsibilities pertaining to implementation and the lack of proper training might have contributed to the poor implementation and limited use of the EMF. Additionally, the fact that the EMF was developed at a district municipal scale and

not necessarily at a fine enough scale for use at local municipal level might further explain the lack of implementation at local municipal level.

Figure 6.2: Overall effectiveness ratings – Case 1



6.3. Effectiveness of Case 2 – West Rand District Municipality EMF

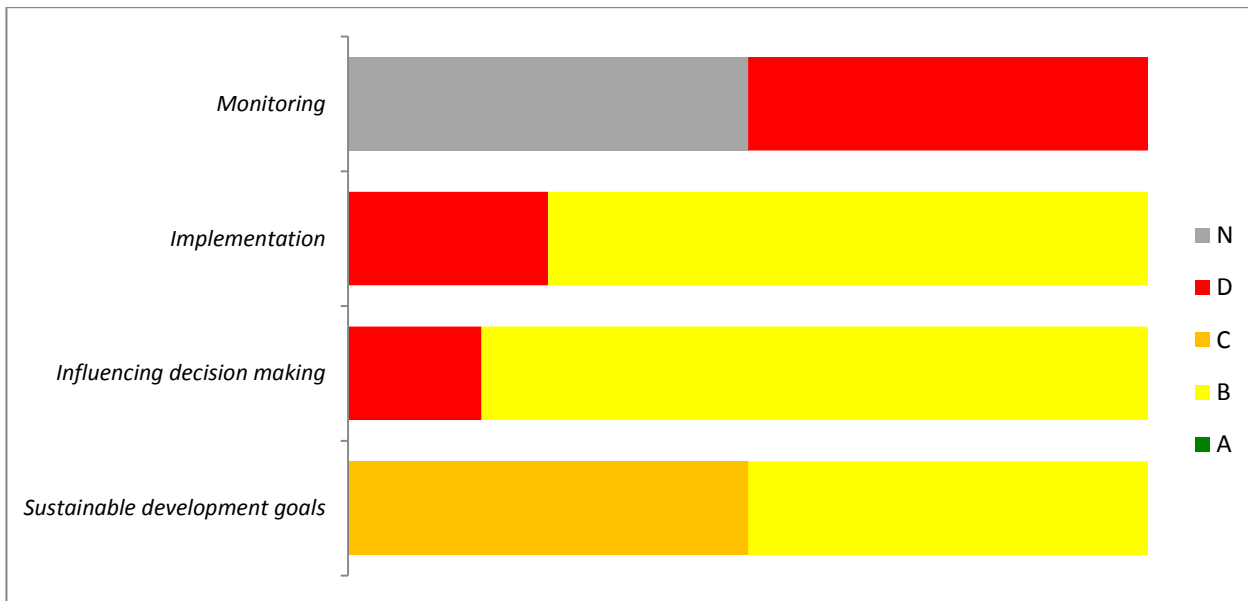
Of the fourteen indicators evaluated as part of the effectiveness evaluation of the West Rand District Municipality (WRDM) EMF not one were awarded a ‘conformance’ rating. Nine indicators received ratings of ‘partial conformance’, one a rating of ‘not conformance’ and the final three ratings of ‘not attempted at all’. The status of one indicator could not be established. The ratings are summarised in **Table 6.2** and **Figure 6.3** and are now discussed in terms of direct and direct outputs.

Table 6.2: Effectiveness scores – Case 2

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)			
<i>Effectiveness indicators</i>					
Review area 11: Monitoring	KPA 11.1: Monitoring	11.1.1	11.1.2		
Review area 12: Implementation	KPA 12.1: Adoption	12.1.1	12.1.2		
	KPA 12.2: Roles and responsibilities	12.2.1	12.2.2		
Review area 13: Influencing	KPA 13.1: Influencing EIA	13.1.1	13.1.2	13.1.3	13.1.4

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)												
decision making	KPA 13.2: Influencing spatial planning and LUMS	13.2.1	13.2.2											
Review area 14: Sustainable development and environmental protection	KPA 14.1: Sustainable development	14.1.1	14.1.2											
<table border="1"> <tr> <td style="background-color: #008000;"></td> <td style="background-color: #ffff00;"></td> <td style="background-color: #ffa500;"></td> <td style="background-color: #ff0000;"></td> <td style="background-color: #808080;"></td> </tr> <tr> <td>Conformance</td> <td>Partial conformance</td> <td>Non conformance</td> <td>Not attempted at all</td> <td>Could not be determined</td> </tr> </table>										Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined										

Figure 6.3: Effectiveness performance per review area – Case 2



6.3.1. Direct outputs

None of the indicators evaluated to determine the direct effect of the EMF conformed to expectations. Eight indicators partially conformed while, three were never attempted and one could not be determined.

6.3.1.1. Implementation and monitoring

The EMF was adopted by the local council by means of a council resolution ^{KPI 12.1.1} but was never formally adopted by provincial government ^{KPI 12.2.1} or published in the provincial gazette ^{KPI 12.1.2}. The minister refrained from gazetting the EMF due to the prospective Gauteng Provincial EMF which was expected to replace the WRDM EMF once adopted (pers. comm. Kapsosideris, 2015). In the light of this issue discussions were held between the different spheres of government to clarify the way forward ^{KPI 12.2.2} and according to Stoffberg (pers. comm. 2015):

“...a good informal understanding was reached between stakeholders.”

As far as could be established no formal agreements describing the roles of the different spheres of government in the implementations of the WRDM EMF was drafted. The Gauteng Province EMF was eventually finalised in 2015 and:

“...effectively replaced all other EMFs in the Gauteng Province, making them inactive.”

(pers. comm. Mafu, 2015)

The Gauteng Provincial EMF is the first of its kind but is unlikely to be duplicated in other provinces. The relative small size of the Gauteng Province and the availability of relatively fine scale data made it possible to develop an EMF for the province. Although the WRDM EMF was being implemented in the period between June 2013 and the adoption of the Gauteng Provincial EMF in 2015 it was never monitored to assess its effect ^{KPI 11.1.1}. As a result no official information on the extent to which it was achieving its objectives was available ^{KPI 11.1.2}.

6.3.1.2. Influencing decision making

Although the EMF was not extensively applied in provincial government some evidence was found to suggest that it was, at least occasionally, being used as a screening tool for EA applications ^{KPI 13.1.1}. The lack of information in EMF on specialist study requirements for specific activities limited its use in this regard ^{KPI 13.1.2} and except for the occasional use of the EMF as a screening tool the extent to which it actually influenced decisions on EAs was limited ^{KPI 13.1.3}. No attempt was made to de-list activities within specific areas through the use of the EMF ^{KPI 13.1.4}. In terms of its influence on land use planning it was established that the EMF was considered in the drafting of the SDF for the municipality ^{KPI 13.2.1} but there was however concern that the EMF was not fully considered in the SDF and that:

“...more attention could have been given to environmental issues in the SDF.”

(pers. comm. Olivier, 2015)

The EMF did affect decisions on land-use change ^{KPI 13.2.2} in the sense that it gave guidance on the sustainability of certain activities in specific areas well before the applications were lodged (pers. comm. Kapsosideris, 2015). It was however also established that this was not the case for all local municipalities in the WRDM and according to Olivier (pers. comm. 2015) the extent to which the EMF was used to guide decisions on land-use change was dependent on the manner in which the environmental section in a municipality provided input on development proposals. The extent to which these inputs were provided were further hampered in some municipalities due to:

“...issues with access to GIS systems.”
 (pers. comm. Olivier, 2015)

The issue of GIS access in some municipalities would mean that users could not access the spatial layers, *i.e.* management zones and sensitivity layers, of the EMF and had to rely on static hardcopy or PDF maps. This issue is expected as the final GIS decision support tool was not presented in an easily accessible GIS viewer.

6.3.2. Indirect outputs

The fact that the EMF was being used at the project level as a screening tool for environmental authorisations and provided guidance on the acceptability of land-use change applications within specified zones meant that it was contributing to sustainable development goals in general ^{KPI 14.1.1}. Its influence on the development of a new SDF for the municipality also meant that it assisted in the promotion of sustainable development goals at the strategic planning level. However, the fact that the EMF was never formally published in a provincial gazette meant that it lacked a formal legal standing which hampered its contribution to environmental protection ^{KPI 14.1.2}.

Figure 6.4: Overall effectiveness ratings – Case 2

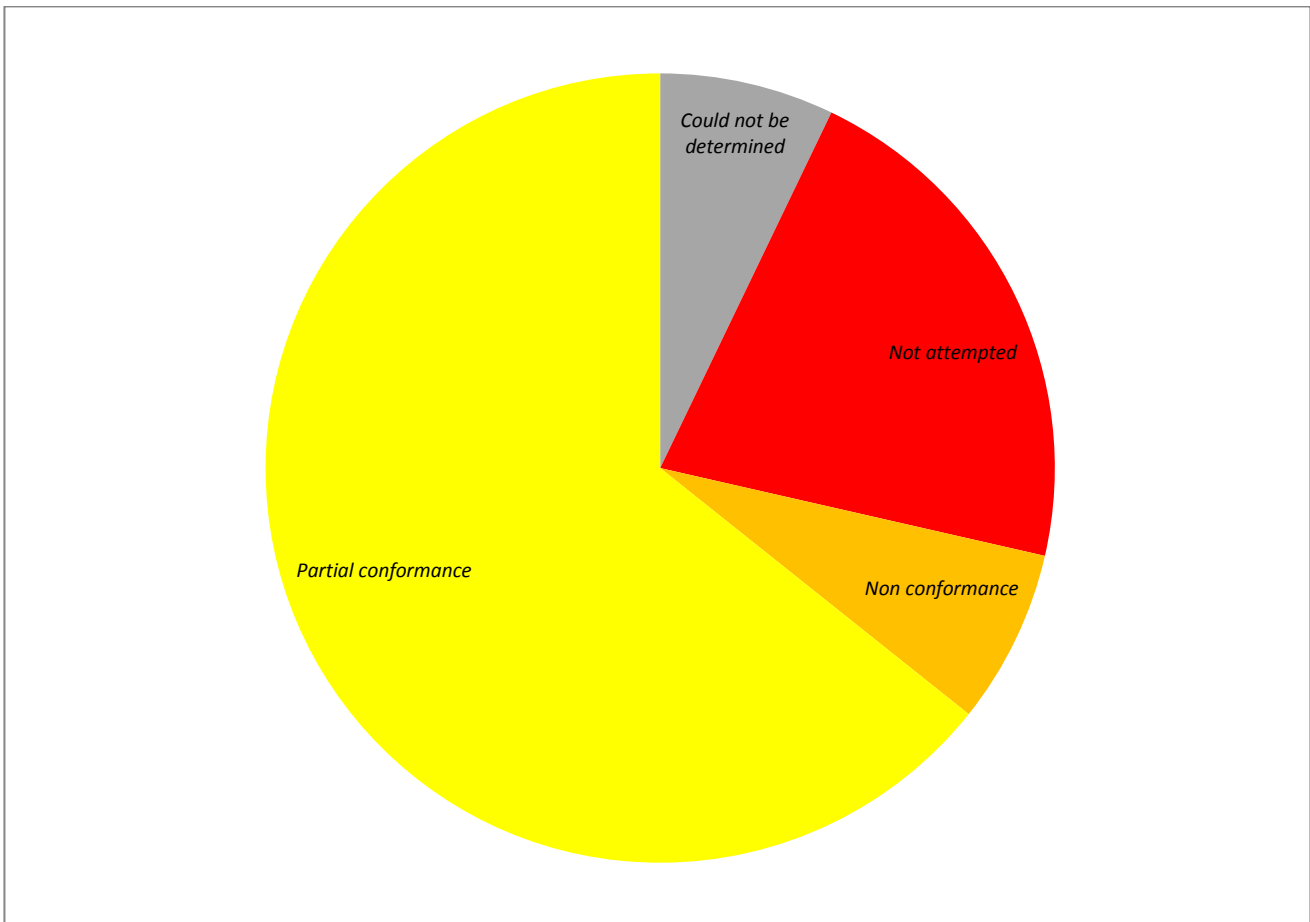
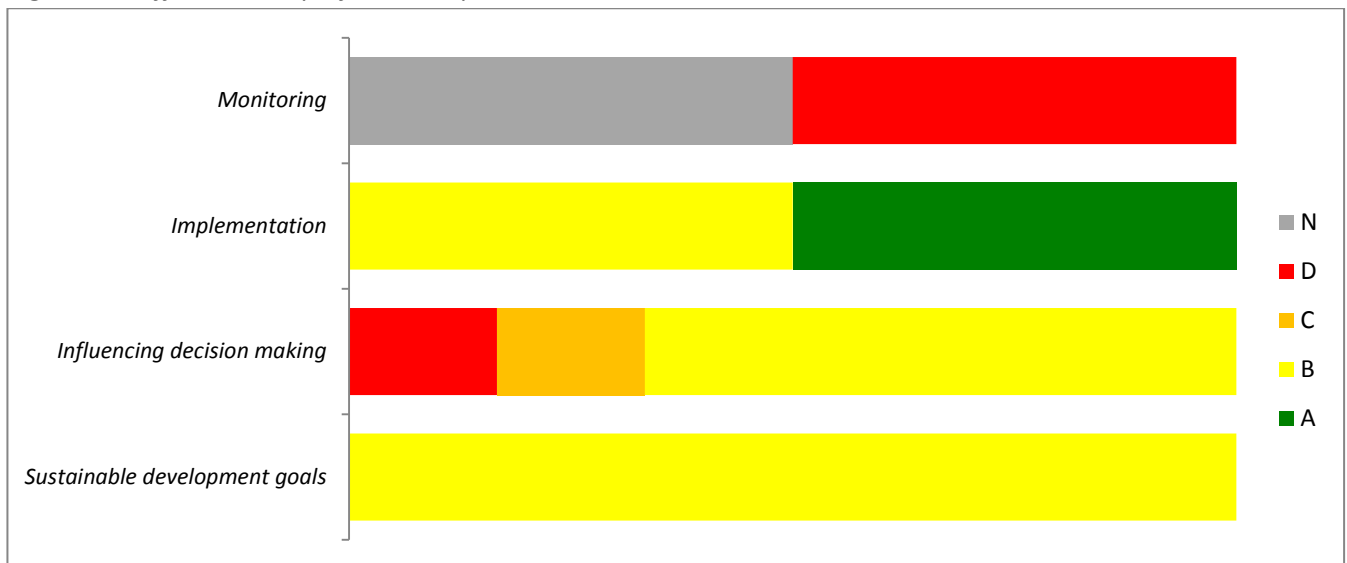


Figure 6.5: Effectiveness performance per review area – Case 3



6.4.1. Direct outputs

Two of the twelve indicators evaluated to determine the direct effect of the EMF conformed to expectations while six partially conformed. One indicator did not conform and two others were never attempted. One indicator could not be evaluated due to a lack of information.

6.4.1.1. Implementation and monitoring

The EMF was formally adopted ^{KPI 12.1.1} and a notice of adoption published in the North-West Provincial Gazette ^{KPI 12.1.2}. Although the EMF was being implemented at provincial level there were issues with the effective implementation of the EMF at the local municipal level ^{KPI 12.2.1}. According to Van Straaten (pers. comm. 2015) this was due to:

“...issues with GIS capacity within the municipality.”

The lack of GIS capacity meant that officials in local government could not access the spatial information contained in the EMF, an issue that was confirmed by a local government representative who stated that the municipality:

“...[did] not have access to the GIS component of the EMF.”

Thapelo (pers. comm. 2015)

Another contributing factor to the lack of implementation at the local municipal level could be the lack of information in the EMF implementations strategy regarding the roles and responsibilities of the different

spheres of government in the implementation of the EMF ^{KPI 12.2.2}. Although a memorandum of understanding was drafted for the development of the project one was not drafted for the implementation of the final EMF (pers. comm. Boshoff, 2015). Possibly as a result of the lack of clarity on roles and functions the EMF performed badly in terms of monitoring and except for a once-off evaluation of all the EMFs being used in the North-West Province no formal monitoring process ^{KPI 11.1.1} was implemented to evaluate the direct effect of the Madibeng local municipality EMF and as a result no official information was available on the extent to which it was achieving its goals and objectives ^{KPI 11.1.2}. The extent to which the issues with implementation affected the actual use of the EMF is discussed below.

6.4.1.2. Influencing decision making

Although it was established that the EMF was being used as a screening tool ^{KPI 13.1.1} to determine the need for EA studies and give guidance on the information requirements for specialist studies ^{KPI 13.1.2}, GIS capacity issues affected the extent to which the EMF was used at the provincial level in a similar way as it did in local government. According to Schaller (pers. comm. 2015):

“A lack of GIS capacity in the EIA [environmental impact assessment] section resulted in officials having to rely on GIS experts in other sections to extract information from the EMF.”

The fact that the final EMF was submitted in a format that required some level of GIS expertise to use contributed to the problem which according to Mathebula (pers. comm. 2015) could have been easily resolved if:

“... the EMF tool [was] developed in a way that was easily accessible and more user friendly.”

Issues with access to the EMF affected the extent to which the EMF was being used to influence final decisions on environmental authorisations ^{KPI 13.1.3}. It was further established that the EMF was never used to de-list any activities ^{KPI 13.1.4} which is not surprising as the EMF made no recommendations in this regard. In terms of the EMFs influence on land-use planning it was established that the EMF had very little effect. The only instance where the EMF was actively being used was where the EMF constraint zones were used to inform the review of the SDF for the municipality ^{KPI 13.2.1}. The extent to which the EMF zones and information would be reflected could however not be established. All other evidence suggested that the EMF was not being used by land-use planners in land-use decisions and was only used by local government officials:

“...when commenting on EA applications but not during the land-use decision process.”

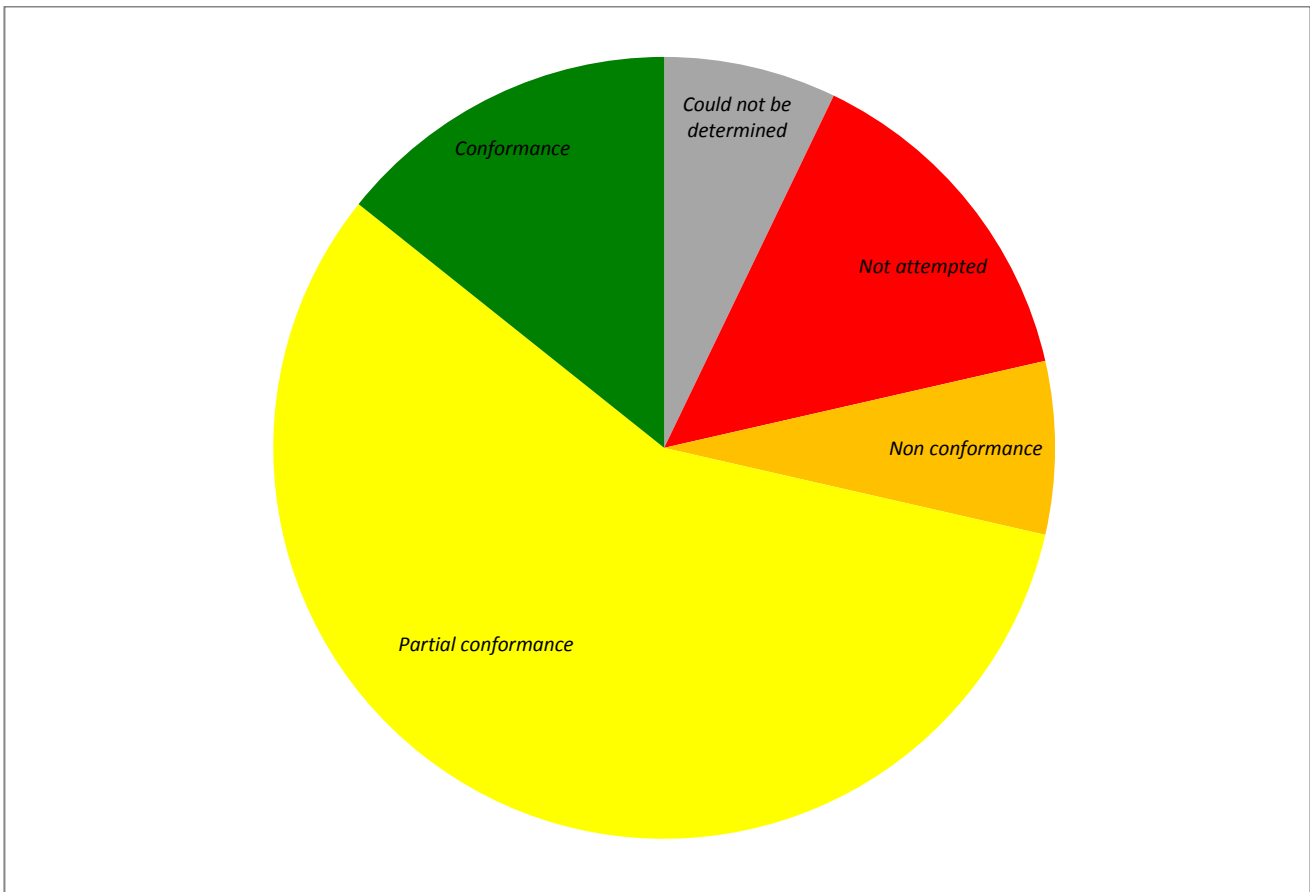
Thapelo (pers. comm. 2015)

The EMF therefore had no direct influence on the land-use change decision making process ^{KPI 13.2.2} and was only considered as part of the EA process – even at local government level.

6.4.2. Indirect outputs

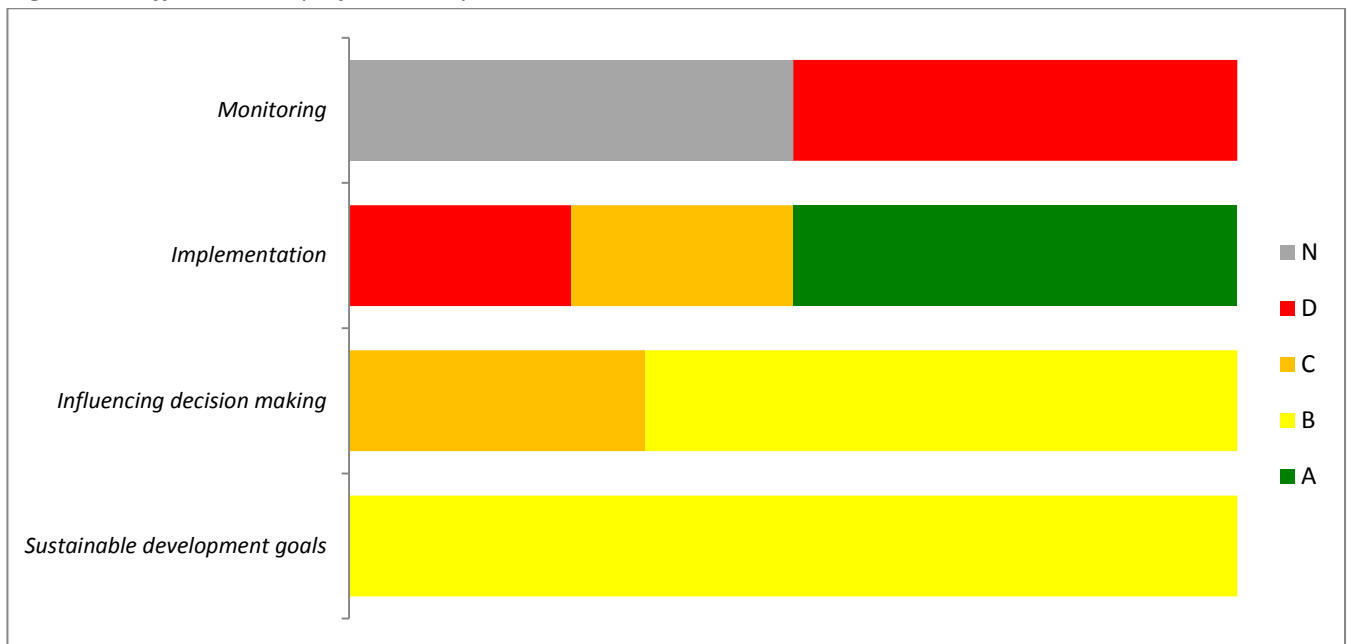
The EMF had some indirect effects through the promotion of sustainable development and environmental protection in the Madibeng Local Municipality ^{KPA 14.1}. The fact that the EMF was being used as a screening tool for EA and that it was influencing the development of a new SDF for the municipality, meant that it was promoting the consideration of environmental issues in decision making albeit only at the strategic level. Other indirect outputs might revolve around the awareness that was being raised surrounding environmental issues in the area although the extent to which this happened could not be confirmed.

Figure 6.6: Overall effectiveness ratings – Case 3



6.4.3. Concluding remarks

Although the effectiveness evaluation showed that the EMF had some effect with a majority of indicators partially conforming to expectations as shown in **Figure 6.6** the overall EMF performance was ‘poor to

Figure 6.7: Effectiveness performance per review area – Case 4

6.5.1.1. Implementation and monitoring

The EMF was formally adopted and a notice of adoption ^{KPI 12.1.1} published ^{KPI 12.1.2} through the described process. Although the EMF adhered to the legal requirements for adoption the actual implementation of the EMF did not perform very well as it was found that the EMF was not being implemented by the relevant role-players ^{KPI 12.2.1}. The lack of implementation might be ascribed to the absence of formally drafted agreements describing the roles and functions of the different spheres of government in the implementation of the EMF – even though proposals for this was made in the EMF document ^{KPI 12.2.2}. Cowden (pers. comm. 2015) however argued that formalised agreements would not necessarily guarantee implementation and that the real issues were:

“...the lack of buy-in [from relevant stakeholders] into the EMF and [his suspicion was] that many organs of state [did not] consider it a legal obligation to consider the EMF in decision making processes.”

This concern relates to the legal standing of EMFs and the extent to which it should be considered. The concern in the DPKSLM EMF is that the EMF was not being used even though it was formally adopted and had a legal standing in terms of law. Another possible reason for the lack of implementation revolves around capacity issues. According to Marebane (per. comm. 2015):

“...the municipality lacked the GIS systems and the necessary capacity to implement the EMF.”

The combination of capacity issues and the lack of buy-in would explain the bad implementation of the EMF. These issues are also seen in the lack of EMF monitoring ^{KPI 11.1.1, 11.1.2} that didn't happen even though the Province was aware that they were:

“...supposed to be responsible for implementation... and follow-up on the EMFs that were developed.”

(pers. comm. Mothiba, 2015)

6.5.1.2. Influencing decision making

Although the EMF experienced extensive problems with regard to implementation there was some evidence that suggested that it was occasionally being used to inform EA processes at the provincial level ^{KPI 13.1.1 – 13.1.3}. The EMF document provided relatively good guidance for environmental management with information on the desirability of activities within specific areas and the information requirements for specialist studies. The use of the EMF at local governmental level however was less clear. There was some evidence suggesting that the EMF was used to inform the development of the SDF for the municipality ^{KPI 13.2.1} but none to suggest its use in the land-use management decision making process ^{KPI 13.2.2}. The overall lack of interest in the EMF at both local and provincial level might be due to the observation by a provincial government representative that:

“...EMFs are not well promoted for use in the Mpumalanga Province.”

(pers. comm. Lotter, 2015)

The EMF was further also not used to guide any processes on the listing or de-listing of activities in the municipality ^{KPI 13.1.4}.

6.5.2. Indirect outputs

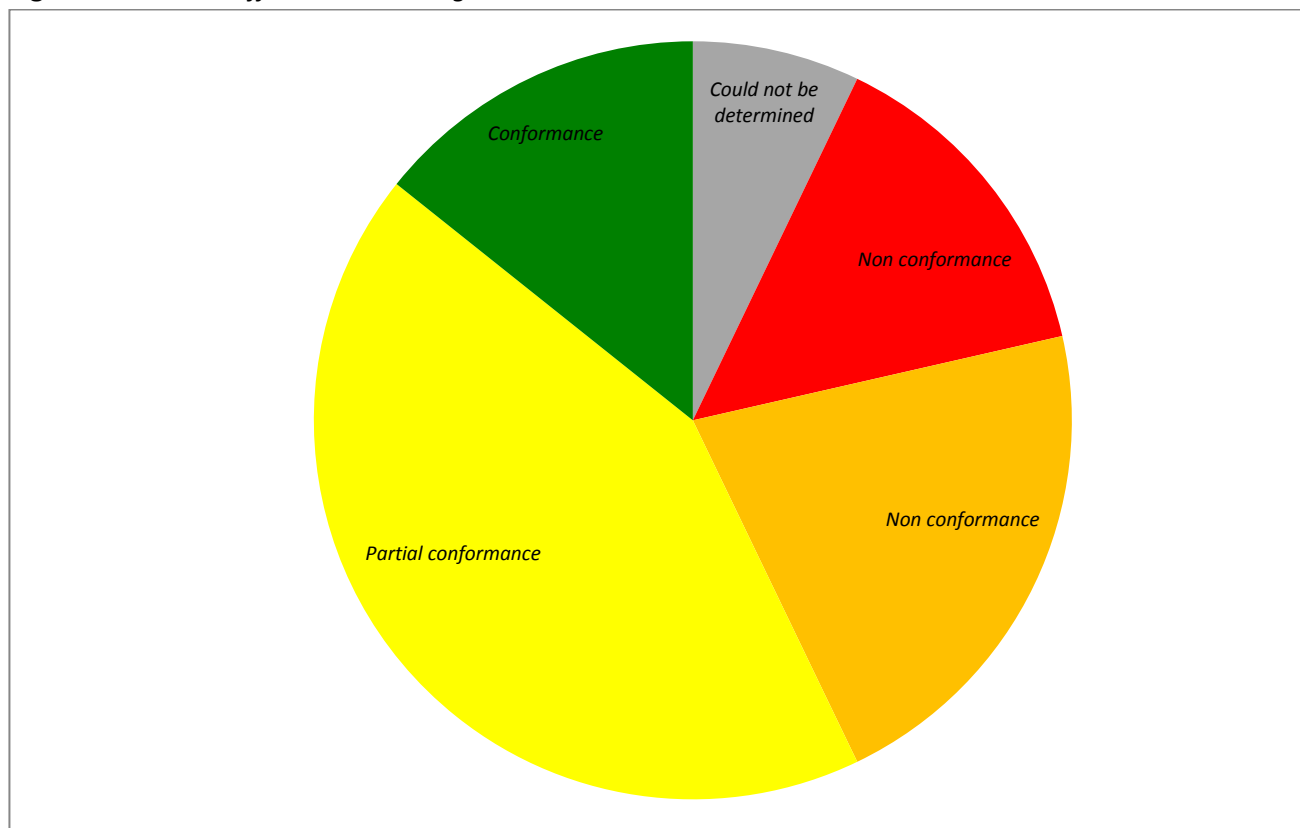
Considering the general lack of implementation the EMF generally had very little indirect impacts or effects ^{KPA 14.1}. The influence of the EMF on the SDF might promote sustainable development and environmental protection at the strategic level, but the general lack of EMF implementation of the EMF at both the provincial and local level would suggest that any influence beyond the SDF would be minimal.

6.5.3. Concluding remarks

Although the EMF was formally adopted many of the implementation indicators did not conform to expectations (see **Figure 6.8**) leading to an 'poor to average' effectiveness performance. The EMF struggled with implementation due to issues such as insufficient capacity and lack proper implementation planning

between role-players. The general lack of GIS capacity further hampered the use of the EMF in decision making processes.

Figure 6.8: Overall effectiveness ratings – Case 4



6.6. Effectiveness of Case 5 – Garden Route EMF

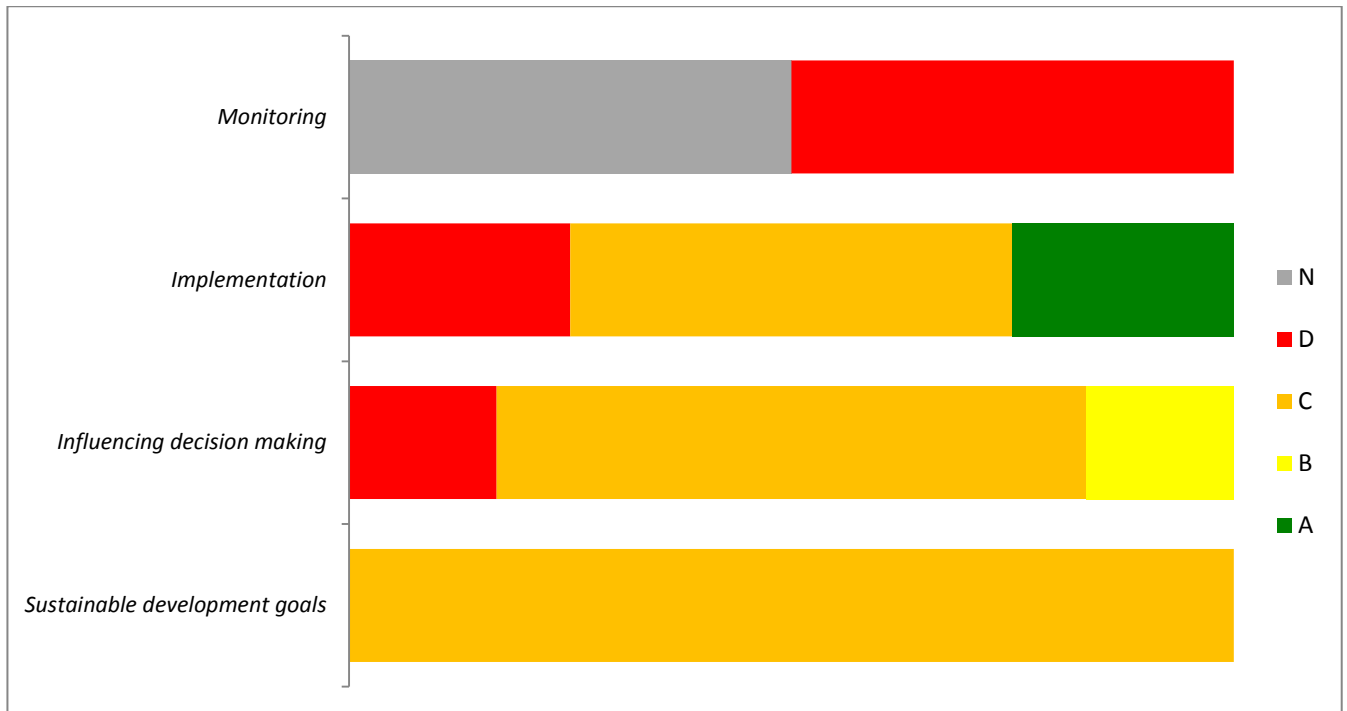
Only one of the fourteen indicators assessed as part of the Garden Route EMF conformed to expectations. One partially conformed while eight did not conform and three were never attempted. The status of one indicator could not be established. The findings are summarised in **Table 6.1** and in **Figure 6.9** and are now discussed in more detail.

Table 6.5: Effectiveness scores – Case 5

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)			
<i>Effectiveness indicators</i>					
Review area 11: Monitoring	KPA 11.1: Monitoring	11.1.1	11.1.2		
Review area 12: Implementation	KPA 12.1: Adoption	12.1.1	12.1.2		
	KPA 12.2: Roles and responsibilities	12.2.1	12.2.2		
Review area 13: Influencing decision making	KPA 13.1: Influencing EIA	13.1.1	13.1.2	13.1.3	13.1.4
	KPA 13.2: Influencing spatial planning and LUMS	13.2.1	13.2.2		

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)		
Review area 14: Sustainable development and environmental protection	KPA 14.1: Sustainable development	14.1.1	14.1.2	
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined

Figure 6.9: Effectiveness performance per review area – Case 5



6.6.1. Direct outputs

In terms of the direct effects of the EMF only one indicator conformed to expectations while another only partially conformed. The majority of indicators (six) did not conform and three were never attempted while one could not be assessed.

6.6.1.1. Implementation and monitoring

Although the Garden Route EMF was formally adopted through a National Gazette notice ^{KPI 12.1.2} the actual adoption of the EMF was not effective in practice ^{KPI 12.1.1}. According to provincial role-players the EMF was published by the National Department of Environmental Affairs without their knowledge in a manner described as:

“...quite suddenly and somewhat ‘hush-hush’.”
(pers. comm. Naudé, 2015)

It should be noted that due to the national significance of the area (large tracts of formally protection areas) the EMF was initiated by the National DEA. Although these formally protected areas would fall under the jurisdiction of the National DEA the remainder of the study area would still be the competency of the provincial government. Subsequently their involvement in the adoption process would be vital to the successful implementation of the EMF. However the exclusion of the provincial department ^{KPI 12.2.2} in this process resulted in uncertainty pertaining to the:

“...manner in which the EMF had to be used in decision making processes as the EMF was not well implemented or ‘handed over’ to the relevant departments and intended users.”

(pers. comm. Naudé, 2015)

As a result of the aforementioned the EMF was not well implemented at all spheres of government ^{KPI 12.2.1}. No evidence could be found suggesting that the EMF was actively being monitored ^{KPI 11.1.1} and subsequently no information existed on the extent to which it was achieving its objectives and goals ^{KPI 11.1.2}.

6.6.1.2. Influencing decision making

The gaps in the implementation of the EMF affected the actual use of the EMF as well. It was established that except for providing some guidance on the requirements for specialist studies ^{KPI 13.1.2} the EMF was not used extensively. One of the reasons why the EMF was seldom used to inform decisions related to EA processes was ^{KPI 13.1.1, 13.1.3}:

“...the fact that the EMF offered very few guidelines on the management of areas making it very difficult and often futile to use.”

(pers. comm. Swanepoel, 2015)

A second issue which further complicated its use was lack of a consolidated management zones data layer which made it:

“...very difficult to identify the sensitive areas from the EMF [as they were] not clearly indicated on a map.”

(pers. comm. Naudé, 2015)

Due to the lack of consolidated management zones the EMF also did not make any recommendations for the listing or de-listing of activities and subsequently this was also not attempted in practice ^{KPI 13.1.4} either. The EMF also performed poorly in terms of its influence on land-use planning and decision making as ^{KPA 13.2}:

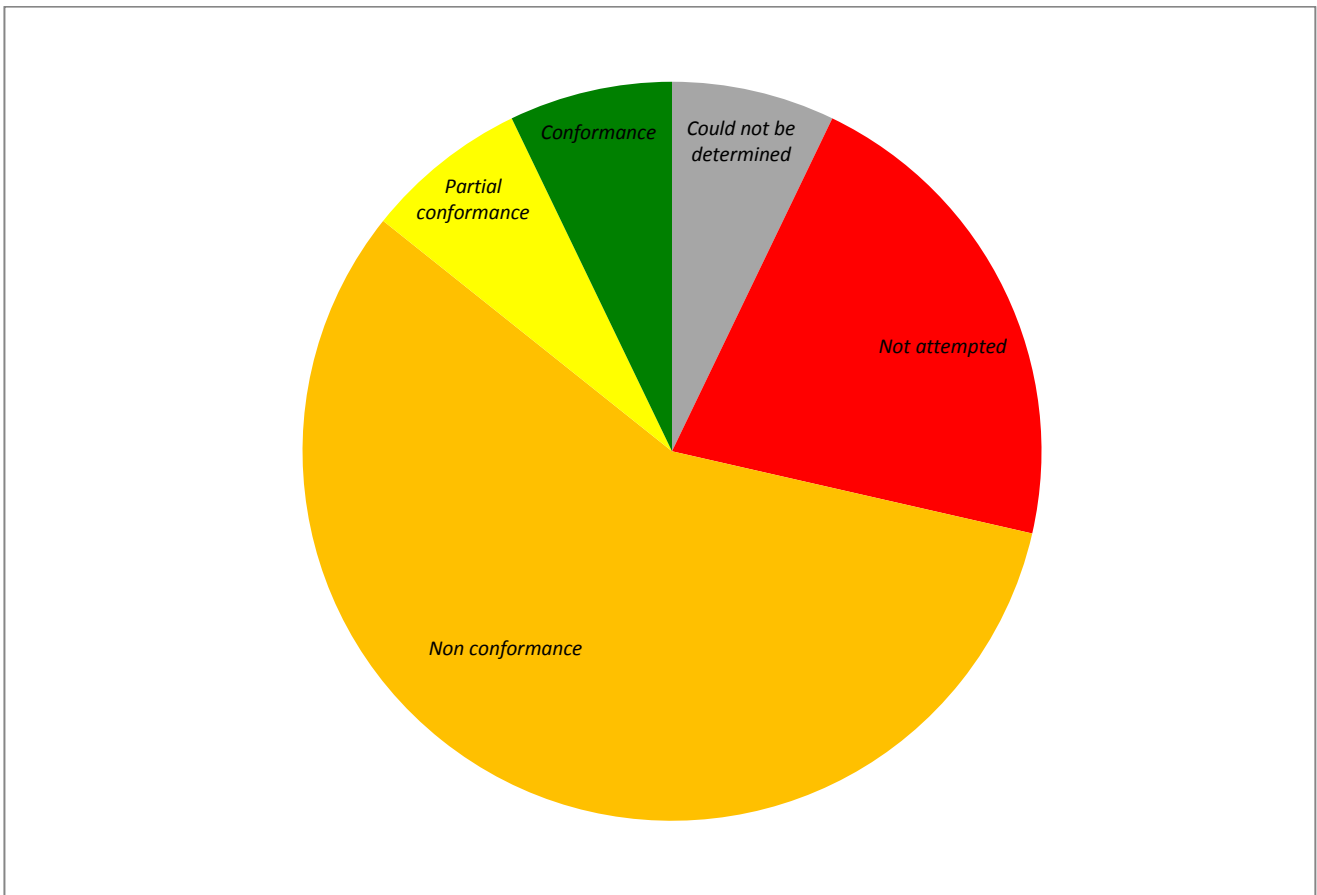
“...the EMF was not being used to inform the development of any SDFs or used to inform land-use change decision making.”
 (pers. comm. Smit, 2015a)

In one case it was found that an environmental officer at local government was not even aware of the existence of the EMF, a finding which echoed the implementation issues experienced with the EMF. It was further established that the South African National Parks board which is considered to be a key role-player in the area due to the number of protected areas also did not consider the EMF when commenting on EA applications but rather used information contained in a Biodiversity Sector Plan. Overall the EMF performed very poorly in terms of its implementation and use and had very little effect on decision making in the area.

6.6.2. Indirect outputs

The overall lack of influence of the EMF on both spatial planning and conservation endeavours resulted in the EMF generally having no indirect effect except perhaps for some awareness raised on conservation issues through the public participation process ^{KPA 14.1}.

Figure 6.10: Overall effectiveness ratings – Case 5



6.6.3. Concluding remarks

As illustrated by **Figure 6.10**, the EMF showed a ‘poor’ performance in terms of effectiveness. The issues experienced with inter-governmental coordination and the shortcomings of the EMF itself in terms of management zones and management guidelines all contributed to the unsatisfactory effectiveness performance. The results underline the importance of proper implementation planning and the involvement of all stakeholders in the EMF development process.

6.7. Effectiveness of Case 6 – Cannon Rocks to Great Kei River Mouth EMF

From the fourteen indicators that were assessed as part of the Canon Rocks EMF effectiveness evaluation only two conformed to expectations while seven partially conformed. Of the remaining seven, two indicators did not conform while one was never attempted and two could not be determined. The effectiveness findings are summarised in **Table 6.6** and **Figure 6.11** and are subsequently discussed in more detail.

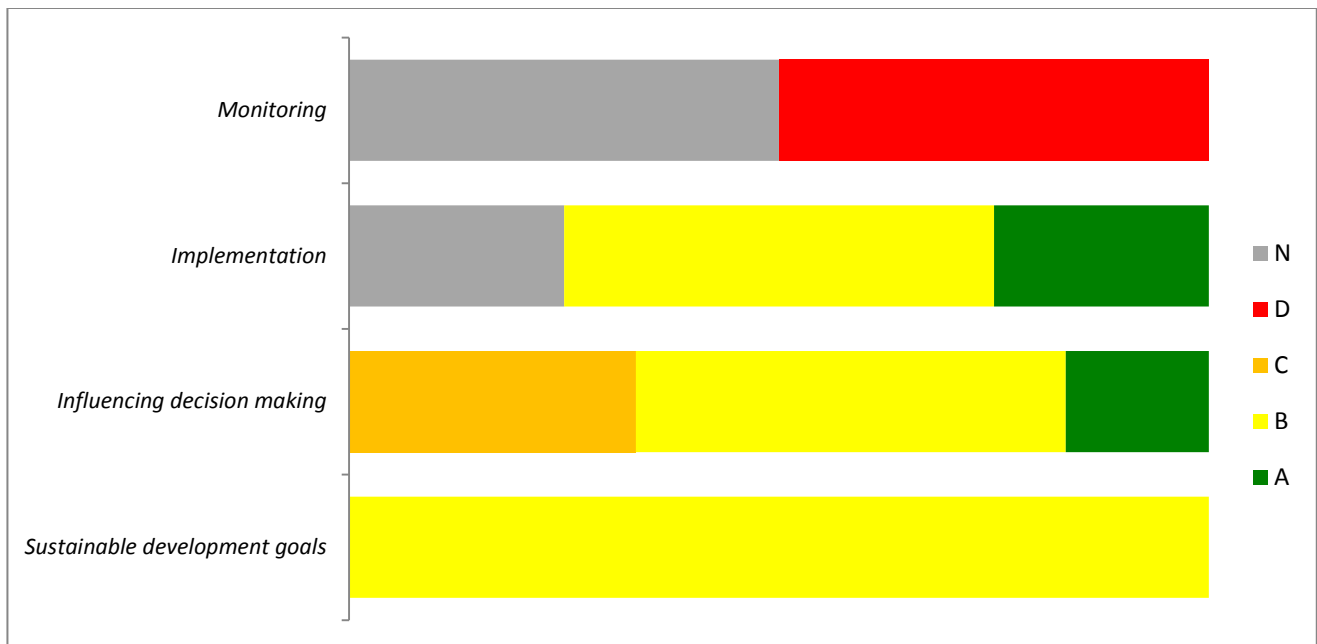
Table 6.6: Effectiveness scores – Case 6

Review areas	Key performance areas (KPAs)	Key performance indicators (KPIs)																		
<i>Effectiveness indicators</i>																				
Review area 11: Monitoring	KPA 11.1: Monitoring	11.1.1	11.1.2																	
Review area 12: Implementation	KPA 12.1: Adoption	12.1.1	12.1.2																	
	KPA 12.2: Roles and responsibilities	12.2.1	12.2.2																	
Review area 13: Influencing decision making	KPA 13.1: Influencing EIA	13.1.1	13.1.2	13.1.3	13.1.4															
	KPA 13.2: Influencing spatial planning and LUMS	13.2.1	13.2.2																	
Review area 14: Sustainable development and environmental protection	KPA 14.1: Sustainable development	14.1.1	14.1.2																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> <tr> <td style="background-color: green;"></td> <td style="background-color: yellow;"></td> <td style="background-color: orange;"></td> <td style="background-color: red;"></td> <td style="background-color: grey;"></td> </tr> <tr> <td>Conformance</td> <td>Partial conformance</td> <td>Non conformance</td> <td>Not attempted at all</td> <td>Could not be determined</td> </tr> </table>																Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined																

6.7.1. Direct outputs

Only two of the twelve indicators evaluated in terms of the direct effect of the EMF conformed to expectations. Of the remaining ten, five partially conformed, two did not conform, one was never attempted and two others could not be determined.

Figure 6.11: Effectiveness performance per review area – Case 6



6.7.1.1. Implementation and monitoring

Although the EMF was adopted by the province ^{KPI 12.1.1} and a notice of adoption was published ^{KPI 12.1.2} in the provincial gazette, the EMF was not implemented at the local governmental level ^{KPI 12.2.1}. The reason for the bad implementation performance at the local governmental level could be ascribed to the fact that:

“...in most municipalities the individuals that were involved in the EMF development process were not there anymore due to a high turn-over in staff and their replacements were often not even aware of the existence of the EMF.”

(pers. comm. Pienaar, 2015)

Attempts to contact those representatives in local government that were involved in the EMF development process and still active in the municipalities were fruitless. E-mails addressed to these individuals were never replied and voicemails and SMS messages never returned. As a result of the unwillingness of these role-players to share their knowledge and experiences the extent to which inter-governmental agreements were drafted could not be objectively determined ^{KPI 12.2.2}. In terms of monitoring it was established that no formal monitoring process was in place ^{KPI 11.1.1} and as a result there was no information available on the extent to which the EMF was achieving its goals and objectives ^{KPI 11.1.2}.

6.7.1.2. Influencing decision making

Although the EMF was not implemented at local governmental it did have at least some effect on decision making at the provincial level. While the EMF was not used as the framework within which decisions were taken it was established that the EMF was being used by decision makers ^{KPI 13.1.1 - 13.1.3} as a:

“...specialist opinion that had to be considered during EA processes.”
(pers. comm. Pienaar, 2015)

The extent to which this ‘specialist opinion’ had to be adhered to was not always clear, however it was discovered that the EMF was being used in a court case to support a negative environmental authorisation decision taken by government which was being challenged by the applicant. The EMF was therefore regarded as a tool with at least some weight in the province. Although the EMF document did make proposals for the de-listing of specific activities within certain management zones, this was never implemented in practice ^{KPI 13.1.4}. In terms of the influence of the EMF on spatial planning it was established that the EMF was successfully influencing all of the SDFs in its jurisdiction and that the SDFs accurately reflected most of the sensitive areas contained in the EMF ^{KPI 13.2.1}. The reason for this success can be ascribed to the effort of provincial officials to promote the alignment of SDFs with the content of the EMF and their involvement in the SDF development processes. In terms of the EMFs influence on land-use management at project level the EMF failed to have any real effect ^{KPI 13.2.2}. According to Pienaar (pers. comm. 2015) the reason for this is that:

“...municipalities do not always see themselves as bound by the guidelines in the EMF and are often not even aware of what these guidelines say.”
(pers. comm. Pienaar, 2015)

The lack of implementation at local governmental level and the fact that many municipal officials are not even aware of the EMF explains why the EMF performed poorly in terms its influence on land-use change decisions at the local governmental level.

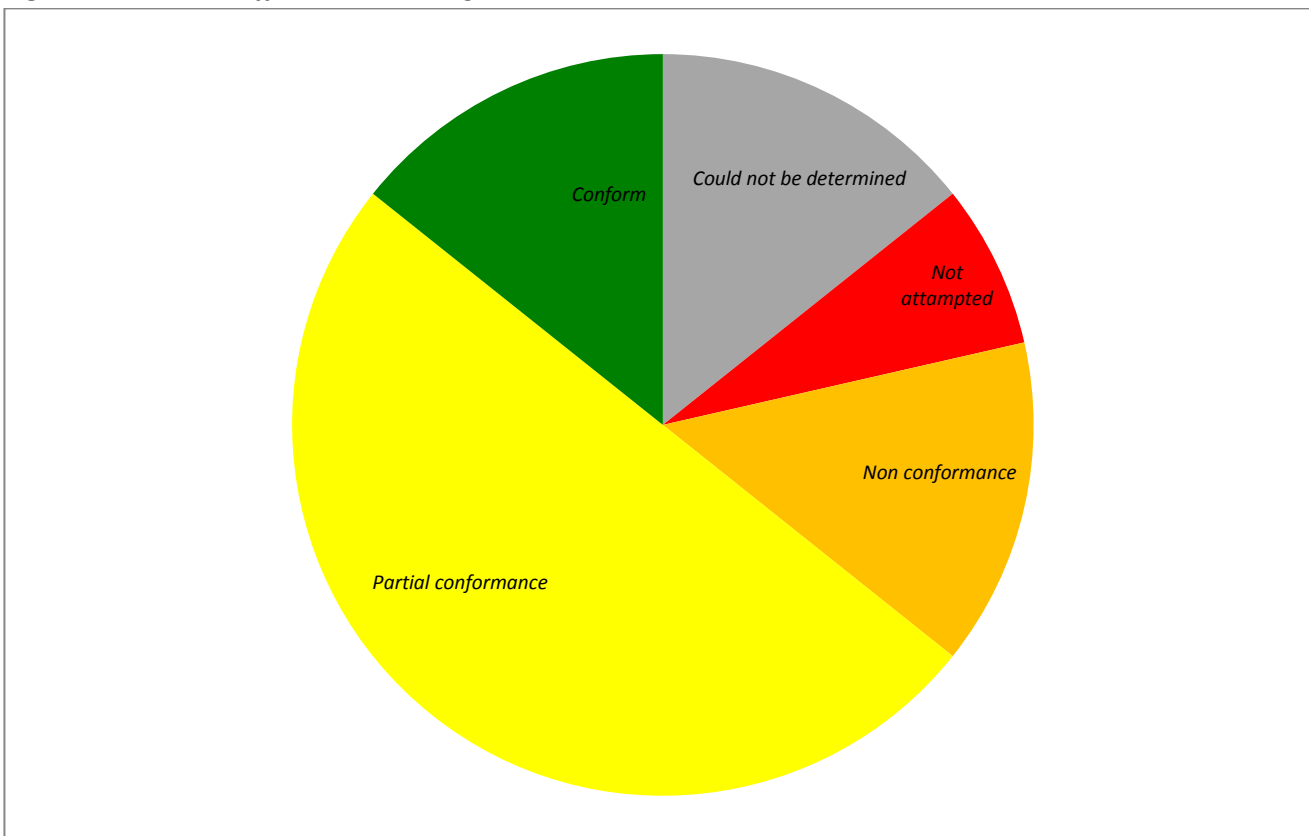
6.7.2. Indirect outputs

The EMF did have some indirect influence and contributed to the promotion of sustainable development and environmental protection goals through its influence on development planning (SDFs) and the guidance it provided to the EA process ^{KPA 14.1}. The EMF further raised some awareness about the sensitive status of the coastal strip it dealt with and might have affected the manner in which some officials and members of the public viewed the environment.

6.7.3. Concluding remarks

Overall the EMF performed ‘poor to average’ in terms of effectiveness. Most indicators only partially conformed to expectation as illustrated in **Figure 6.12**. Although the EMF had some effect at the provincial level and influenced some aspects of the EA process it had very little effect – except for its influence on the development of SDFs – at local governmental level. The aforementioned can be viewed as a direct consequence of the lack of implementation at local governmental level.

Figure 6.12: Overall effectiveness ratings – Case 6



6.8. Inter-governmental EMF use

In addition to the use of EMFs by regular role-players such as the local authorities and the provincial departments EMFs are sometimes applicable to other government sectors as well. One such case is where a proposed development is located within a protected area and has to be dealt with by the National DEA. It was however established that EMFs were almost never considered in these cases as:

“...the scale at which most EMFs are developed are too coarse making the unsuitable for informed decision making as they will not be defensible in court.”

(pers. comm. Smit, 2015b)

Another instance where EMFs should be considered is where applications are made in terms of the Mineral and Resources Act. It was however established through consultation with department of mineral resources officials responsible for dealing with environmental issues in the regions to which the six case studies applies that they were often not even aware of the existence of the EMFs.

6.9. Final remarks

This chapter presented the findings for the effectiveness evaluation of the six EMF case studies addressing the research question:

“What is the effectiveness of EMFs?”

It was established that most of the EMFs were struggling with implementation and that they were not actively influencing decision making processes. Most cases had some effect at the provincial level but failed at the local governmental level. General issues pertain to the lack inter-governmental agreements concerning the implementation and eventual use of EMFs and the lack of GIS capacity to utilize the spatial components of EMFs.

Chapter 7 presents a cross-case analysis identifying patterns and relationships in an effort to better understand the issues that are hampering the implementation and successful use of EMFs in South Africa.

Research Question	Method	Phase	Chapter
Q1 - What is an environmental management framework?	Literature review	Phase 2-1: Clarify the purpose and objectives of EMFs in South Africa	Chapter 3: Literature review
		Phase 2-2: Understanding EMF	
Q2 - What is the status and extent of Environmental management frameworks in South Africa?	Survey	Phase 3-1: Determine the status and extent of EMFs in South Africa	Chapter 4: The status and extent of Environmental management frameworks in South Africa
Q3 – What is the quality of EMFs?	Case study reviews: - Documentation reviews - Data and methodology review	Phase 4-1: Determine the data and methodological requirements for developing an EMF	Chapter 5: Case study analysis: EMF quality
Q4 – What is the effectiveness of EMFs?	- Interviews	Phase 4-2: Assess the ‘real world’ effect that EMFs are having	Chapter 6: Case study analysis: EMF effectiveness
Q5 – What are the factors influencing the quality and effectiveness of EMFs?	Case study reviews: - Within-case analysis - Cross case analysis	Phase 4-3: Critically evaluate the <i>status quo</i> of EMFs in South Africa	Chapter 7: Cross case analysis
Research Aim			
To evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice		Phase 5-1: Synthesis and conclusion	Chapter 8: Synthesis and conclusions

CHAPTER SEVEN

CROSS-CASE ANALYSIS

7.1. Introduction

Having determined the quality and effectiveness findings for the six individual case studies, **Chapter 7** applied a cross-case analysis approach to address the research question:

What are the factors influencing the quality and effectiveness of EMFs?

- Research question 6 -

Possible patterns and relationships across all cases are identified allowing for a better understanding of the factors that are influencing EMF practice in South Africa. These patterns and relationships are subsequently discussed in further detail.

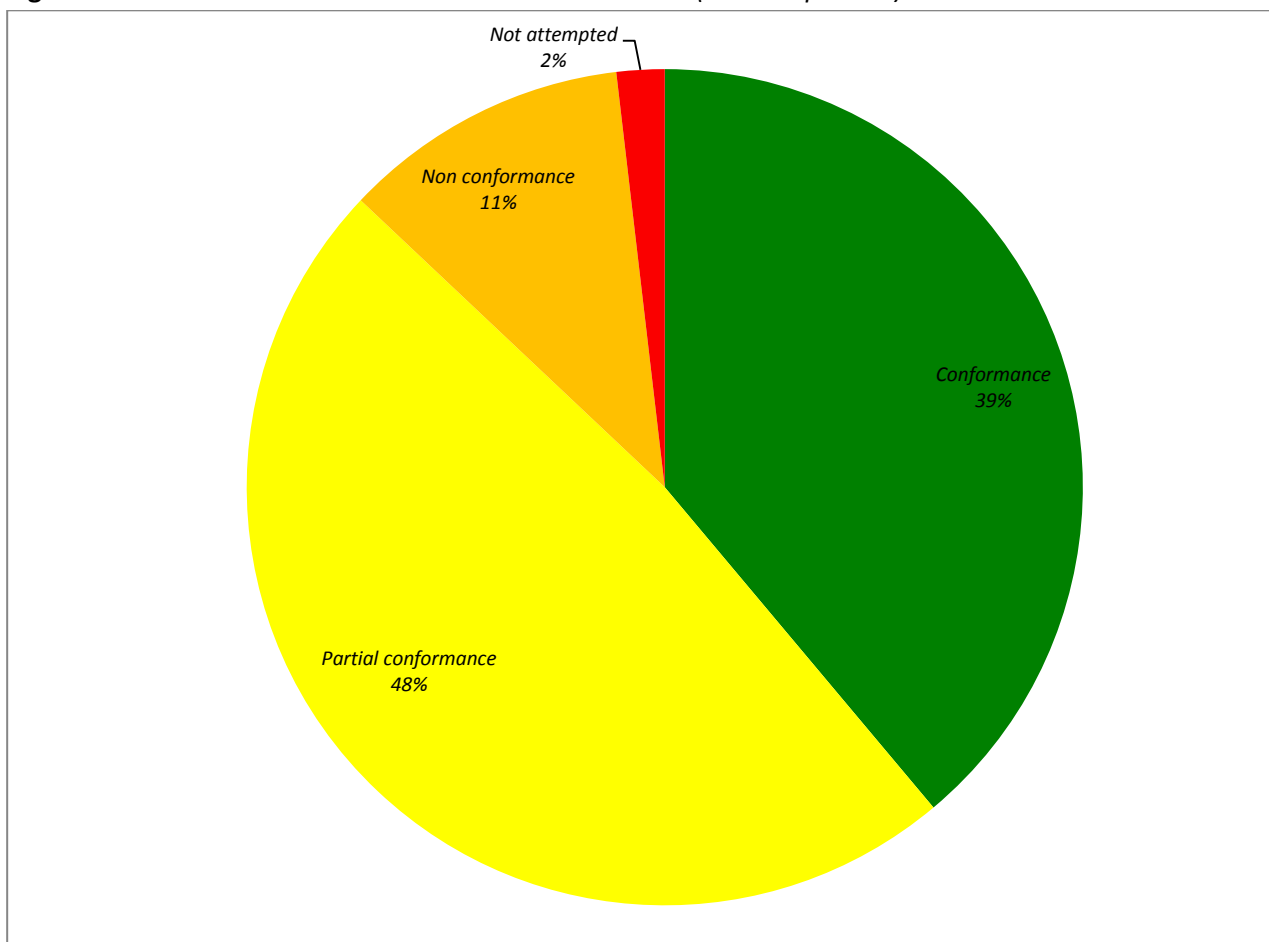
7.2. Inputs

7.2.1. Review area 1: General process

Review area one performed relatively well across all cases with 39% of all KPIs conforming to expectations and 48% partially conforming (**Figure 7.1**). Only 11% of all KPIs did not conform and only 2% were not attempted. The detailed breakdown for review area one across all cases is presented in **Table 7.1**. The KPIs that showed similar performance across the six cases were KPIs 1.1.1, 1.1.2, 1.1.3, 1.2.1, 1.3.2, 1.3.3. EMFs were generally well contextualised and reflected on context specific issues, priorities and opportunities related to their study areas ^{KPI 1.1.1, 1.1.3}. One area where improvement could be made was with the formulation of environmental goals ^{KPI 1.1.2}. Environmental goals were often vague and considered more relevant at a provincial or even national level than at a local level as should have been the intent. The contextualisation of environmental goals is important as it guides the development of detailed objectives and management guidelines in the EMF. Although the formulation of the 'need' for an EMF only became a formal requirement after 2010 through Regulation 3(3)(a) of the 2010 EMF regulations (South Africa, 2010) most EMFs successfully communicated the necessity of the EMF and gave reference to the key issues it was supposed to address ^{KPI 1.2.1}. This however is partly to be expected as EMFs are primarily focussed on addressing specific issues and pressures that are being experienced in an area, *i.e.* it is often seen as an intervention mechanism dealing with specific issues and addressing a

specific need. The expectations for the EMF should therefore be clarified prior to the commencement of an EMF project. It was however determined that this was not always the case and that requirements pertaining to the scope ^{KPI 1.3.2} of an EMF and the technical requirements ^{KPI 1.3.3} against which an EMF were to be developed were not always clearly articulated (KPA 1.3). It was found that EMF scope was often adjusted as a project developed and as new issues and information surfaced. This trend might suggest that the scope of an EMF cannot always be fixed at the onset of a project and that a dynamic approach to dealing with scope might be advisable. This could also explain why operational scale ^{KPI 1.3.4} was not always clearly defined at the onset of a project. There should however be a stage in the project where both the scope and the operational scale at which an EMF will be developed are decided to allow for spatial analysis to continue and for the project to be finalised.

Figure 7.1: KPI breakdown across all cases: Review area 1 (General process)



Technical requirements dealing with things such as methodological expectations could, and should, however be dealt with before a project commences. In most cases technical requirements were found to be unclear and often non-existent. This shortcoming could partly be ascribed to the often generic nature

of ‘terms of reference’ documentation used to inform the development of the EMF. These terms of reference documents often did not give clear guidance on technical requirements. The lack of clarity on technical requirements often affected issues such as data management and spatial analysis which are further discussed in **Section 7.5**. Although review area one performed relatively well, addressing the discussed shortcomings could improve the overall quality of all ensuing phases.

Table 7.1: Cross-case synthesis: Review area 1 (General process)

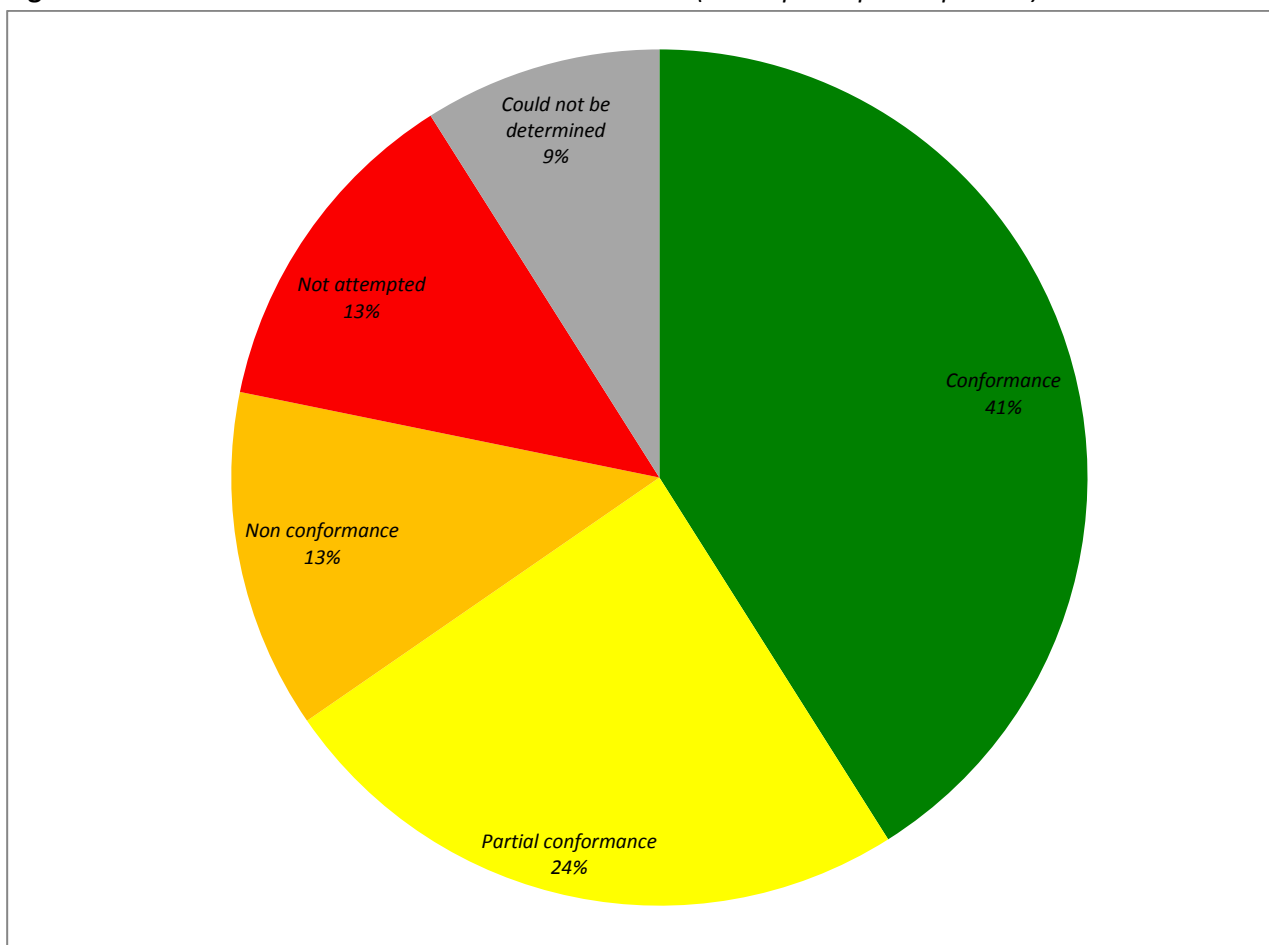
Key performance areas (KPA)	Key performance indicators (KPI)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 1.1: Context	KPI 1.1.1	Green	Green	Green	Green	Yellow	Green
	KPI 1.1.2	Green	Yellow	Yellow	Yellow	Green	Yellow
	KPI 1.1.3	Green	Yellow	Green	Green	Yellow	Green
KPA 1.2: Need	KPI 1.2.1	Yellow	Green	Green	Yellow	Green	Green
KPA 1.3: Requirements and objectives	KPI 1.3.1	Green	Yellow	Green	Yellow	Yellow	Green
	KPI 1.3.2	Yellow	Green	Yellow	Yellow	Yellow	Yellow
	KPI 1.3.3	Yellow	Orange	Yellow	Yellow	Orange	Yellow
	KPI 1.3.4	Orange	Red	Yellow	Yellow	Orange	Green
	KPI 1.3.5	Yellow	Orange	Yellow	Green	Orange	Yellow
		Green	Yellow	Orange	Red	Grey	
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			

7.2.2. Review area 2: Public participation process

Overall public participation across all cases showed an average performance with 41% of all KPIs conforming to expectations while 24% partially conformed (**Figure 7.2**). Of the remainder 13% did not conform while another 13% were never attempted. Due to various reasons 9% of KPIs across all cases could not be objectively established. The KPIs presented in **Table 7.2** that performed similarly across cases were KPIs 2.1.1, 2.1.2, 2.1.3, 2.1.5, 2.2.1, 2.2.3, 2.3.1, 2.3.2 and 2.4.3. Public participation processes were generally well planned ^{KPI 2.1.1} and care was generally taken in the identification of the key stakeholders and possible interested and affected parties ^{KPI 2.1.2}. There was however isolated cases where not all stakeholders were identified or were some were intentionally excluded from the process. An area where some improvement could still be made in terms of the planning of the public participation process is with regard to the distribution of background information documents explaining the EMF context and the process through which possible stakeholders could partake in its development ^{KPI 2.1.3}. Although some sort of background information documents was circulated in all cases their contents were not always of sufficient detail. Providing possible contributors with adequate background information is important to

ensure that all stakeholders have the same understanding and expectations of the project and that they can effectively participate in the process. If the aforementioned is not achieved stakeholders might attend meetings unprepared resulting in their unsatisfactory participation in the process or in discussions being side-tracked by irrelevant issues not really applicable to the process. No evidence suggesting that effort was made to include disabled and disadvantaged members of the community in the process was further found^{KPI 2.3.1}. This meant that some members of the public, such as those that are illiterate, did not have a fair opportunity to participate in the process. This is however not just an issue for EMFs but for public participation in general and the manner in which it should be dealt with is not clear.

Figure 7.2: KPI breakdown across all cases: Review area 2 (Public participation process)



Another area of possible improvement is the documenting of the public participation process^{KPI 2.1.5}. Although the planning processes were generally well documented the manner in which the actual processes unfolded were not always adequately covered. Details on the interaction between stakeholders and the extent to which participation was achieved were absent from most EMF reports. This lack of information often made it difficult to determine the extent to which stakeholders had the opportunity to

partake in the process and the manner in which they actually interacted. Little feedback was further provided to stakeholders on the manner in which their concerns were being addressed ^{KPI 2.4.3}. It was however found that draft EMF reports were generally made easily accessible for sufficient timeframes ^{KPI 2.2.3} for consideration by registered stakeholders as well as any other interested parties ^{KPI 2.2.1}. In contrast to the availability of the draft EMFs the final EMFs were virtually impossible to access for people outside of government ^{KPI 2.3.2}. EMFs had to be sourced through key government officials who in some cases did not have access to the final documents themselves. The general inaccessibility of the final EMF documentation meant that environmental assessment practitioners, public interest groups and the broader general public would have issues in accessing and using the EMF.

Table 7.2: Cross-case synthesis: Review area 2 (Public participation process)

Key performance areas (KPA)	Key performance indicators (KPI)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 2.1: Structuring and execution of public participation process	KPI 2.1.1	Green	Green	Green	Green	Green	Yellow
	KPI 2.1.2	Green	Green	Green	Green	Yellow	Yellow
	KPI 2.1.3	Yellow	Yellow	Green	Green	Green	Yellow
	KPI 2.1.4	Green	Green	Green	Green	Orange	Yellow
	KPI 2.1.5	Yellow	Green	Green	Yellow	Yellow	Yellow
KPA 2.2: Opportunity to comment	KPI 2.2.1	Green	Green	Green	Grey	Grey	Green
	KPI 2.2.2	Green	Green	Green	Orange	Grey	Green
	KPI 2.2.3	Green	Green	Yellow	Grey	Grey	Green
KPA 2.3: Ease of access	KPI 2.3.1	Grey	Orange	Red	Red	Red	Red
	KPI 2.3.2	Orange	Orange	Orange	Orange	Orange	Orange
KPA 2.4: Consideration of comments	KPI 2.4.1	Yellow	Yellow	Yellow	Green	Red	Yellow
	KPI 2.4.2	Yellow	Green	Green	Red	Red	Red
	KPI 2.4.3	Yellow	Yellow	Grey	Red	Red	Orange
		Green	Yellow	Orange	Red	Grey	
Conformance	Partial conformance	Non conformance		Not attempted at all		Could not be determined	

7.2.3. Review area 3: Data management

Data management was generally neglected in all cases and performed poorly with 44% of KPIs not being attempted at all and 9% not conforming to expectations (Figure 7.3). Of the remainder 45% partially conformed to expectations while only 2% were found to fully conform. The KPIs that showed likewise performance across cases were 3.1.3, 3.1.4, 3.1.5, 3.2.2, 3.3.1 and 3.3.2 (Table 7.3). None of the cases succeeded in presenting a comprehensive data-matrix summarising the characteristics of available datasets. The data-matrix (or gap analysis) is meant to guide the selection of datasets for inclusion in the study based on characteristics such as scale, quality and accuracy. Due to the general lack of comprehensive gap analyses, most cases failed to reflect on the quality and scale of available datasets

that were included in the analysis ^{KPI 3.1.4, 3.1.5}. As a result many datasets included in analyses were found to be of unsuitable scale and often also unsuitable quality ^{KPI 3.2.1, 3.2.2}. Except for a failed attempt in one case, metadata was non-existent ^{KPI 3.3.1} and as a result data sources were very seldom revealed ^{KPI 3.1.3}. Information on the methods used to capture new data was very poorly discussed and in most cases totally ignored. The lack of detail on data usage and the methods used to capture new data is problematic. Data management was one of the worst performance areas across all cases, which is worrying as the spatial data is generally regarded as the backbone of an EMF.

Figure 7.3: KPI breakdown across all cases: Review area 3 (Data management)

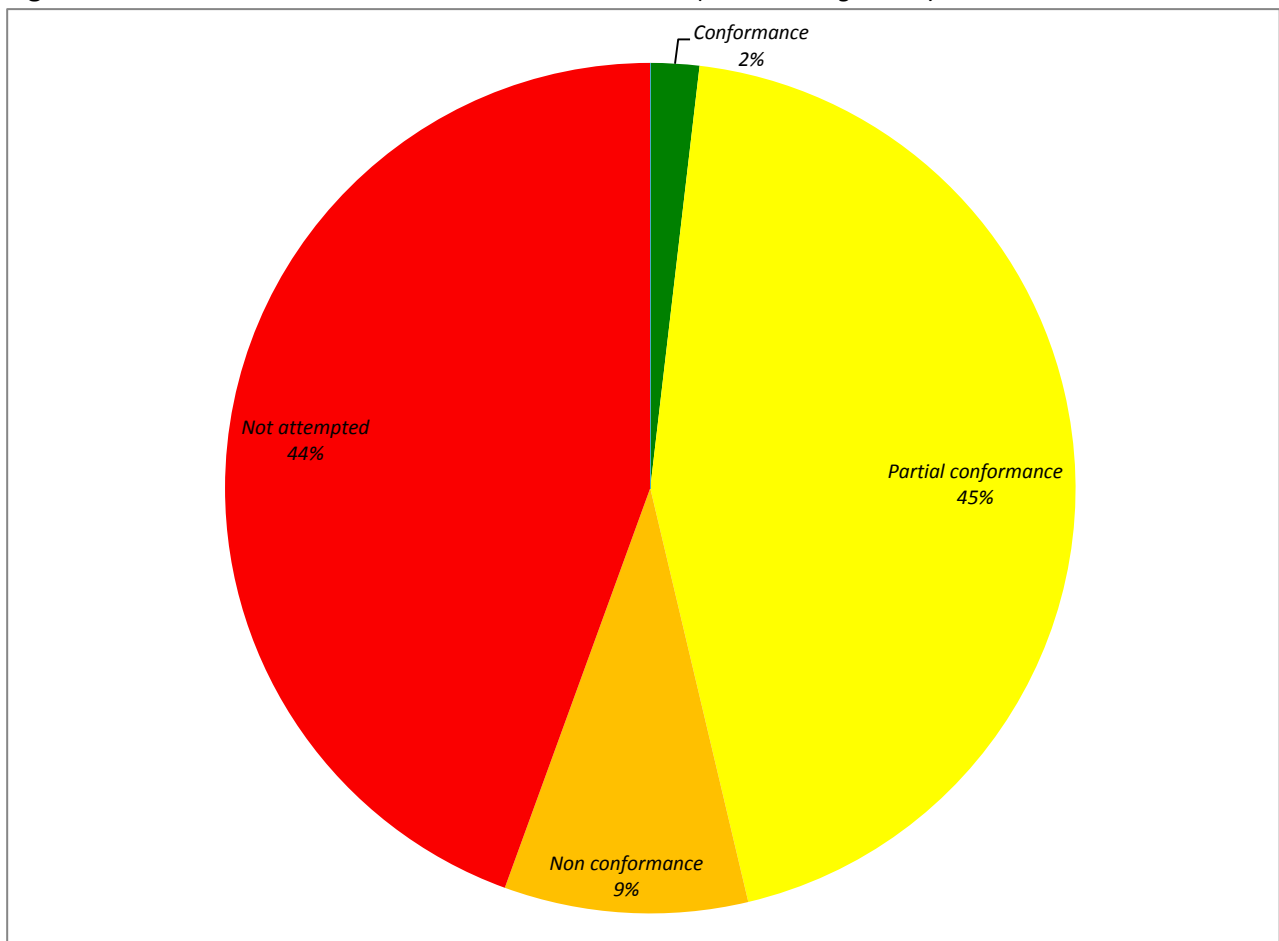


Table 7.3: Cross-case synthesis: Review area 3 (Data management)

Key performance areas (KPAs)	Key performance indicators (KPIs)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 3.1: Gap analysis	KPI 3.1.1	Yellow	Red	Yellow	Yellow	Red	Yellow
	KPI 3.1.2	Red	Orange	Yellow	Yellow	Red	Yellow
	KPI 3.1.3	Red	Yellow	Yellow	Yellow	Red	Yellow
	KPI 3.1.4	Red	Red	Red	Yellow	Red	Yellow

Key performance areas (KPAAs)	Key performance indicators (KPIs)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 3.2: Data use	KPI 3.1.5						
	KPI 3.2.1						
	KPI 3.2.2						
KPA 3.3: Metadata	KPI 3.3.1						
	KPI 3.3.2						
Conformance	Partial conformance	Non conformance	Not attempted at all		Could not be determined		

7.2.4. Review area 4: Spatial analysis

Spatial analysis generally did not perform very well either. Only 26% of all indicators were found to conform to expectations while 35% only partially conformed (**Figure 7.4**). From the remainder 30% did not conform to expectations while 9% were not attempted at all. The performance of KPIs showed considerable variation across cases but key KPIs that are discussed later in more detail are KPIs 4.1.2, 4.1.3, 4.1.4, 4.2.1, 4.2.2, 4.2.3 and 4.2.4 (**Table 7.4**). The spatial analysis review area investigated two key components which were sensitivity analysis and the delineation of environmental management zones. The sensitivity analysis component generally performed better than the delineation of management zones. Four of the six cases struggled with the spatial analysis component of the EMF while two performed slightly better. The description of the methodologies that were applied to assess sensitivity was not always thoroughly discussed with details on overlay techniques and allocation of weights often not being revealed ^{KPI 4.1.2}. Most cases further neglected to define the term ‘sensitivity’ and what it would entail ^{KPI 4.1.3}. The manner in which sensitivity should be interpreted is crucial to understand the approach and eventual results. Although most cases did reflect on some element of sensitivity the methodological uncertainties meant that it was difficult to determine whether the final results effectively reflected actual sensitivity ^{KPI 4.1.4}. According to the EMF Guidelines (South Africa, 2006:14; 2012:15) both environmental opportunities and constraints must be identified and used to inform the delineation of management zones. Environmental opportunities refer to those areas where development opportunities can be encouraged while environmental constraints refer to those areas that are sensitive to impacts. It was, however, found that most EMFs neglected to reflect on opportunities ^{KPI 4.2.2} and were generally more constraint orientated ^{KPI 4.2.1}. This would imply that most cases neglected the full spectrum of sustainable development and was actually anti-development orientated. Except for one case, most cases did not present a scientifically sound and defensible approach to the delineation of environmental management zones ^{KPI 4.2.3} while none of them effectively documented all methodological steps used in the approach ^{KPI 4.2.4}. The explanation of scientific methods used for spatial analysis was generally insufficient and not well

documented. The spatial analysis component forms the core of any EMF and it is crucial that the processes used to derive environmental management zones are transparent and scientifically sound.

Figure 7.4: KPI breakdown across all cases: Review area 4 (Spatial analysis)

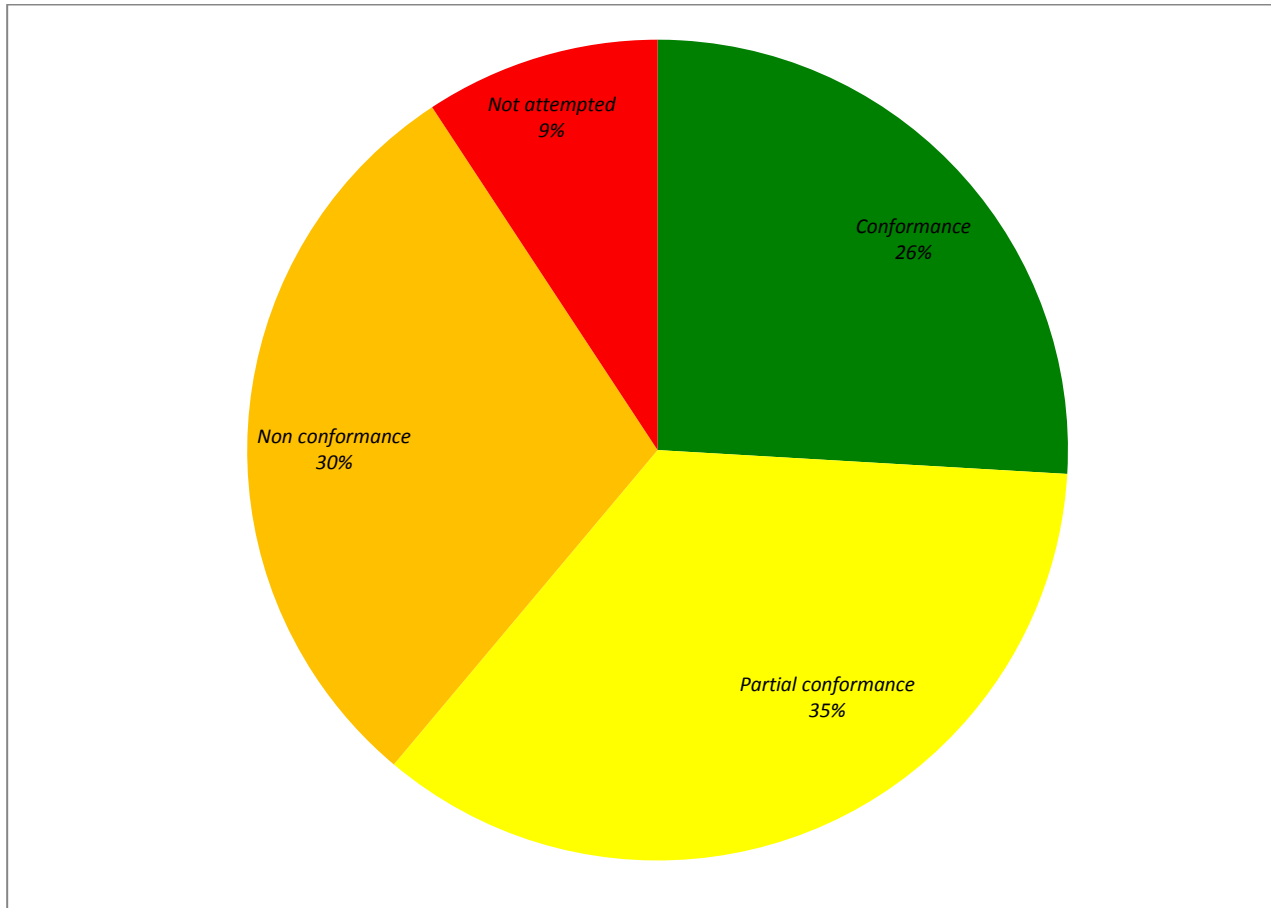


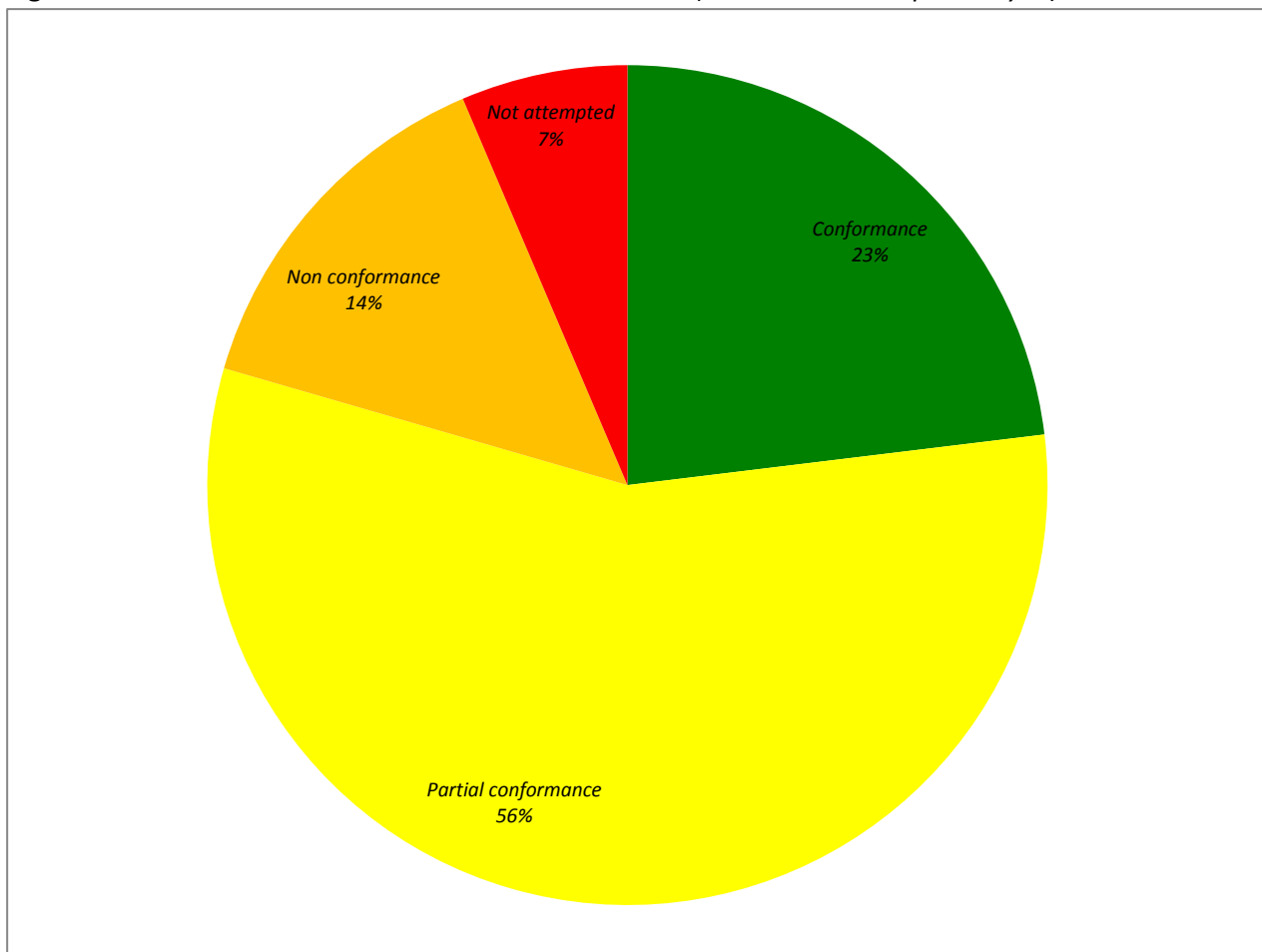
Table 7.4: Cross-case synthesis: Review area 4 (Spatial analysis)

Key performance areas (KPA)	Key performance indicators (KPI)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 4.1: Sensitivity analysis	KPI 4.1.1	Yellow	Yellow	Yellow	Green	Yellow	Green
	KPI 4.1.2	Yellow	Yellow	Yellow	Green	Red	Green
	KPI 4.1.3	Red	Red	Yellow	Green	Yellow	Green
	KPI 4.1.4	Yellow	Yellow	Yellow	Yellow	Yellow	Green
KPA 4.2: Delineation of environmental management zones	KPI 4.2.1	Yellow	Green	Green	Green	Yellow	Green
	KPI 4.2.2	Yellow	Yellow	Yellow	Yellow	Red	Yellow
	KPI 4.2.3	Yellow	Yellow	Yellow	Yellow	Yellow	Green
	KPI 4.2.4	Red	Yellow	Yellow	Yellow	Yellow	Yellow
	KPI 4.2.5	Green	Yellow	Yellow	Yellow	Yellow	Green
		Green	Yellow	Yellow	Red	Grey	
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			

7.2.5. Review area 5: Content – Status quo analysis

The assessment of the environmental *status quo*, i.e. current state of the environment, showed an average performance across all cases. A total of 23% of all indicators conformed to expectations while 56% only partially conformed (**Figure 7.5**). From the remainder, 14% of indicators did not conform while 7% were never attempted at all. The KPIs that showed similar performance across cases were KPIs 5.1.1, 5.2.1, 5.5.2, 5.5.3, 5.5.4 and 5.5.5. Others which had some variation, but which are also discussed, are KPIs 5.4.1 and 5.4.3 (**Table 7.5**).

Figure 7.5: KPI breakdown across all cases: Review area 5 (Content – status quo analysis)



Although all cases presented discussions on the bio-physical and socio-economical environments none fully conformed to expectations. In terms of the description of the bio-physical environment the most common gaps were discussions on soil, topography, water quality, groundwater, visual impacts and sensitive habitat types ^{KPI 5.1.1}. Although they were not always altogether excluded from the analysis they often lacked detail and were often not spatially reflected. The same trend was observed for the analysis of the socio-economic environment where most attributes were never spatially mapped ^{KPI 5.2.1}. Other

7.2.6. Review area 6: Content – Desired state of the environment

The assessment of the desired state of the environment (DSoE) generally performed much better than the analysis of the *status quo* of the environment and was the best performing review area of all. A total of 40% of all indicators conformed to expectations with another 48% partially conforming (**Figure 7.6**). Only 5% did not conform while another 5% were not attempted at all. The remaining 2% of indicators could not be determined objectively. The KPIs that showed similar performances across all cases were KPIs 6.1.2, 6.2.1 and 6.3.1 (**Table 7.6**). Strategic objectives expressing the desired state for specific environmental attributes were generally well presented across all cases ^{KPI 6.1.2}. These objectives were in most cases also clearly linked to the bio-physical and socio-economic attributes discussed in the *status quo* analysis ^{KPI 6.2.1}. This is important considering that the strategic objectives are meant to inform management guidelines on environmental priorities that have to be managed from a current state towards a desired state. The only major concern was that socio-economic priorities did not receive the same level of attention as did bio-physical priorities ^{KPI 6.3.1}.

Figure 7.6: KPI breakdown across all cases: Review area 6 (Content – Desired state of environment)

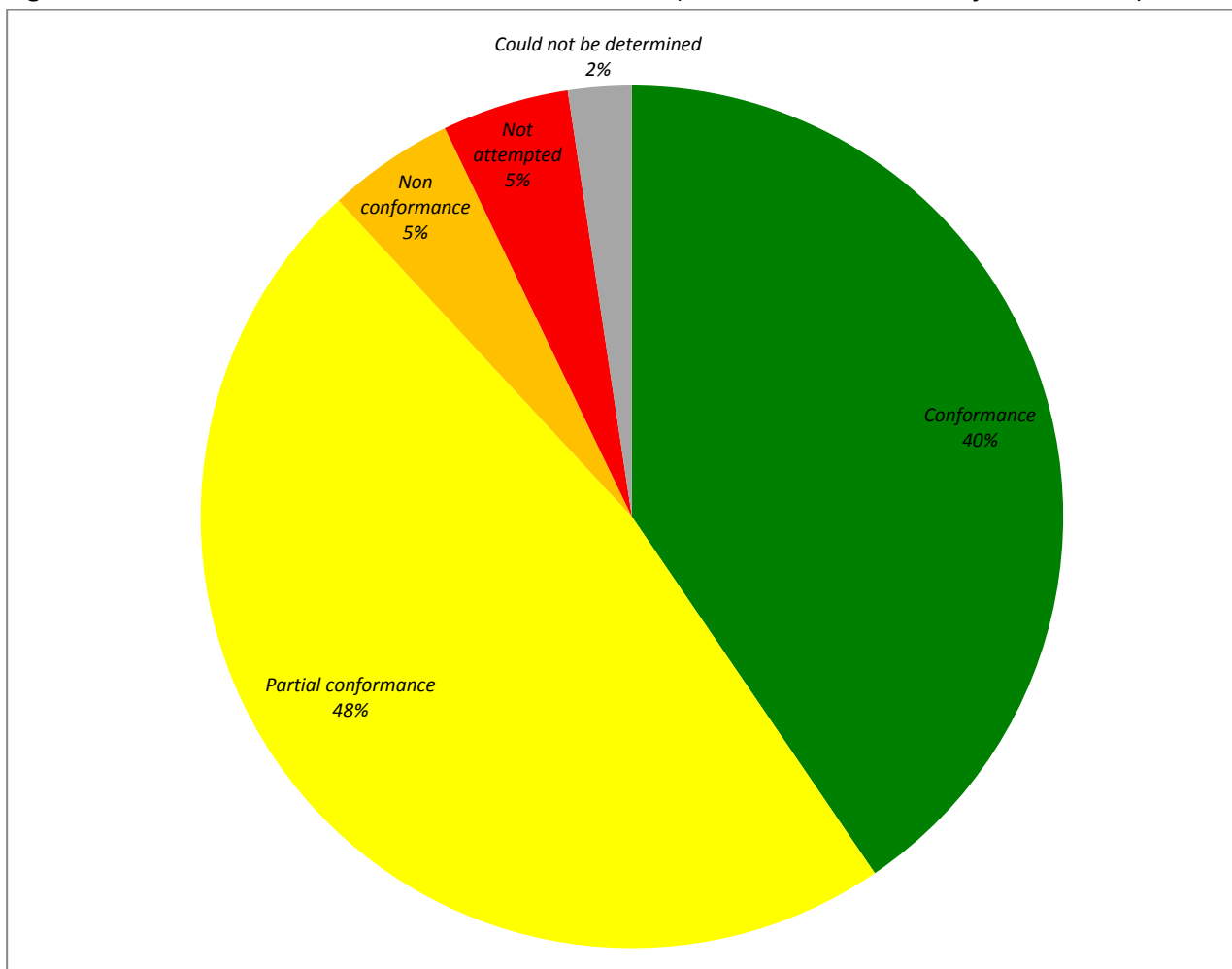


Table 7.6: Cross-case synthesis: Review area 6 (Content – Desired state of environment)

Key performance areas (KPA)	Key performance indicators (KPIs)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 6.1: Strategic objectives	KPI 6.1.1	Green	Green	Green	Green	Yellow	Yellow
	KPI 6.1.2	Green	Green	Green	Green	Yellow	Yellow
	KPI 6.1.3	Yellow	Green	Green	Yellow	Green	Red
KPA 6.2: Describing the desired state of the environment	KPI 6.2.1	Green	Yellow	Yellow	Green	Yellow	Yellow
	KPI 6.2.2	Green	Green	Yellow	Yellow	Red	Grey
	KPI 6.2.3	Green	Yellow	Green	Green	Yellow	Yellow
KPA 6.3: Priorities	KPI 6.3.1	Yellow	Yellow	Yellow	Green	Yellow	Yellow
		Green	Yellow	Orange	Red	Grey	
		Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined	

7.2.7. Review area 7: Content – EMF tool

The review showed that the final EMF tools were of average quality with 30% of indicators across all cases conforming to expectation and 39% partially conforming (Figure 7.7). Of the remainder 14% did not conform while 17% were never attempted. The KPIs that showed clear patterns across all cases were KPIs 7.3.2, 7.4.3 and 7.4.6 (Table 7.7). Other KPIs that showed more variation but which are also discussed in more detail were KPIs 7.2.3, 7.3.1 and 7.4.4.

Figure 7.7: KPI breakdown across all cases: Review area 7 (Content – EMF Tools)

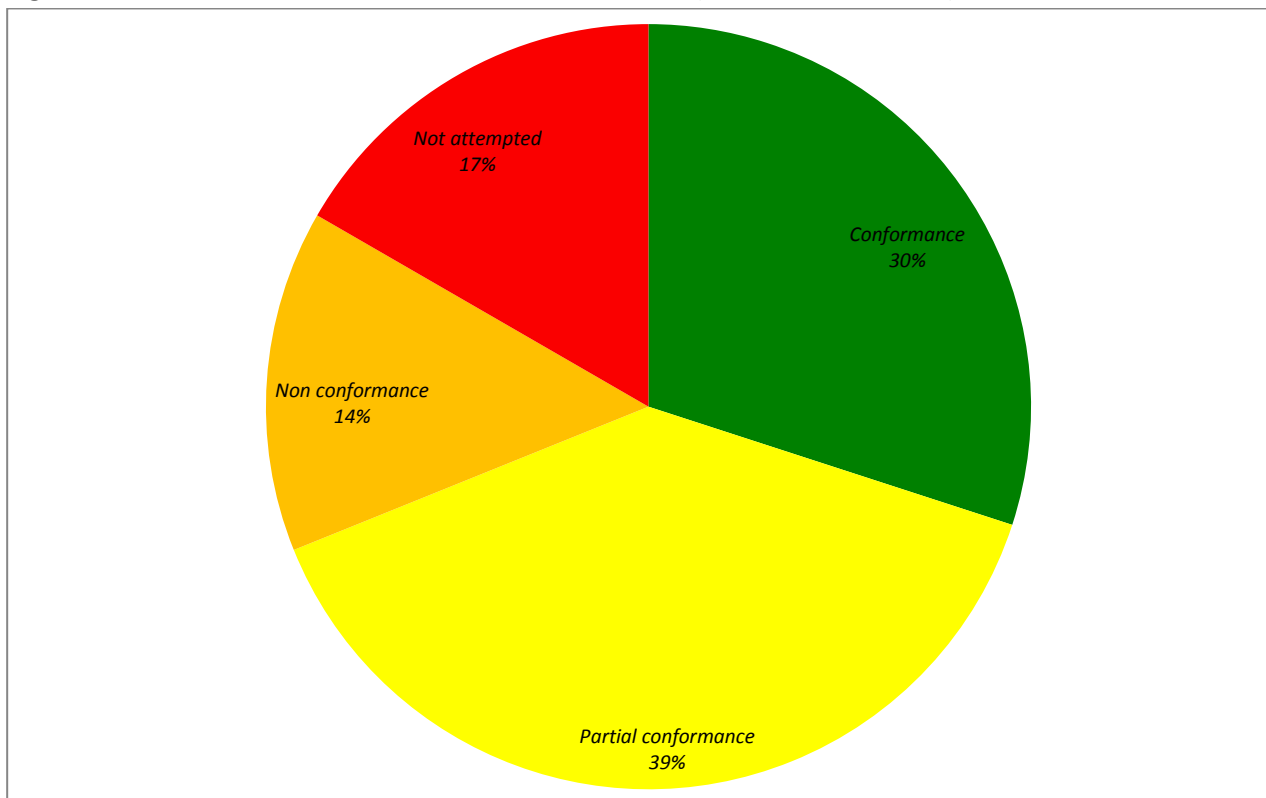


Table 7.7: Cross-case synthesis: Review area 7 (Content – EMF Tools)

Key performance areas (KPA)	Key performance indicators (KPI)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 7.1: Identification of impacts in relation to environmental attributes	KPI 7.1.1	Yellow	Orange	Green	Green	Orange	Green
	KPI 7.1.2	Yellow	Orange	Green	Red	Orange	Green
	KPI 7.1.3	Orange	Yellow	Green	Green	Yellow	Orange
KPA 7.2: Desirable and undesirable land uses	KPI 7.2.1	Green	Yellow	Yellow	Red	Red	Green
	KPI 7.2.2	Green	Yellow	Yellow	Green	Red	Green
	KPI 7.2.3	Yellow	Red	Red	Orange	Red	Green
KPA 7.3: Thresholds, limits and cumulative impacts	KPI 7.3.1	Yellow	Orange	Yellow	Red	Yellow	Red
	KPI 7.3.2	Red	Red	Red	Yellow	Red	Red
	KPI 7.3.3	Yellow	Yellow	Yellow	Red	Yellow	Orange
KPA 7.4: Management zones guidelines	KPI 7.4.1	Green	Yellow	Green	Green	Yellow	Yellow
	KPI 7.4.2	Green	Yellow	Green	Green	Yellow	Yellow
	KPI 7.4.3	Green	Green	Green	Yellow	Yellow	Green
	KPI 7.4.4	Green	Orange	Orange	Yellow	Orange	Yellow
	KPI 7.4.5	Yellow	Orange	Yellow	Yellow	Yellow	Green
	KPI 7.4.6	Yellow	Yellow	Yellow	Green	Yellow	Green
		Green	Yellow	Orange	Red	Grey	
Conformance	Partial conformance	Non conformance	Not attempted at all		Could not be determined		

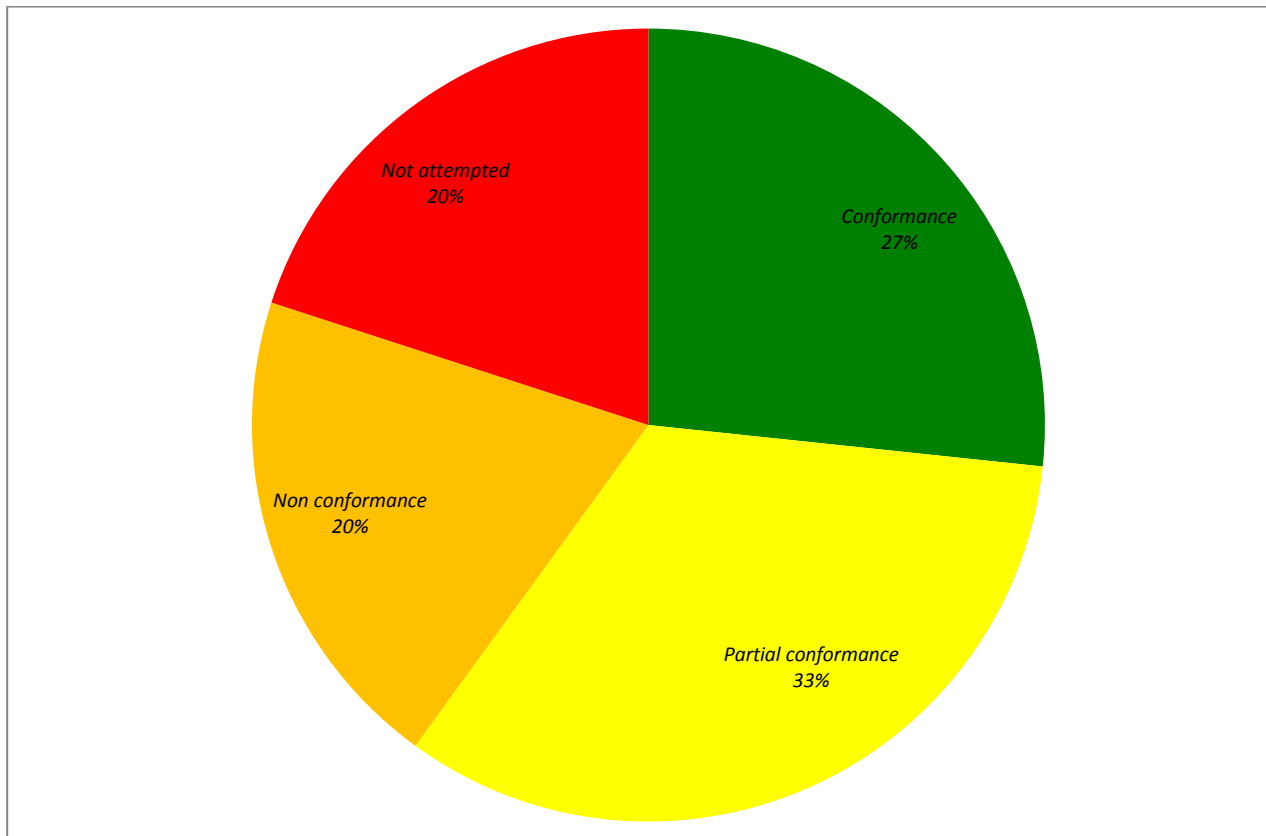
All cases dealt with management guidelines to inform the manner in which development applications should be managed within specific management zones ^{KPI 7.4.3}. Some of the guidelines however did not clearly relate to specific management zones which were problematic in terms of their future interpretation. Although all management guidelines attempted to deal with the existing decision making framework within which the EMF would operate, not all achieved effective integration ^{KPI 7.4.6}. It is important that EMF users understand the decision making context within which to apply the EMF to ensure its effective use and implementation. One area where all cases fell short was with the consideration of cumulative impacts ^{KPI 7.3.2}. Cumulative impacts were only partially considered in one case and never attempted in any of the other cases. It is a difficult concept to deal with at a strategic level due to information gaps and uncertainty as to the impacts that would be involved. To effectively deal with cumulative impacts the development of impact scenarios might be necessary relying on a thorough understanding of thresholds and limits which is not always readily available. None of the cases thoroughly dealt with thresholds and limits associated with specific environmental attributes ^{KPI 7.3.1}. Another area where most cases struggled was with the unlocking of opportunities in the environment ^{KPI 7.4.4}. Constraints and limitations of the environment were almost always adequately dealt with while opportunities were largely ignored. Considering the status of an EMF as a sustainable development orientated tool the promotion of development opportunities through management guidelines is equally

as important as the protection of sensitive environmental features. This could also be achieved through the de-listing of specific activities within specific environmental management zones. Half of the cases did not consider the listing or de-listing of activities at all ^{KPI 7.2.3}. The lack of detail on listing and de-listing can most likely be ascribed to uncertainties associated with the actual listing and de-listing process and the manner in which EMF should inform this process.

7.2.8. Review area 8: Content – Implementation strategy

An implementation strategy is supposed to give guidance on the manner in which an EMF must be implemented. The development of implementation strategies performed poorly with only 27% of indicators across all cases conforming to expectations while 33% partially conformed. From the remaining 40% of indicators half did not conform while the other half was never attempted (**Figure 7.8**).

Figure 7.8: KPI breakdown across all cases: Review area 8 (Content – Implementation strategy)



The ratings showed considerable variation across cases as can be seen in **Table 7.8**. Some KPIs did however reveal some valuable insights and are furthermore discussed. They are KPIs 8.1.1, 8.1.2 and 8.2.2. Although one case succeeded, most cases struggled to describe the relationship between the EMF and other strategic planning tools ^{KPI 8.1.1}. A big opportunity for EMF is to inform other strategic planning

tools, something which to date has been largely neglected. Two cases successfully described the roles and responsibilities of government departments in the implementation of the respective EMFs while the remaining four cases struggled with this ^{KPI 8.1.2}. The delineation of responsibilities is important to guide role-players in the implementation of the EMF. An area where most cases – except for case number six – failed was the development of a monitoring plan and framework ^{KPI 8.2.2}. Monitoring entails the constant evaluation of the implementation of the EMF and should be planned for from the onset of the EMF.

Table 7.8: Cross-case synthesis: Review area 8 (Content – Implementation strategy)

Key performance areas (KPA)s	Key performance indicators (KPI)s	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 8.1: Planning for implementation	KPI 8.1.1	Yellow	Yellow	Orange	Yellow	Orange	Green
	KPI 8.1.2	Orange	Orange	Yellow	Green	Orange	Green
	KPI 8.1.3	Green	Green	Yellow	Green	Orange	Yellow
KPA 8.2: Revision schedule	KPI 8.2.1	Red	Yellow	Yellow	Green	Red	Yellow
	KPI 8.2.2	Red	Red	Yellow	Red	Red	Green
		Green		Yellow		Orange	
		Yellow		Orange		Red	
		Orange		Red		Grey	
Conformance	Partial conformance	Non conformance		Not attempted at all		Could not be determined	

7.2.9. Review area 9: Training

Due to the often technical nature of EMFs, the training of potential users in the use of the final EMF tool is very important. Training involves both discussions on the theoretical background of the EMF as well as the practical use of the EMF tool. Training performed poorly with 33% of all indicators never being attempted while 42% only partially conformed to expectations (**Figure 7.9**). Only 8% of indicators conformed to expectations while the status of the remaining 17% could not be established objectively. KPI 9.1.1 and KPI 9.1.2, as seen in **Table 7.9**, are now discussed. Although some attempts were made at training users it was established that the key stakeholders were not always present during training sessions and that training sessions were often only held once and mostly through one-day workshops ^{KPI 9.1.1}. Training material was further not well developed in any of the cases ^{KPI 9.1.2}. Issues that further hampered training sessions were the high turnover of government employees which resulted in trained individuals changing jobs after receiving training and untrained individuals replacing them. Some training experiences pointed to the problem that some potential users were unfamiliar with the concept of ‘spatial thinking’ and struggled to relate information on maps to the real world. It was also uncovered that some service providers feel that training should not necessarily be provided and that stakeholders should rather be involved throughout the EMF development process and get acquainted with the EMF in

that manner. This is however not a reasonable request as all users cannot actively be involved and stakeholder meetings don't necessarily cover the technical aspects related to the use of the tool.

Figure 7.9: KPI breakdown across all cases: Review area 9 (Training)

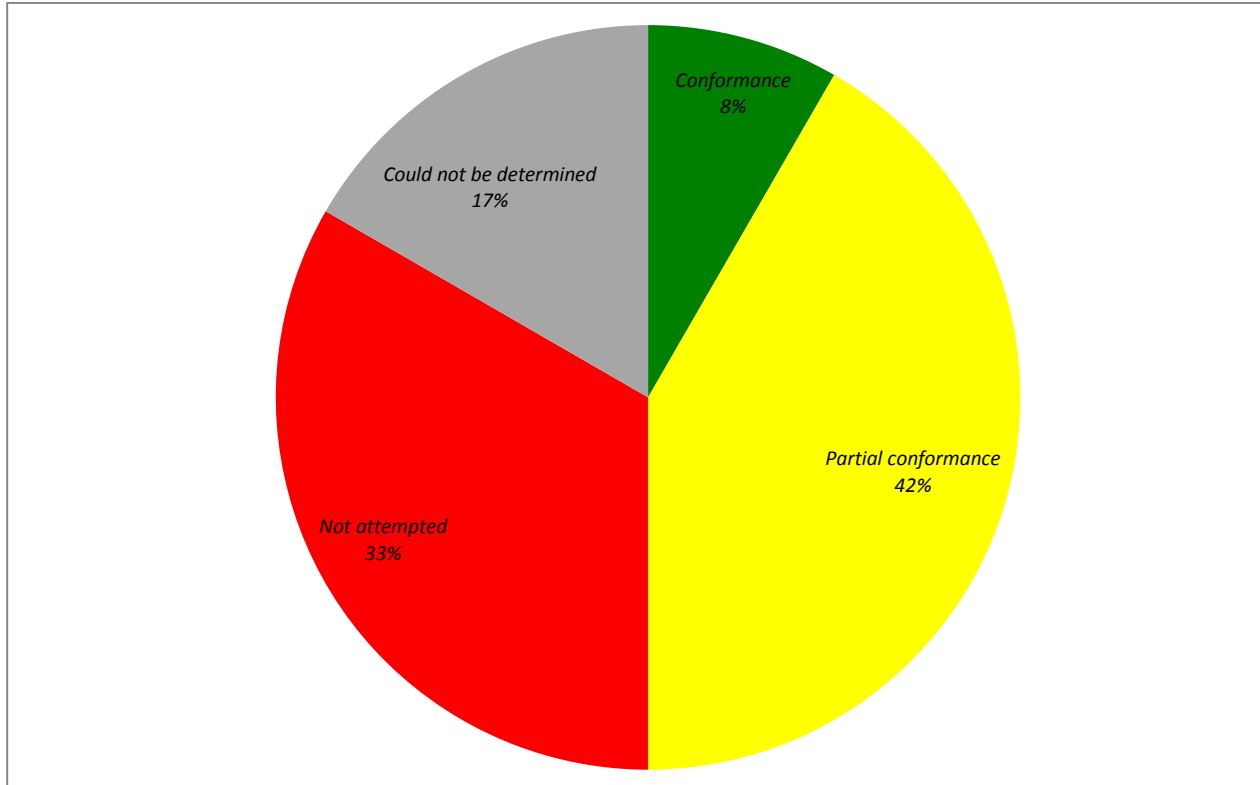


Table 7.9: Cross-case synthesis: Review area 9 (Training)

Key performance areas (KPA)	Key performance indicators (KPI)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 9.1: Training	KPI 9.1.1	Yellow	Yellow	Grey	Yellow	Red	Yellow
	KPI 9.1.2	Red	Yellow	Grey	Green	Red	Red
		Green	Yellow	Orange	Red	Grey	
		Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined	

7.2.10. Review area 10: Deliverables

Deliverables were generally well met with 46% of all indicators conforming to expectations while another 33% partially conformed (**Figure 7.10**). Of the remainder 13% did not conform while 8% were never attempted. The indicators that showed similar performance across all cases were KPI 10.1.1 and 10.2.2 (**Table 7.10**). For all cases a comprehensive set of documentation was submitted to the relevant authorities for approval and eventual adoption ^{KPI 10.1.1}. However, where the cases struggled was with the

delivering of the spatial component of the EMFs. Although most cases submitted the spatial information in an acceptable GIS format, the GIS-tools through which the spatial data was made accessible were not necessarily easily accessible or user-friendly ^{KPI 10.2.2}. It was generally found that a certain level of GIS expertise was required to open and use the spatial information. In some cases the spatial information required the use of proprietary software for which licences first had to be procured before the EMF tool could actually be used.

Figure 7.10: KPI breakdown across all cases: Review area 10 (Deliverables)

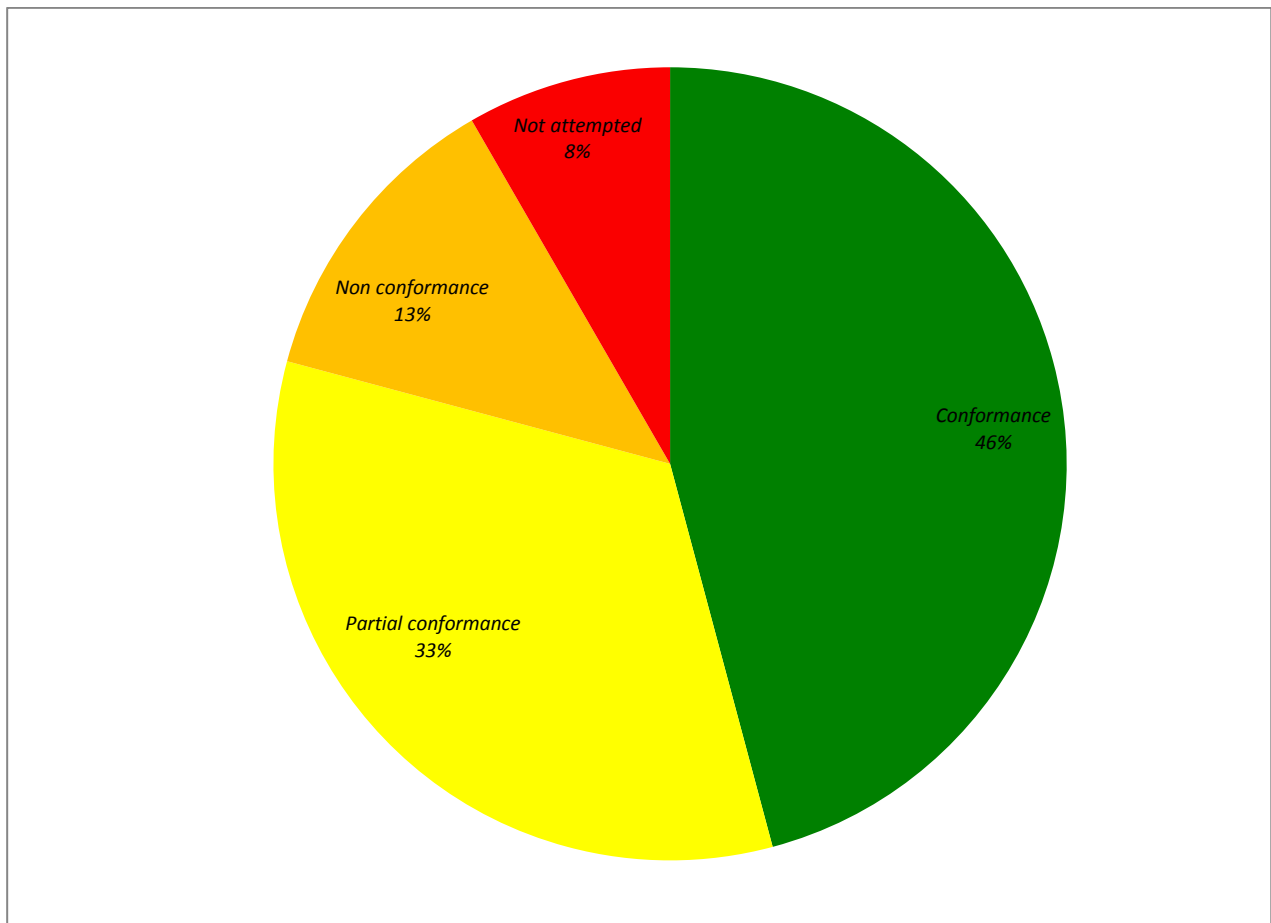


Table 7.10: Cross-case synthesis: Review area 10 (Deliverables)

Key performance areas (KPA)	Key performance indicators (KPI)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 10.1: Documentation	KPI 10.1.1	Green	Green	Green	Green	Green	Green
KPA 10.2: Spatial product	KPI 10.2.1	Green	Yellow	Green	Green	Yellow	Yellow
	KPI 10.2.2	Yellow	Orange	Yellow	Yellow	Orange	Yellow
	KPI 10.2.3	Red	Yellow	Green	Green	Red	Orange
		Green	Yellow	Orange	Red	Grey	
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			

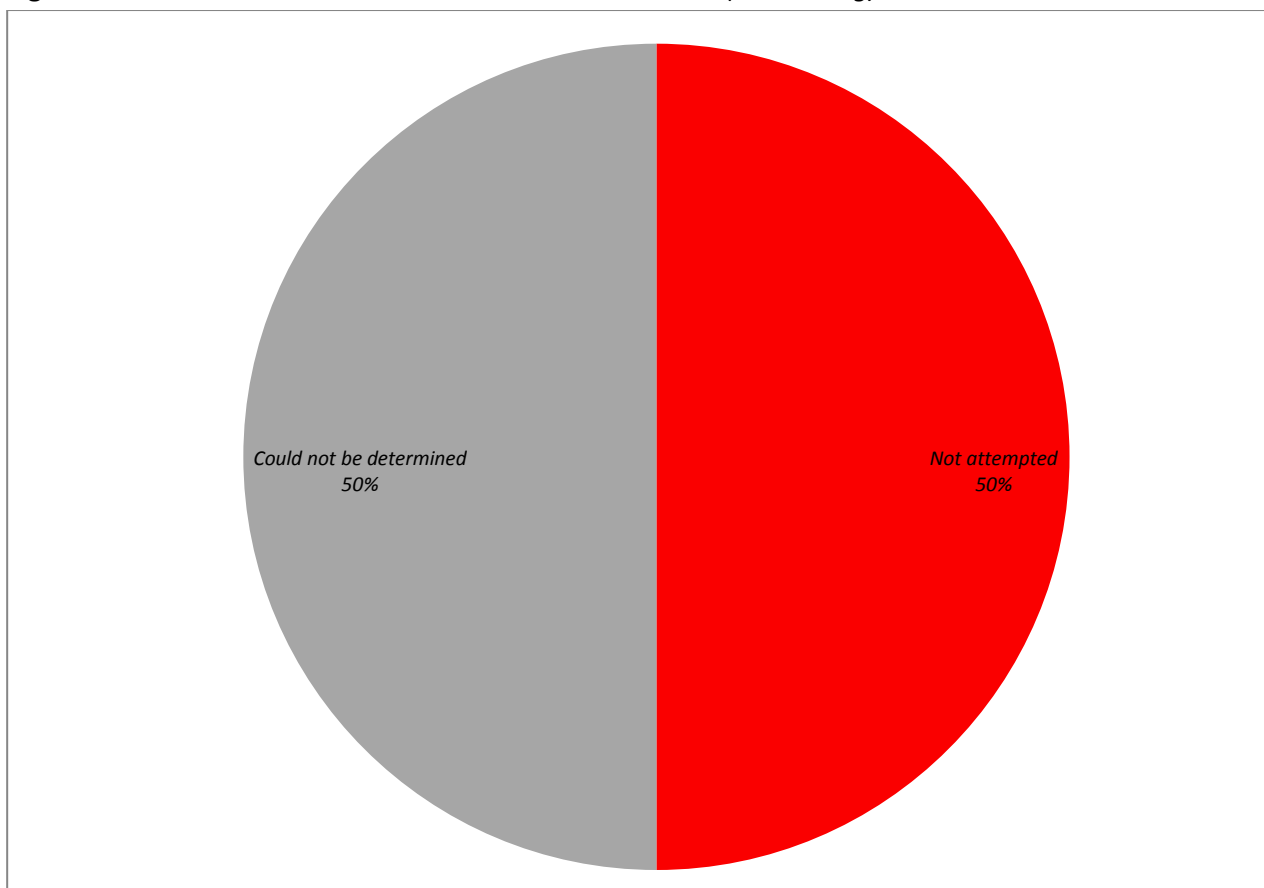
7.3. Direct outputs

The review areas evaluated to determine the direct outputs of the EMF performed poorly across all cases. The three review areas that dealt with direct outputs are now discussed.

7.3.1. Review areas 11 & 12: Implementation and monitoring

EMF implementation showed an average performance with only 33% of indicators across all cases conforming to expectations, while 29% partially conformed. Of the remainder of indicators, 17% did not conform to expectations, while 13% were never attempted. The final 8% could not be established (**Figure 7.12**). Monitoring on the other hand performed very poorly with 50% of indicators across all cases never being implemented and the other 50% being undetermined (**Figure 7.11**). The indicators that showed clear patterns across all cases were KPIs 11.1.1 and 12.1.2 (**Tables 7.11 and 7.12**).

Figure 7.11: KPI breakdown across all cases: Review area 11 (Monitoring)



Some of the general findings from other KPIs are also reflected on to further inform the discussion. It was found that in most of the cases EMFs were formally adopted and gazetted ^{KPI 12.1.2} but it was also found that the formal adoption and publication of EMFs did not necessarily result in their effective

implementation. None of the six EMFs were successfully implemented at the local governmental level. The lack of implementation at local governmental level could be ascribed to a number of reasons. The first is that the formal adoption and publication process, which was run by either provincial or national government departments, often did not adequately include local government representatives in the process. The second issue pertained to the high turnover of staff in local governments and the inefficient transferal of institutional knowledge which resulted in many local government officials no being aware of the existence of particular EMFs. The final and most common reason was the lack of GIS infrastructure and capacity at the local governmental level which meant that the spatial component of the EMF was mostly inaccessible. It should however be noted that implementation performed better at the provincial governmental level, probably because they were more intimately involved in the development and adoption of the EMFs. Although partially implemented, none of the EMFs were actively being monitored to evaluate their use and impact ^{KPI 11.1.1}. As a result no official information was available to indicate to decision makers the effect that an EMF was having or not having.

Figure 7.12: KPI breakdown across all cases: Review area 12 (Implementation)

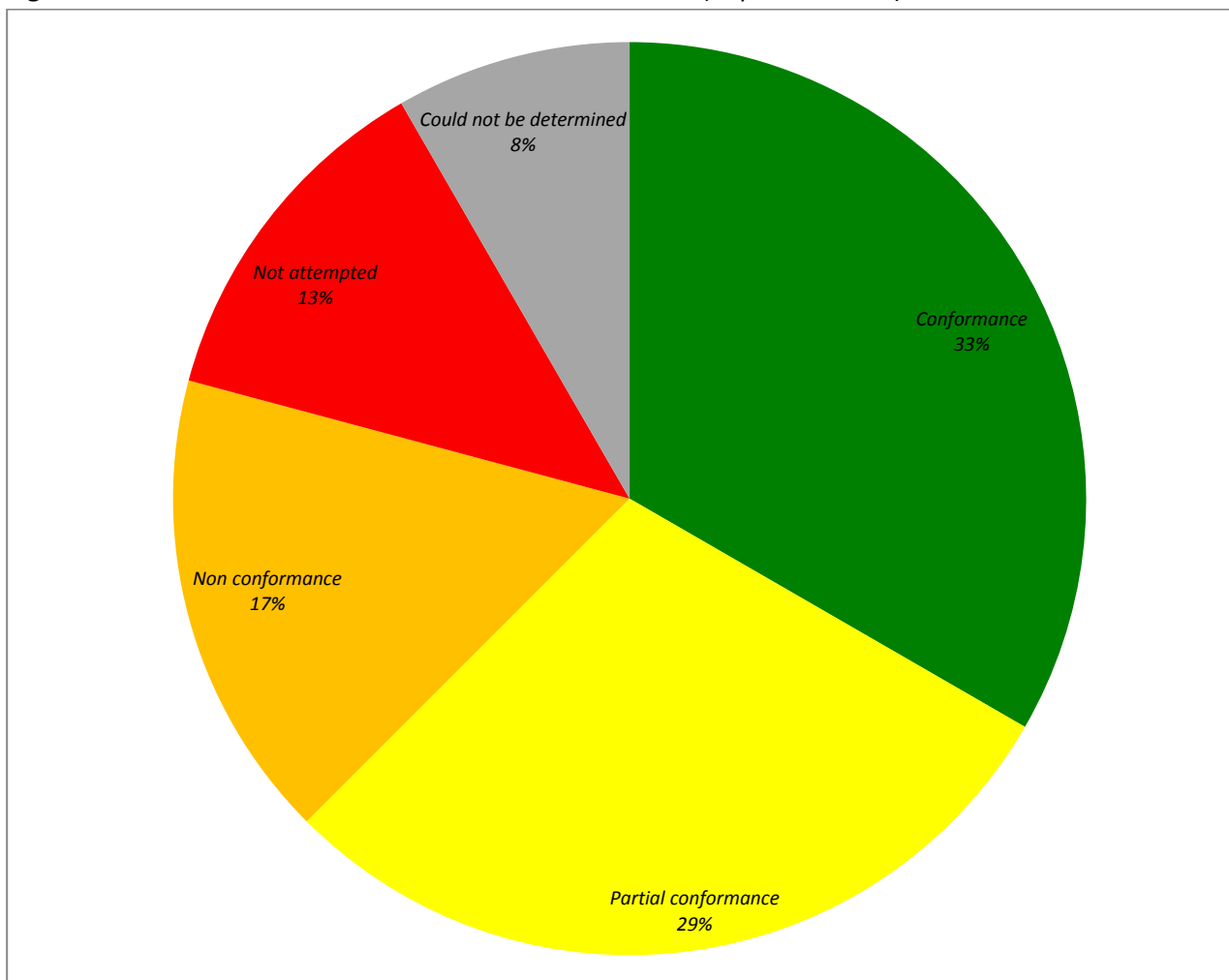


Table 7.11: Cross-case synthesis: Review area 11 (Monitoring)

Key performance areas (KPA)	Key performance indicators (KPI)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 11.1: Monitoring	KPI 11.1.1						
	KPI 11.1.2						
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			

Table 7.12: Cross-case synthesis: Review area 12 (Implementation)

Key performance areas (KPA)	Key performance indicators (KPI)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 12.1: Adoption	KPI 12.1.1						
	KPI 12.1.2						
KPA 12.2: Roles and responsibilities	KPI 12.2.1						
	KPI 12.2.2						
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			

7.3.2. Review area 13: Influencing decision making

The six cases performed very poorly in terms of their influence on decision making. Only 3% of indicators across all cases conformed to expectations while 50% only partially conformed. From the remainder, 36% did not conform while 11% were never attempted at all (**Figure 7.13**). The KPIs that showed clear similarities across all phases were KPIs 13.1.1, 13.1.2, 13.1.3, 13.1.4 and 13.2.2 (**Table 7.13**). It was established that EMFs were mostly used at the provincial governmental level where it was often used a screening tool for environmental authorisations and regarded as a ‘specialist opinion’ informing on the desirability of certain activities and the requirements for specialist studies ^{KPI 13.1.1 - 13.1.3}. It was, however, established that EMFs were not necessarily viewed as legally binding by some decision makers. Furthermore, none of the EMFs had any actual effect on the listing or de-listing of activities in their areas of jurisdiction ^{KPI 13.1.4}. Although some EMFs did make proposals towards the exemption of EA requirements within specific areas these proposals were never implemented. In terms of their effect on land-use decision making it was established that EMFs had very little influence ^{KPI 13.2.2}. Considering the lack of implementation at the local governmental level and the fact that land-use decision making is a function of local government in South Africa, this could be expected. The only impact that EMFs had on land-use planning was through the influence it had on SDFs in some cases.

7.4.1. Review area 14: Achievement of sustainable development goals

Overall the EMFs did not perform very well in terms of the achievement of sustainable development goals. None of the indicators conformed to expectations while 42% did not conform and 58% only partially conformed (**Figure 7.14**). Both indicators shown in **Table 7.14** are discussed. Some stakeholders observed that the influence that some EMFs had on the development of SDFs might contribute to both sustainable development and environmental protection ^{KPA 14.1}. The argument would be that the environmentally sensitive areas reflected in an EMF would – if reflected in an SDF – result in less development/environmental protection conflicts and more sustainable land-use patterns. Another indirect effect might be the environmental awareness that was raised amongst stakeholders during the development of the EMF. Information that was not necessarily known to stakeholders was made available and could have influenced the manner in which they interacted with the environment. This potential effect was only speculated and could not be established.

Figure 7.14: KPI breakdown across all cases: Review area 14 (Sustainable development)

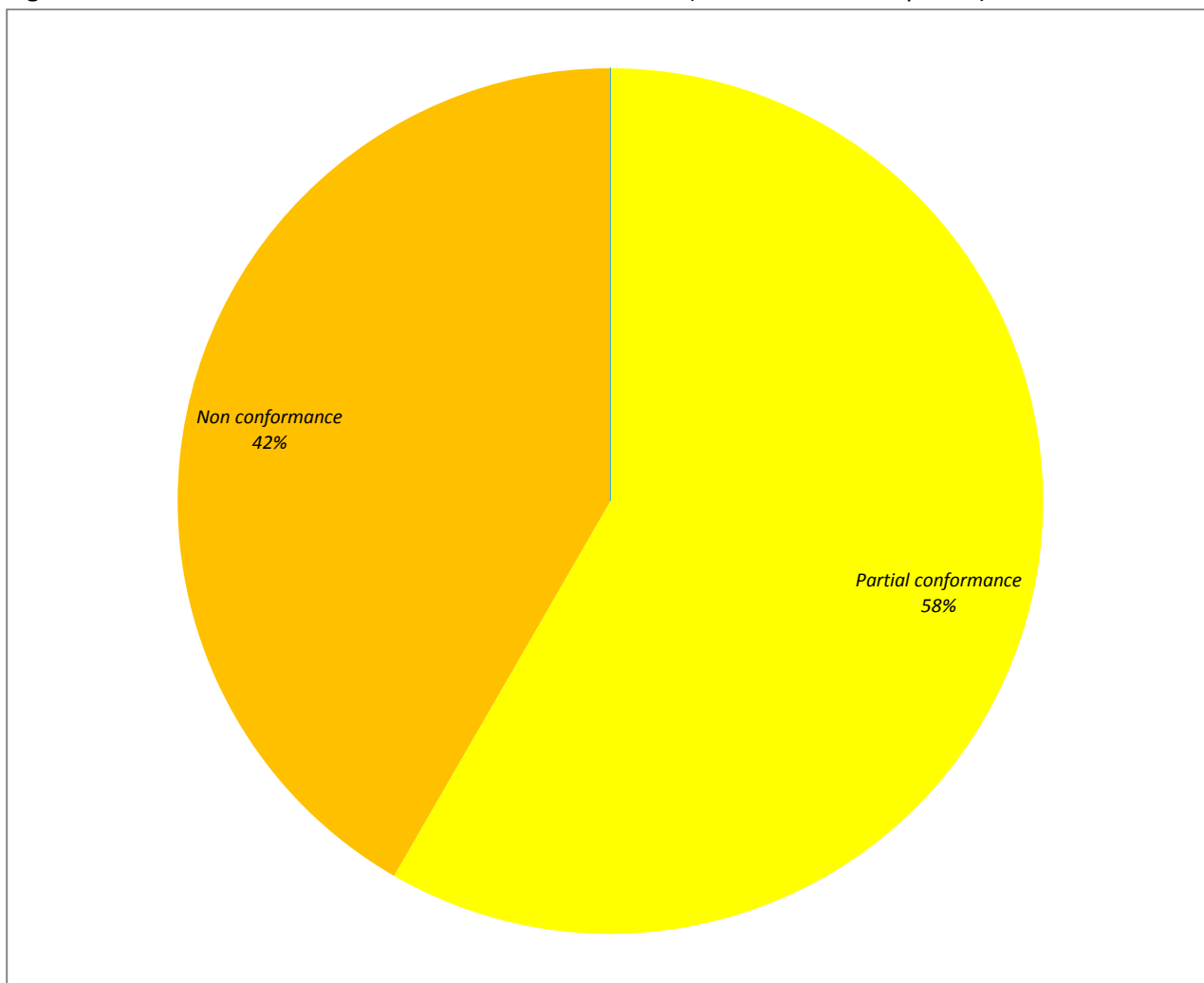


Table 7.14: Cross-case synthesis: Review area 14 (Sustainable development)

Key performance areas (KPA)	Key performance indicators (KPIs)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 14.1: Sustainable development and environmental protection	KPI 14.1.1						
	KPI 14.1.2						
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			

7.5. Relationships between EMF components

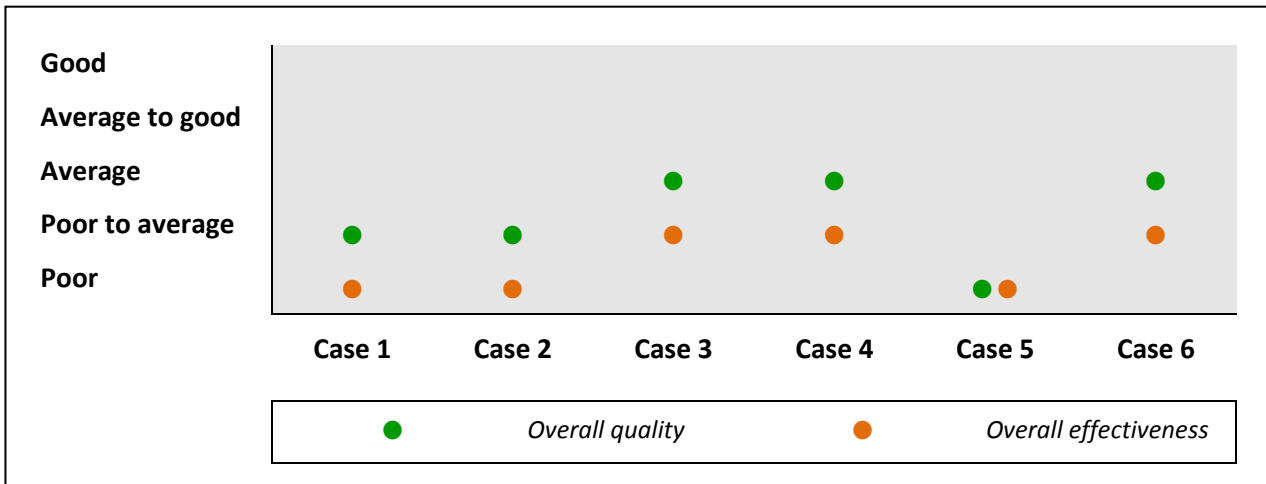
Having discussed the performances of the individual review areas across all cases, the relationship between EMF components is now discussed. **Table 7.15** lists the overall ratings for the fourteen review areas across all cases. The significant relationships that emanated from **Table 7.15** (see also **Annexure E**) are shown in **Figures 7.15** to **7.22** and are subsequently discussed.

Table 7.15: Overall ratings for review areas

Review area	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
General process	Average to good	Average	Average to good	Average	Average	Average to good
Public participation process	Average	Average to good	Average to good	Average	Poor to average	Average
Data management	Poor	Poor	Poor to average	Poor to average	Poor	Average
Spatial analysis	Poor to average	Poor to average	Poor to average	Average to good	Poor to average	Good
Status quo analysis	Average	Average	Average	Poor to average	Average	Average
Desired state of the environment	Average to good	Average to good	Average to good	Average to good	Poor to average	Average
EMF tool	Average	Poor to average	Average	Average	Poor to average	Average
Implementation strategy	Poor to average	Average	Average	Average to good	Poor	Average
Training	Poor to average	Average	Not determined	Average to good	Poor	Poor to average
Deliverables	Average	Average	Good	Good	Average	Average
Overall quality	Poor to average	Poor to average	Average	Average	Poor	Average
Monitoring	Poor	Poor	Poor	Poor	Poor	Poor
Implementation	Average to good	Poor to average	Average to good	Average	Poor to average	Average
Influencing decision making	Poor	Average	Poor to average	Poor to average	Poor	Poor to average
Sustainable development and environmental protection	Poor	Poor to average	Average	Average	Poor	Average
Overall effectiveness	Poor	Poor	Poor to average	Poor to average	Poor	Poor to average

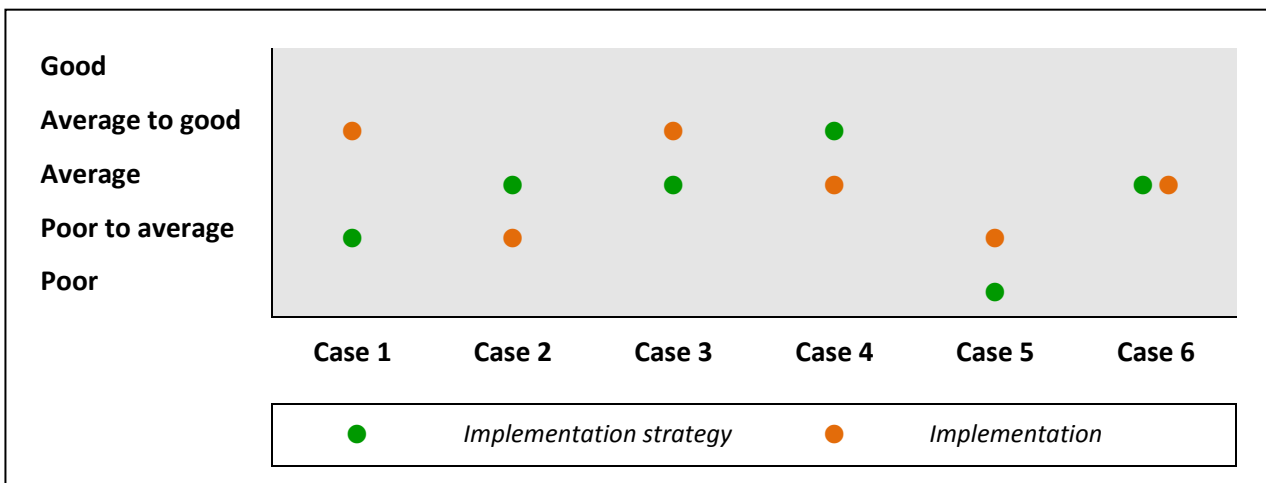
Quality and effectiveness performance showed a relationship across all six cases as illustrated in **Figure 7.15**. Overall EMF quality outperformed overall EMF effectiveness in all cases except for case five where both performed the same. This relationship suggests that the quality of the finalised EMF tool affects the extent to which it will be implemented and used to guide decision making.

Figure 7.15: Relationship between overall quality and effectiveness



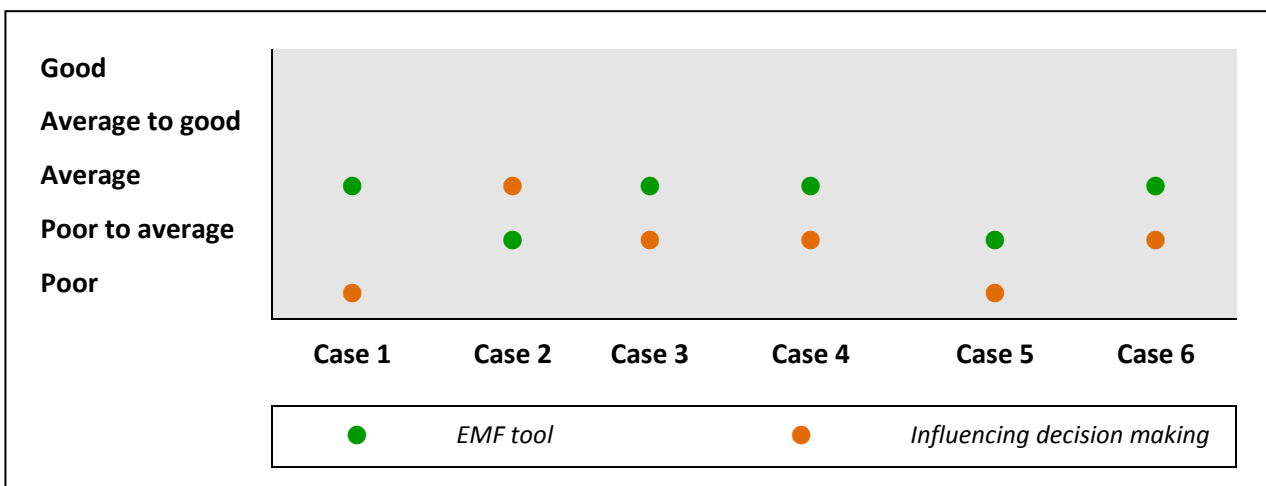
In terms of the successful implementation of an EMF it was found that the quality of the implementation strategy seemed to contribute towards the actual implementation of the EMF (**Figure 7.16**). In five of the six cases the quality of the implementation strategy and the effective implementation of the EMF were closely related. Although one did not always perform better than the other they were always closely related. This relationship suggests that it is important that implementation is planned for to assist in the effective implementation of an EMF.

Figure 7.16: Relationship between ‘implementation strategy’ and ‘implementation’



There further seemed to be at least some relationship between the quality of the final EMF tool and the influence it was having on decision making (**Figure 7.17**). In five of the six cases it was found that there was a relationship between the quality of the final EMF tool and the influence that the tool was having on decision making. In most cases ‘influence on decision making’ performed worse than the ‘EMF tool’, suggesting that the quality of the EMF tool (management guidelines etc.) affected the manner in which it could be used to influence decision making.

Figure 7.17: Relationship between ‘EMF tool’ and ‘influencing decision making’



Another factor that was found to influence the effect that EMFs were having was the quality and extent of training (**Figure 7.18**). In four of the six cases a relationship was found between the level of training and the effect that the EMF was having on decision making. In one case the status of EMF training could not be established. Although this relationship was not as clear as some of the others already discussed, when considering the findings discussed throughout **Chapter 5** it can be argued that the lack of capacity building and skills development hampers the effective use of the EMF.

There was also a relationship between the manner in which data management was conducted and the quality of the spatial analysis component in an EMF (**Figure 7.19**). In four of the six cases it was found that poor data management was closely related to the performance of the spatial analysis. This is however to be expected as the data is at the core of any spatial analysis process. It was further found that in turn the quality of the spatial analysis component also showed a relationship with the quality of the final EMF tool (**Figure 7.20**). This relationship was present in five of the six cases. Considering the spatial nature of EMFs and the fact that the management guidelines contained in an EMF should be linked to spatially explicit management area, this is also to be expected.

Figure 7.18: Relationship between ‘training’ and ‘influencing decision making’

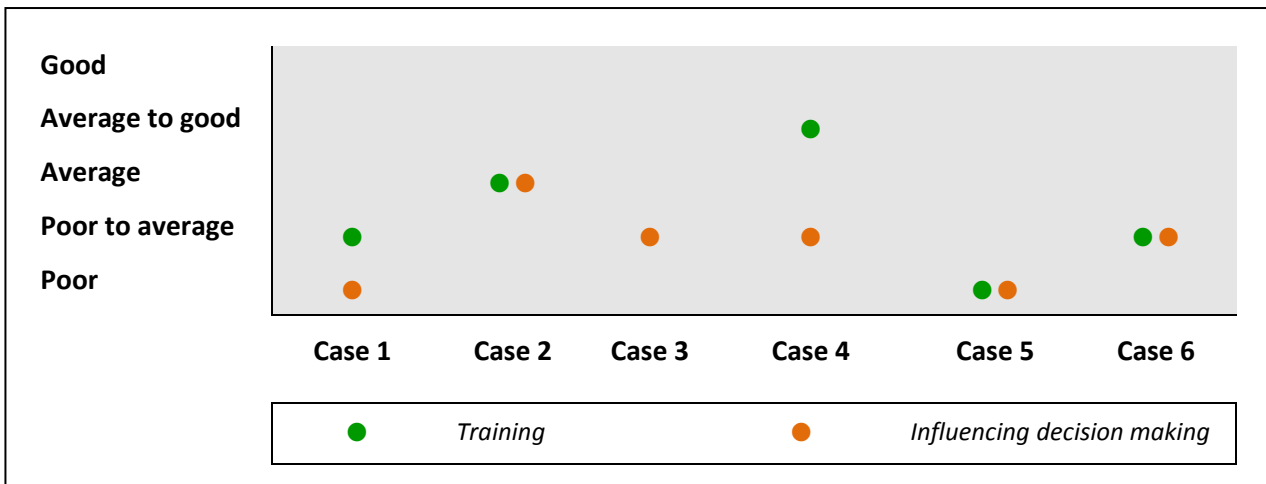


Figure 7.19: Relationship between ‘data management’ and ‘spatial analysis’

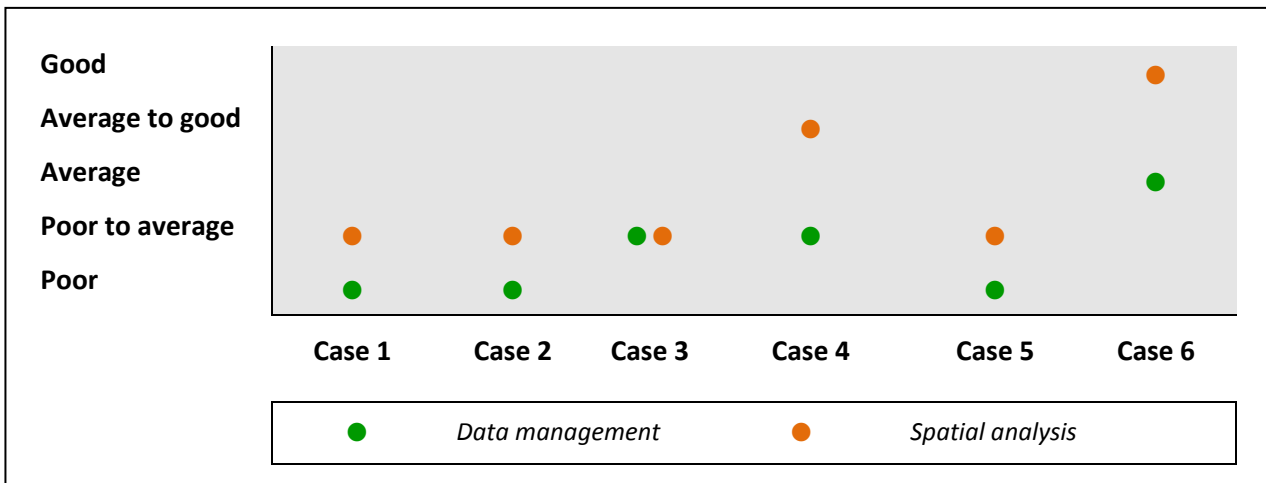
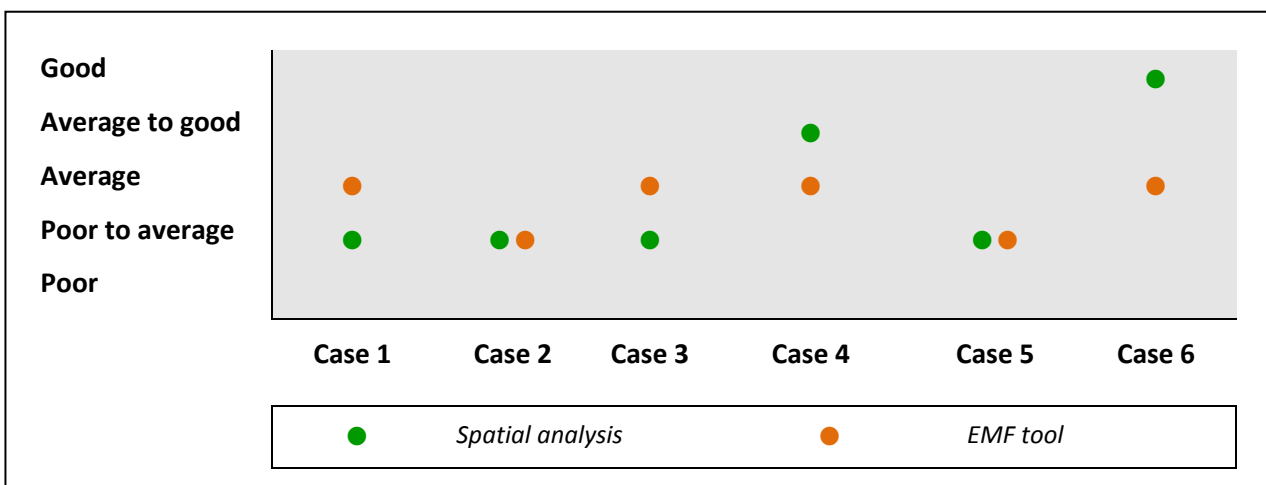


Figure 7.20: Relationship between ‘spatial analysis’ and ‘EMF tool’



A much clearer relationship was the relationship between the public participation process and the desired state of the environment component of the EMF (**Figure 7.21**). In all six cases the quality of the public participation process showed a clear relationship with the quality of the development of the DSoE. It was found that the quality of the public participation process contributed to the development of the DSoE component. Finally, a relationship was also found to exist between the quality of the DSoE component and the final EMF (**Table 7.22**). This pattern was observed for five of the six cases. Although many other factors also influenced the development of the final EMF tool this relationship suggests that the inputs obtained from the DSoE is one of the important factors that should be considered.

Figure 7.21: Relationship between ‘public participation’ and ‘desired state of the environment’

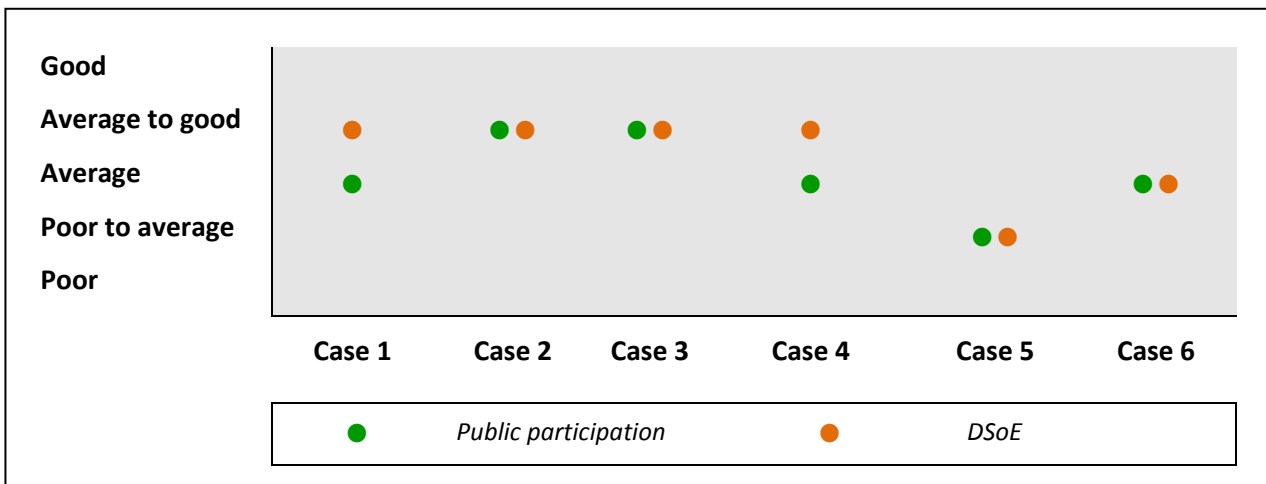
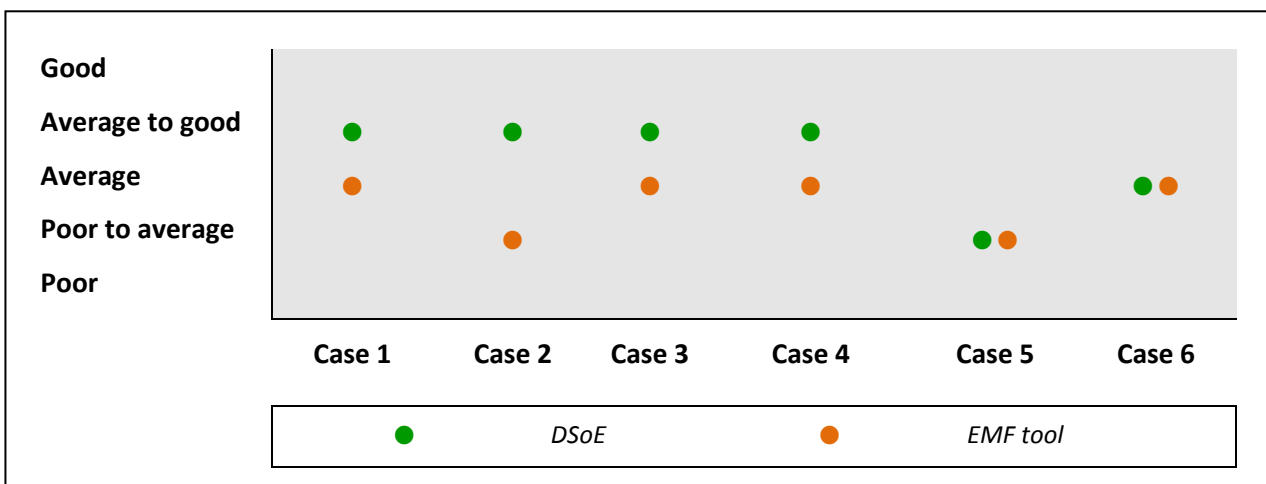


Figure 7.22: Relationship between ‘desired state of the environment’ and ‘EMF tool’



7.6. Final remarks

The cross-case analysis findings suggest that the ultimate EMF goal – which is to have influence on decision making – can be achieved if some key EMF components are thoroughly addressed. A well-managed data management process should contribute to the inclusion of data that is of suitable scale, quality and accuracy in the EMF process. The use of acceptable data should again positively influence the spatial analysis process through which the data will be analysed. A thoroughly planned public participation process on the other hand should assist in the involvement of all necessary stakeholders in the EMF development process and also facilitate their active contribution to its development. Input from stakeholders should ensure that important local knowledge is sourced, that all information sources are explored and that all applicable issues and priorities are identified. This again should contribute – along with the assessment of spatial data – to the drafting of a high quality DSoE vision and accompanying objectives. The combination of high quality DSoE and spatial analysis processes is expected to contribute to the development of a good quality EMF tool. A detailed implementation plan describing the implementation process and associated roles and responsibilities should further assist in the effective implementation of the EMF. Good quality training again should finally ensure that prospective users understand how to use the tool once implemented. The combination of a good quality EMF, effective implementation and sufficient training should result in an EMF having influence on decision making processes. This chapter applied a cross-case analysis approach through which patterns and relationships across all six cases were investigated. The discussed patterns and relationships assisted in answering the research question:

“What are the factors influencing the quality and effectiveness of EMFs?”

The findings from **Chapters 5 to 7** are now reflected on in **Chapter 8** to further distil and discuss the key factors that could be addressed in an effort to improve EMF practice.

Research Question	Method	Phase	Chapter
Q1 - What is an environmental management framework?	Literature review	Phase 2-1: Clarify the purpose and objectives of EMFs in South Africa	Chapter 3: Literature review
		Phase 2-2: Understanding EMF	
Q2 - What is the status and extent of Environmental management frameworks in South Africa?	Survey	Phase 3-1: Determine the status and extent of EMFs in South Africa	Chapter 4: The status and extent of Environmental management frameworks in South Africa
Q3 – What is the quality of EMFs?	Case study reviews: - Documentation reviews - Data and methodology review - Interviews	Phase 4-1: Determine the data and methodological requirements for developing an EMF	Chapter 5: Case study analysis: EMF quality
Q4 – What is the effectiveness of EMFs?		Phase 4-2: Assess the ‘real world’ effect that EMFs are having	Chapter 6: Case study analysis: EMF effectiveness
Q5 – What are the factors influencing the quality and effectiveness of EMFs?	Case study reviews: - Within-case analysis - Cross case analysis	Phase 4-3: Critically evaluate the <i>status quo</i> of EMFs in South Africa	Chapter 7: Cross case analysis
Research Aim			
To evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice		Phase 5-1: Synthesis and conclusion	Chapter 8: Synthesis and conclusions

CHAPTER EIGHT

SYNTHESIS AND CONCLUSION

8.1. Introduction

The overall aim of the research is:

To evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice
- Research aim -

The quality and effectiveness of EMFs in South Africa were successfully evaluated and discussed in **Chapters 5 to 7** following the approach discussed in **Section 2.5.6**. The manner in which the insights gained through this research could contribute to the improvement of EMF practice is now discussed. Talen (1997:577) in his paper on the evaluation of development plans argues that failure in planning can be attributed to either *internal* factors or *external* factors. Internal factors refer to the uncertainty that is faced while in the process of planning into the future while external factors refer to the factors that are beyond the control of the planner such as the socio-political environment. In the same way there are both internal and external factors that are influencing EMF practice in South Africa. The following sections start by discussing the internal factors followed by a reflection on the external factors. A conceptual framework aimed at improving the quality and effectiveness of EMF practice is then discussed followed by recommendations for future research.

8.2. Internal factors

Eight internal factors affecting EMF quality and effectiveness were derived from the findings presented in **Chapters 5 to 7**. These factors and the manner in which they could contribute to improved EMF practice are discussed in the following sections.

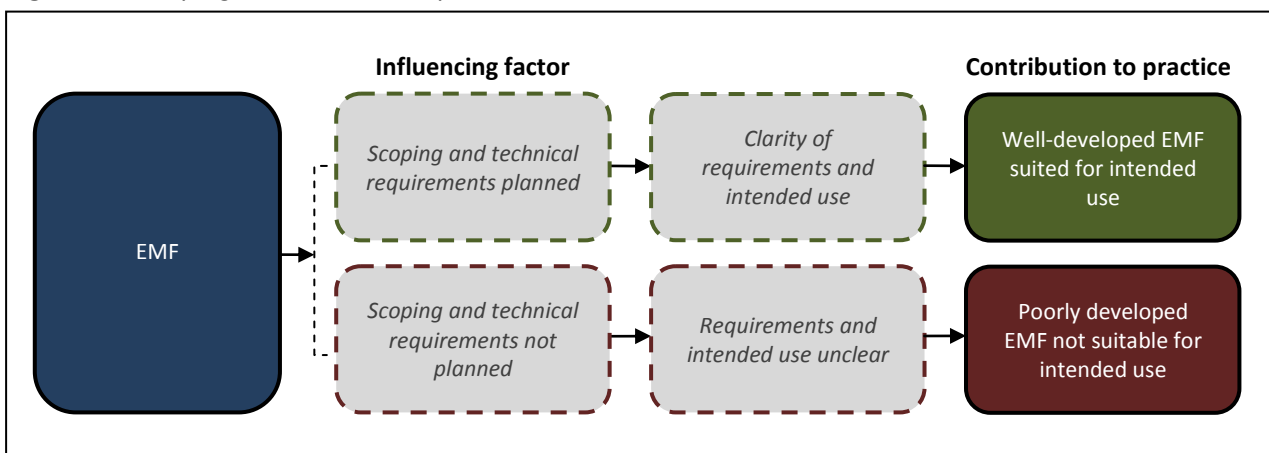
8.2.1. Importance of defining the scope and technical requirements

Defining the desired scope of any EMF, *i.e.* planning the development of the EMF tool, is fundamental to its success. The performance of KPA 1.3 which dealt with the scope and requirements of EMFs showed a relationship with the quality performance of EMFs (*see Section 7.2.1*). As Mtolo (pers. comm. 2015) pointed out in the case of EMFs:

“We should be clear on what the expectation of an EMF is and which components of say, sustainable development, it would address.”
(pers. comm. Mtolo, 2015)

The need for the EMF must therefore be clarified well before the commencement of its development. The clarification of the scope should ensure that the EMF is developed with a clear objective in mind from the outset. The importance of proper scoping and planning is confirmed by the EMF guidelines (South Africa, 2012:5) which calls for the scope of an EMF to be defined prior to the commencement of the EMF development process. According to the EMF guidelines, the clarification of the scope involves detail on requirements, such as the operational scale at which the EMF will be applied, the data requirements of the EMF (associated with a specific need) and the expected deliverables that should be produced. This research however found that EMFs are generally struggling with this process and that requirements are seldom clearly defined (see KPIs 1.3.1 – 1.3.5 in **Table 7.1**). **Figure 8.1** illustrates the importance of dealing with scope and technical requirements prior to EMF development.

Figure 8.1: Scoping and technical requirements

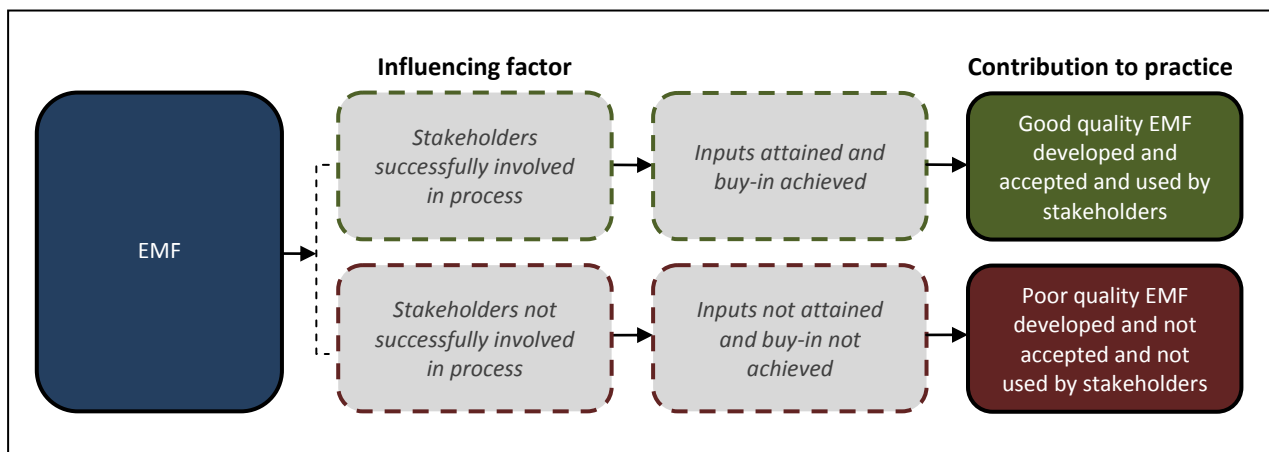


8.2.2. Actively involving all relevant stakeholders

Margerum and Born (1995:377) stated that interaction between stakeholders, the public and government is the key operational component of any IEM process as it ensures the successful implementation of plans and processes by generating the necessary buy-in (Margerum, 1999:152). It was found in this research that there was often a relationship between the success of the overall public participation process, *i.e.* stakeholder engagement and consideration of inputs, and the quality of the DSoE (**Section 7.5, Figure 7.21**) which in turn showed a relationship with the quality of the EMF tool (**Section 7.5, Figure 7.22**). Although the research found that EMFs performed relatively well in terms of

the identification and involvement of key stakeholders (see KPAs 2.1 – 2.2 in **Section 7.2.2**) there were instances where EMFs failed to involve key sector departments such as the Department of Mineral Resources who was often not even aware of the existence of some EMFs (pers. comm. Nethwadzi, 2015). To avoid this scenario where stakeholders are not aware of an EMF and what it entails, proper planning has to be done to ensure the involvement of all possible stakeholders as called for by both the EMF regulations (South Africa, 2010:192) and the EMF guidelines (South Africa, 2012:21-23). Key stakeholders should be identified and approached with the necessary supporting documentation explaining the scope (**Section 8.2.1**) of the proposed EMF as well as the manner in which they should be involved in the process. Stakeholders important for the eventual implementation of the EMF should also be approached at this stage to ensure that their buy-in is achieved from the beginning.

Figure 8.2: Stakeholder involvement



Successful stakeholder engagement should promote buy-in into the EMF and ensure that important information and 'local knowledge' that would inform the EMF is not lost (**Figure 8.2**). However, merely involving stakeholders in the process is not enough as their inputs should also be actively considered in the EMF – an area in which the evaluated EMFs did not perform very well (see KPAs 2.3 – 2.4 in **Section 7.2.2**). The involvement of stakeholders will only be effective if their inputs are considered and they are truly made part of the process. The active involvement of stakeholders is therefore an important consideration that should be prioritised and not neglected when developing an EMF.

8.2.3. Importance of data quality and scale

In spatial analysis the quality of the inputs are directly related to the quality of the spatial analysis outputs, *i.e.* the 'garbage in, garbage out' principle often referred to in computer science. The EMF guidelines confirm the applicability of this principle to EMFs and stress the importance of using data of

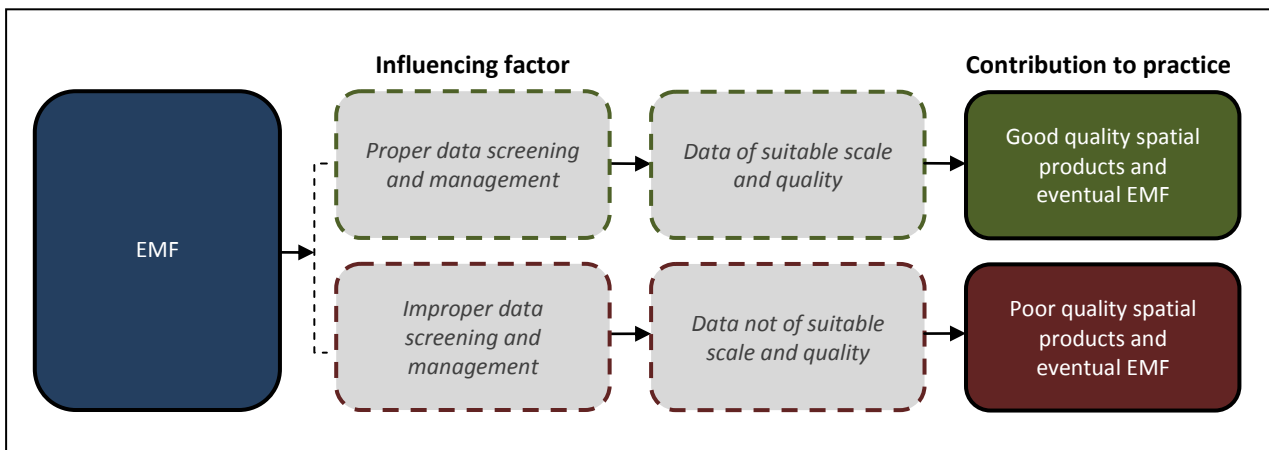
suitable quality and scale in analysis (South Africa, 2012:6-7). This research however found that EMFs struggled to adhere to this requirement and overall performed poorly in terms of data management (see KPAs 3.1 – 3.3 in **Section 7.2.3**). Although it should be noted that the EMF guidelines prescribes the use of datasets at arguably unrealistic scales³ ranging from 1:1,000 – 1:5,000, EMFs could still adhere to the principle of using good quality data albeit at a scale of roughly 1:50,000 which is realistic and achievable. The research showed that there was a relationship between the quality of data inputs and the spatial analysis results (**Section 7.5, Figure 7.19**) which seems to confirm the expectation that the quality of spatial analysis results will be affected by the quality of data inputs. It was further found that the quality of data inputs was influencing the use of EMFs as it was established that:

“...a major concern for EMFs [was] the scale, depth and accuracy of information which hampers the use of EMFs at project EA level.”

(pers. comm. Smit, D., 2015)

Figure 8.3 illustrates the contribution of data quality and scale to the development of EMFs. The proper screening of spatial datasets against scale, data quality and data accuracy requirements should be prioritised to ensure that only suitable data are used.

Figure 8.3: Data quality and scale



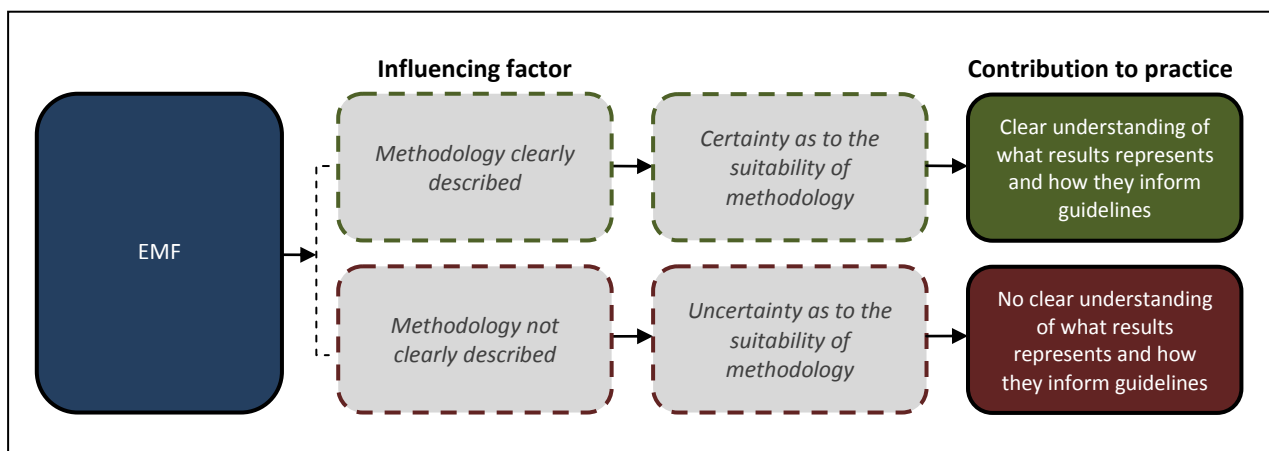
8.2.4. Disclosing methodological premise

The approach used when conducting spatial analysis should be clearly described to ensure that users and reviewers will have a clear understanding of the analysis and its subsequent results. Although the EMF guidelines (South Africa, 2012:13-16) do make some proposals related to the analysis of spatial data

³ Most spatial data in South Africa is available at spatial scales of 1:50,000 or smaller and are usually readily (and freely) available for use in EMFs. Generating datasets at the proposed scales of 1:1,000 to 1:5,000 for large EMF study areas will be very expensive and will result in an already costly tool becoming even more expensive.

the research found that the description and justification of the methodological approaches used were generally either very vague or not really described at all (see KPAs 4.1 – 4.2 in **Section 7.2.4**). Details on analysis techniques such as the type of overlay analysis that was used, the weightings that was applied and the criteria that was used during analysis were often not discussed in detail. Lack of clarity on the methodological approach used could lead to a situation where questions are raised pertaining to the reliability of spatial analysis results. The danger of modern spatial analysis software suites are that ‘out of the box’ analysis tools can be used with default settings without the user ever really knowing what the analysis tool is doing in the background or how the default settings will affect the results. This could lead to uncertainty and lack of confidence in results. It was found that there was a relationship between the quality performance of the overall ‘spatial analysis’ component and the quality performance of the final EMF tool (**Section 7.5, Figure 7.20**). **Figure 8.4** suggests that the disclosure of the methodological approach followed in the assessment of spatial information will contribute to a clearer understanding of the result and their link to the management guidelines. Unsuitable methodological approaches could however lead to a scenario where, even if good quality data is used, the results may be unusable and still regarded as ‘garbage’.

Figure 8.4: Methodology



8.2.5. Clarifying management guidelines

The management guidelines presented in an EMF will eventually be used to guide and influence decision making (South Africa, 2012:17). It was established that the quality of the set of management guidelines, which is a key component of the finalised EMF, and the manner in which these guidelines were linked to spatially demarcated management zones often affected the extent to which they influenced decision making (**Section 7.5, Figure 7.17**). **Figure 8.5** illustrates this understanding where well formulated

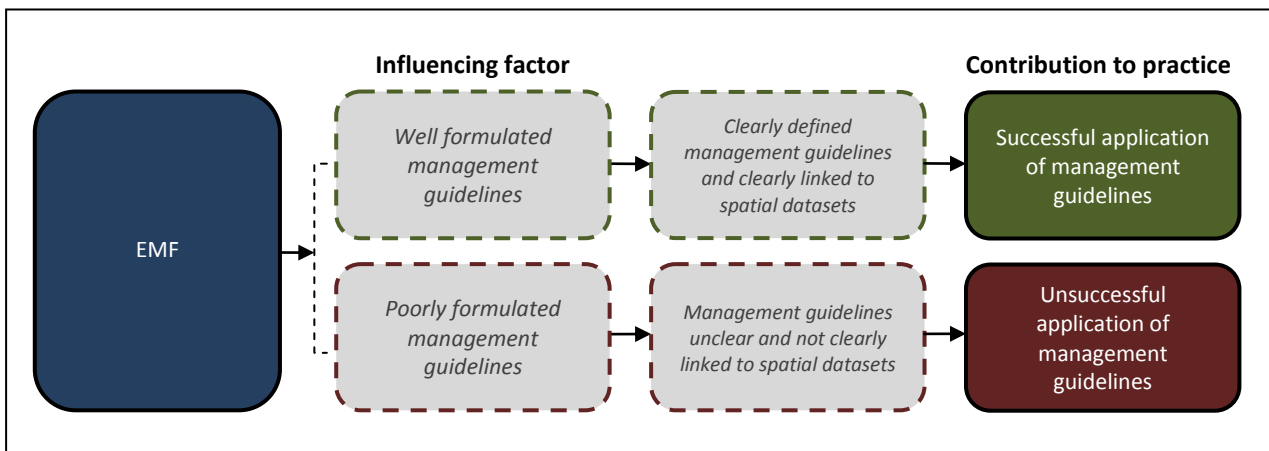
management guidelines which are clearly linked to specific geographic areas are expected to contribute to the decision-making processes or *vice versa*. This exact trend was found in the Garden Route case study (Section 6.6) which was the worst performing case study overall and considered to have very little effect on decision making. According to a key user of the particular EMF the reason why it was not being used extensively was because:

“...the management guidelines were not discussed in adequate detail and not clearly linked to geographical areas.”

(pers. comm. Swanepoel, 2015)

Management guidelines for the particular case were presented as ‘general guidelines’ and not explicitly linked to specific management zones. Overall the formulation of management guidelines did not perform very well (see KPIs 7.4.1 – 7.4.6 in Section 7.2.7) which might explain the lack of influence that EMFs had on decision making (see KPAs 13.1 – 13.2 in Section 7.3.2).

Figure 8.5: Clear management guidelines

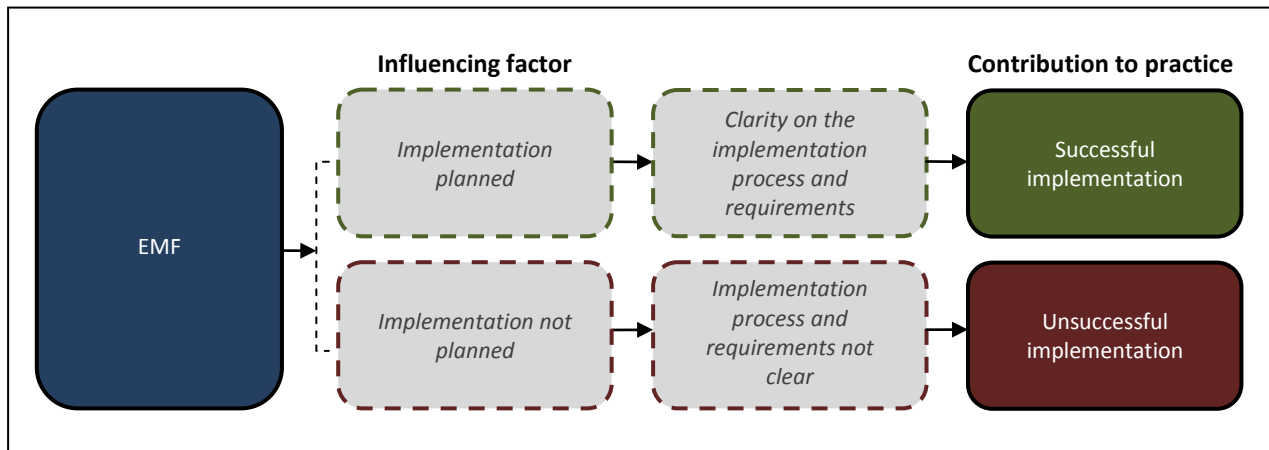


8.2.6. Importance of planning for implementation

For an EMF to be used, it first has to be successfully implemented and applied by the relevant role players (South Africa, 2012:23). The research suggested that the manner in which implementation is planned for affects the actual implementation of the EMF (Section 7.5, Figure 7.16). The overall poor planning for implementation (Section 7.2.8) might then explain the overall poor implementation and use of EMFs (Section 7.3.1). The implementation planning process involves the identification of key stakeholders that would be responsible for the implementation of the tool and the clarification of their

roles and functions during the implementation processes as required by the EMF guidelines (South Africa, 2012:23-25). If implementation is well planned through the clear description of the implementation processes and the role-players responsible for them, successful implementation is expected to be achieved (**Figure 8.6**). These observations agree with the view of Margerum (1999:160) that stakeholders should from the start support the implementation strategy and consider their roles in the successful implementation of an IEM tool.

Figure 8.6: *Planning for implementation*



8.2.7. Effective implementation

As discussed in **Section 8.2.6** an EMF first has to be implemented before it can be used to influence decision making. As was established for the case of the Magaliesberg Protection Environment EMF (South Africa, 2013b) an EMF that is not implemented and adopted does not have a clear legal standing. This observation agrees with that of Faludi (2000:299) who argued that in the case of spatial development plans, they first need to be implemented and ‘have teeth’ before they can influence decision making and truly be effective. The EMF guidelines also confirms the importance of implementing an EMF at all the relevant spheres of decision making at which they would be applied (South Africa, 2012:24-25). The findings from this research however suggest that EMFs are struggling with this and that the lack of implementation at all levels in many cases hampered the eventual use of the EMFs (**Section 7.3.1**). Implementation should further be initiated as soon as an EMF has been finalised to avoid a scenario where:

“...the slow process of approving and Gazetting EMFs is hampering their effective use and implementation.”

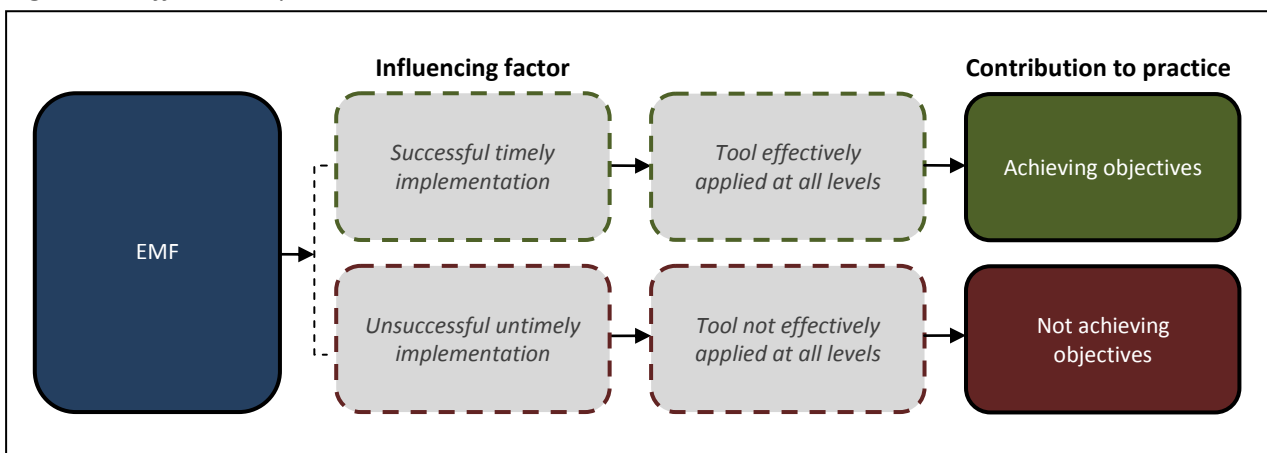
(pers. comm. Pienaar, 2015)

In many cases EMFs took more than ten months to implement (see **Section 4.3.6**), a time lag which was viewed by some implementers as:

“...a serious threat to the utilization and success of an EMF.”
(pers. comm. Mathebula, 2015)

If successful and timely implementation at all applicable levels of decision making can be achieved it is expected that an EMF will be more likely to achieve its objectives and be used for its intended purpose as illustrated in **Figure 8.7**.

Figure 8.7: *Effective implementation*



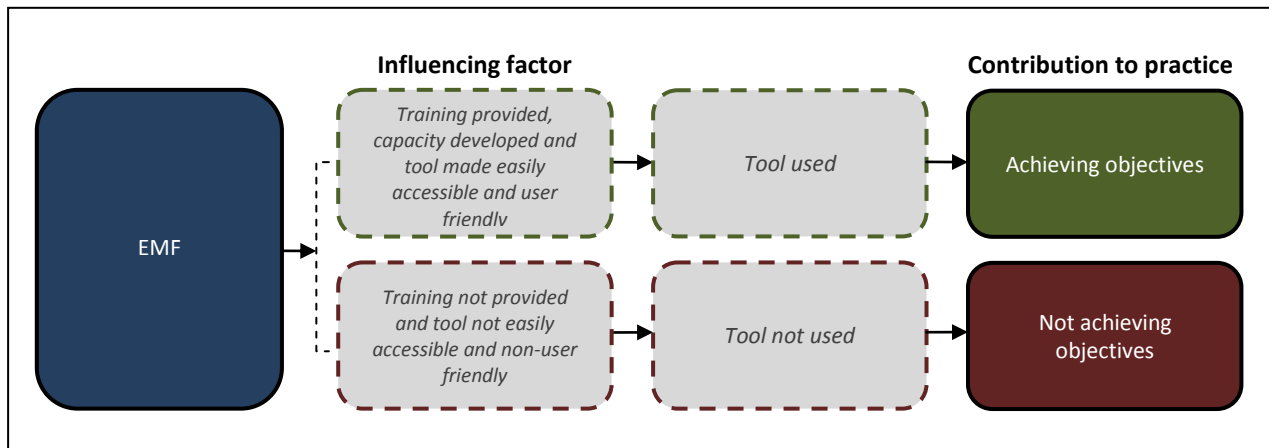
8.2.8. Capacity building and accessibility

A final consideration influencing the extent to which an EMF will be used is the ability of users to access and apply the tool. It is crucial that potential users are trained in the use of the EMF and that the necessary skills are transferred to them. Although neither the EMF regulations nor the guidelines stipulate the need for training it is often a requirement in the EMF terms of reference documents (documents specifying the requirements for a particular EMF). The research found that EMF training performed poorly across all EMFs (see KPA 9.1 in **Section 7.2.9**). It was further found that there was at least some relationship between the extent to which training was provided and the use of an EMF (**Section 7.5, Figure 7.18**). It was finally established that the accessibility of the actual GIS component influenced the use of EMFs, as was confirmed by Schaller (pers. comm., 2015) who argued that:

“...if the GIS tools for EMFs were set-up more efficiently they would be used more.”
(pers. comm. Schaller, 2015)

In many cases the final EMF tools were too technical limiting their use to only GIS capable individuals. If made more accessible and user friendly and if proper training is provided to the relevant users the extent to which an EMF can be used should improve (**Figure 8.8**). It should further be considered to make training and capacity building a requirement for EMF development to avoid the situation where training is not provided due to the views of certain role-players as discussed in throughout **Chapter 5**.

Figure 8.8: Access to tool



8.3. External factors

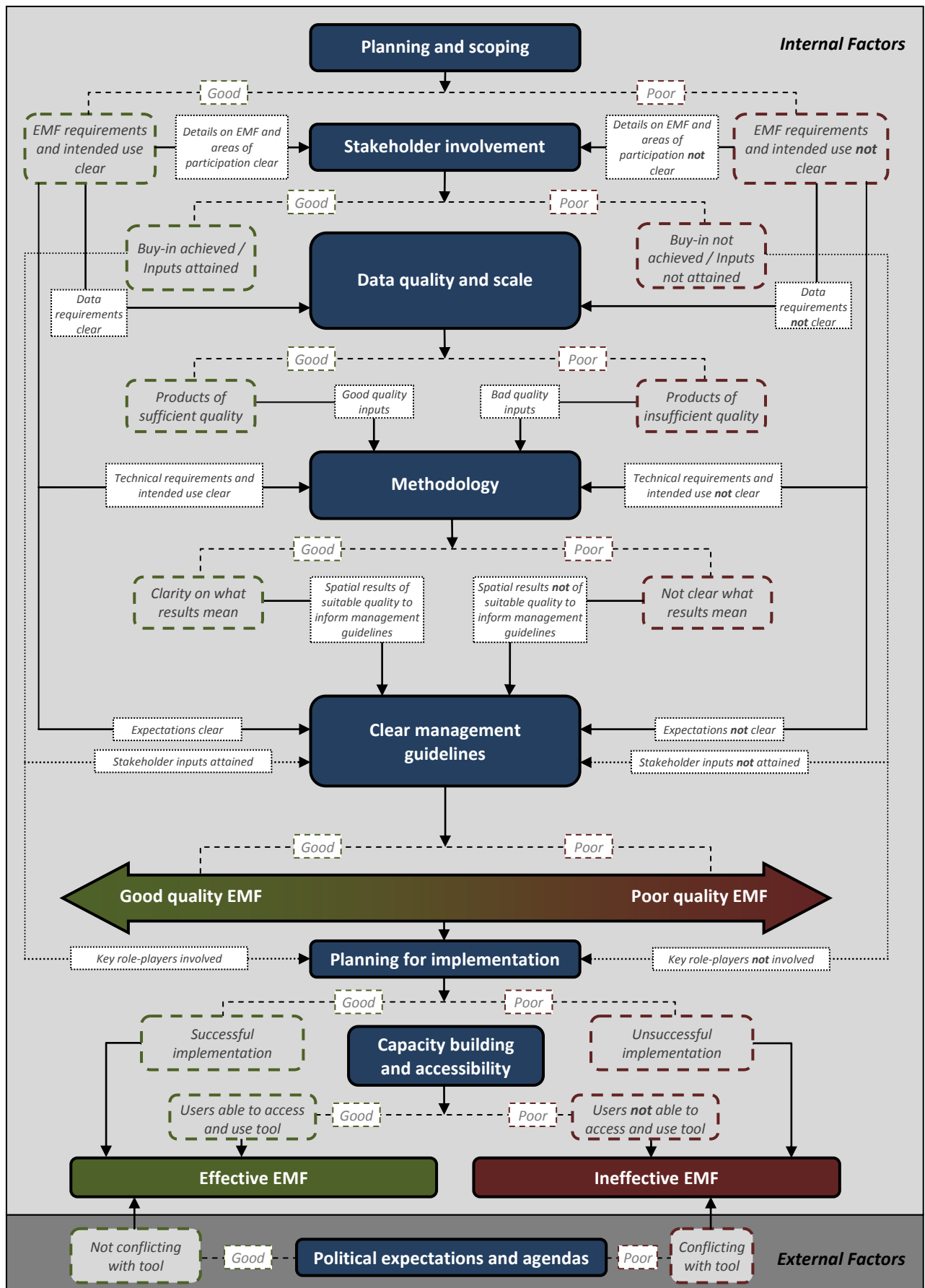
In addition to the internal factors influencing the use of an EMF there are certain 'external factors' that will also affect the manner in which a tool will succeed in achieving its objectives. It was found that political influence often affected the manner in which EMFs influenced decision making as:

"...officials [decision makers] are often under the guidance of politicians on where development should go."

(pers. comm. Mtolo, 2015)

This means to say that political will in some cases overrule the guidance provided by the EMF. External factors such as political influence are very difficult to manage and the most effective way to try and address this issue will be through the involvement of politicians during the development stages of an EMF. In this way their inputs and views could be addressed pro-actively and situations where they call for decisions conflicting with the guidelines contained in an EMF, to some extent, be avoided. It should however also be noted that political will frequently changes and that the fluid nature of the political arena might make the aforementioned approach challenging.

Figure 8.9: Conceptual framework for improving the quality and effectiveness of EMFs



8.4. The way forward – a conceptual framework for EMFs

In an effort to synthesise the key learning points gained from this research, a conceptual framework describing the key aspects that will influence the quality and effectiveness of EMFs was developed (**Figure 8.9**). The development of the conceptual framework was informed by the internal and external factors discussed in **Sections 8.2** and **8.3** as well as the general insights gained from **Chapters 5, 6** and **7**.

The framework argues that proper ‘planning and scoping’ is the first and most important factor in the development of an EMF. If properly planned the intended use of the EMF should be clear and requirements pertaining to data and methodological approaches known. The manner in which planning is done will further affect the other stages of the EMF development process. The second factor that should be considered is the extent to which stakeholders are involved in the process of conceptualising and developing an EMF. Actively involving key stakeholders should ensure that the necessary buy-in for the implementation of the EMF is achieved and that any important local or expert knowledge which might guide the development of the EMF is attained. The third factor involves the use and management of data sources used in the development of the EMF. If proper planning was done and the data requirements were clarified this factor should be easily achievable. Good data management and data screening should ensure that datasets of adequate scale and quality are used to address factor four which involves the analysis of the datasets to develop a spatial tool. Clarity on the methodological approaches used to analyse environmental sensitivity and assess possible environmental impacts should ensure that results are transparent and that methods can be evaluated in terms of their suitability. Methodological clarity and robustness should further increase confidence in the use of spatial results.

The fifth factor concerns the drafting of management guidelines. These guidelines should be linked to the results emanating from the spatial analysis of data and describe the management of specific geographical regions or environmental features that were assessed. Factors one to five, if well executed, should contribute to the development of a good quality EMF. Once an EMF has been developed the next factor to consider will be the development of an implementation plan. Proper implementation planning should assist in the successful implementation of the EMF which is expected to directly affect its eventual use. Along with its implementation the final factor involves the building of capacity amongst potential users to ensure that they will be able to access and use the EMF for its intended purpose.

In addition to these internal factors, there will always be some external factors that will also influence the extent to which an EMF will achieve its objectives. The nature of these external factors may not always be known and may differ from case to case, but it is important that they are considered as they surface. One

of these external factors will be the political will to develop and implement EMFs. When considering the poor performance of EMFs as discussed in this research the challenge for EMF will be to prove itself as a viable strategic level environmental management tool (worthy of development and implementation). For this to be achieved an effort will have to be made to improve the quality and the effectiveness of EMFs and it is proposed that the discussed EMF conceptual framework and the learning obtained from this research should be considered to assist authorities and consultants alike in achieving this task. The learning from this research should further be used to inform the development of the 'Environmental Management Framework Strategy' referred to in **Section 1.2**. If EMF quality and effectiveness are not improved, EMF is facing the risk of being questioned regarding its suitability and necessity as an environmental management tool.

8.5. Future research

This research revealed a number of areas that could be explored in future research studies. One of these areas relates to the causal explanations between quality and effectiveness. Research investigating the manner in which one EMF component affects the other, *i.e.* cause and effect, will contribute to a better understanding of the key components affecting EMF. A number of weaknesses pertaining to the development and implementation of EMFs in South Africa were further identified through this research. Research studies investigating the following aspects are proposed:

- A study determining the data requirements for conducting an EMF reflecting on aspects such as data types, data quality and data scale;
- A study testing different methodological approaches to sensitivity analysis and environmental management zone delineation in order to determine the most suitable method for EMF development; and
- A study investigating the requirements for successful implementation reflecting on components such as management guideline requirements, contents of an implementation strategy and the need for EMF monitoring.

These types of studies will contribute to our understanding on EMFs and strategic environmental management in general and will in time contribute to the improvement of EMF practice in South Africa.

8.6. Conclusion

This study evaluated the quality and effectiveness of environmental management frameworks (EMFs) in South Africa through the application of a mixed-methods and an evaluation research approach. Six EMF case studies were evaluated against a quality and effectiveness review protocol developed specifically for

EMF quality and effectiveness review. The findings of the study showed that EMFs performed poorly in terms of quality and effectiveness and that they were struggling to influence decision making processes. The analysis did however highlight certain key factors that influenced the quality and effectiveness of EMFs and the extent to which they were achieving their objectives. The relationship between these factors were investigated and used to develop a conceptual model which, if applied should assist in the improvement of EMF practice in South Africa, as was the aim of this research:

“To evaluate the quality and effectiveness of EMFs in South Africa with a view to improve practice.”

This research has made an important contribution towards a better understanding of EMF quality and effectiveness. EMF practice, characterised by improved quality and effectiveness should contribute to more informed decision making on issues affecting the environment and assist government in dealing with the increasingly important and inter-connected issues and challenges they are facing.

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ANNEXURES

ANNEXURE A: LIST OF SURVEY INTERVIEWEES

Name	Designation	Method	Relevance
Key interviewees			
Khanyiso Mtolo	National Department Of Environmental Affairs	E-mail and personal discussion (various)	National IEM Department responsible for EMF (involved in all EMF projects)
Bradley Nethononda	National Department Of Environmental Affairs	E-mail and personal discussion (various)	National IEM Department responsible for EMF (involved in all EMF projects)
Simon Moganetsi	National Department Of Environmental Affairs	E-mail and personal discussion (various)	National IEM Department responsible for EMF (involved in all EMF projects)
Sibusisiwe Hlela	National Department Of Environmental Affairs	E-mail and personal discussion (various)	National IEM Department responsible for EMF (involved in all EMF projects)
Validated findings			
Siyabonga Zondi	National Department Of Environmental Affairs	Personal discussion	National Department of Environmental Affairs
Surprise Zwane	National Department Of Environmental Affairs	Personal discussion	National Department of Environmental Affairs
Dawie Jansen van Vuuren	Metro Gis Consulting	Personal discussion	EMF Consultant
Francois Naudé	Western Cape Department Of Environmental Affairs And Development Planning	Personal discussion	Provincial Department of Environmental Affairs
Danie Swanepoel	Western Cape Department Of Environmental Affairs And Development Planning	Personal discussion	Provincial Department of Environmental Affairs
Warrick Stewart	Srk Consulting	Personal discussion	EMF Consultant
Gerry Pienaar	Eastern Cape Economic Development, Environmental Affairs And Tourism	Personal discussion	Provincial Department of Environmental Affairs
Rhulani Mathebula	North West Department of Rural, Environment and Agricultural Development	Personal discussion	Provincial Department of Environmental Affairs
Tharina Boshoff	North West Department of Rural, Environment and Agricultural Development	Telephonic discussion	Provincial Department of Environmental Affairs
Adriaan van Straaten	North West Department of Rural, Environment and Agricultural Development	Telephonic discussion	Provincial Department of Environmental Affairs
Darryl Kilian	SRK Consulting	Personal discussion	EMF Consultant
Surgeon	Mpumalanga Province:	E-mail and personal	Provincial Department

Marebane	Department of Economic Development, Environment and Tourism	discussion	of Environmental Affairs
Gavin Cowden	Mpumalanga Province: Department of Economic Development, Environment and Tourism	Telephonic discussion	Provincial Department of Environmental Affairs
Victor Mongwe	Limpopo Department of Economic Development, Environment and Tourism	Telephonic discussion	Provincial Department of Environmental Affairs

ANNEXURE B: SURVEY FINDINGS

EMF name	Lead agent	Funding agent	Province	Operational scale of EMF	Status of EMF	Year initiated	Year completed	Appointed consultant
Waterberg DM	National DEA	National DEA	LP	DM	Gazetted	2010	2010	Environomics
Olifants / Letaba Catchment Areas	National DEA	National DEA	LP	Regional	Gazetted	2009	2009	Environomics
Pixley ka Seme LM	Province	National DEA	MP	LM	Gazetted	2010	2011	SRK Consulting
Siyanda	Province	National DEA	NC	DM	Gazetted	2007	2008	Environomics
Garden Route EMF	Province	National DEA	WC	Regional	Gazetted	2008	2010	Earth-Inc
Rustenburg EMF	Province	National DEA	NW	LM	Gazetted	2010	2011	Chanzo Environmental Management
Cannon Rocks to Great kei River	Province	National DEA	EC	Regional	Adopted	2007	2010	SRK Consulting
Umsunduzi	Province	National DEA	KZN	LM	Final Report	2008	2010	SRK Consulting
Emakhazeni	Province	National DEA	MP	LM	Gazetted	2007	2009	SEF
Madibeng LM	Province	National DEA	NW	LM	Gazetted	2007	2009	SEF
Dihlabeng	Province	National DEA	FS	LM	Final Report	2009	2010	CSIR
Ekurhuleni EMF	Province	Province	GP	LM	Gazetted	2006	2007	Environomics
Dinokeng	Province	Province	GP	LM	Gazetted	2008	2010	SSI Bohlweki
Zone of choice (Northern Tshwane region) EMF	Province	Province	GP	Regional	Gazetted	2006	2007	Environomics i.a. GIS Global Image; Deaon van Zyl Property Development Consultants and Mawatsan
Mogale City	Province	Province	GP	LM	Adopted	2010	2011	SEF
Metsweding	Province	Province	GP	DM	Adopted	2010	2011	SSI
Cradle of Humankind	Province	Province	GP	Regional	Final Report	2009	2011	SRK Consulting
Nelson Mandela Bay	Province	Province	EC	Regional	Final Report	2010	2014	SRK Consulting
Gert Sibande	Province	Province	MP	DM	Final Report	2010	2014	BKS
Namakwa DM	Province	Province	NC	DM	Gazetted	2008	2010	Nemai
John Taole EMF	Province	Province	NC	DM	Adopted	2010	2011	SSI
Tlokwe LM	Province	Province	NW	LM	Gazetted	2008	2009	SSI
City of Cape Town EMF	Province	Province	WC	LM	Gazetted	2011	2012	City Space Planning?

Saldanha	Province	Province	WC	Regional	Final Report	2010	2013	Chand Environmental
Sandveld	Province	Province	WC	Regional	In progress	2014		Mott MacDonald
Upper Breede River Valley	Province	Province	WC	Regional	In progress	2011		
Magaliesberg PE EMF	Province	Province	NW	Regional	Gazetted	2007	2007	K2M
Dr Kenneth Kaunda EMF phase 1	Local Municipality	Local Municipality	NW	DM	In progress	2013		Townscape Planning & K2M
West Rand District EMF	Local Municipality	Local Municipality	GP	DM	Adopted	2011	2013	BKS
Frances-Baard District EMF	Local Municipality	Local Municipality	NC	DM	Final Report	2007	2009	Nemai
Mskuligwa and Albert Luthuli EMF	Province	Province	MP	LM	Gazetted	2009	2010	SRK Consulting
Cape Winelands DM	Local Municipality	Local Municipality	WC	DM	In progress	2011		SRK Consulting
Central Karoo	National	National	WC	DM	Final Report	2009	2010	Enviropart
Emfuleni LM	Local Municipality	Local Municipality	GP	LM	Final Report	2014	2015	Lidwala
Mapungubwe WHS	National DEA	National DEA	LP	Regional	Final Report	2013	2014	Nemai
uMsunduzi	DEA	National DEA	KZN	LM	Adopted	2008	2010	SRK Consulting
uMhlatuze	DEA	National DEA	KZN	Regional	Final Report	2010	2011	Thorn-Ex & Metro GIS
Umjindi	Local Municipality	Local Municipality	MP	LM	Proposal			
Vredefort Dome WHS EMF	National DEA	National DEA	FS/NW	Regional	Gazetted	2012	2013	CEM/NWU
South Western Tshwane and North Western Johannesburg EMF	Province	Province	GP	Regional	Gazetted	2008	2009	SEF
Gauteng Province EMF	Province	Province	GP	Provincial	Gazetted	2013	2014	Environomics & MtroGIS
Taung	National RDLR	National RDLR	NW	LM	In progress	2014		CEM & NWU
Mangaung	Local Municipality	Local Municipality	FS	LM	In progress	2015		SEF
Newcastle	Province	Province	KZN	LM	Final Report	2011	2014	Thorn-Ex
Wild Coast EMF	Province	Province	EC	Regional	Proposed			
Ngwathe LM	National	National	FS/NW	LM	Final	2012	2013	CEM/NWU

EMF	DEA	DEA			Report			
Moghaka LM EMF	National DEA	National DEA	FS/NW	LM	Final Report	2012	2013	CEM/NWU
Sedibeng EMF	National DEA	National DEA	GP	DM	In progress	2008		Felehetsa Environmental
Umkhanyakud e EMF	Province	Province	KZN	DM	Final Report	2012	2013	Nemai
ilembe EMF	Province	Province	KZN	DM	Final Report	2012	2013	Royal Haskoning DHV
Ugo EMF	Province	Province	KZN	DM	Final Report	2012	2014	Mott Macdonald
Mandeni LM	Local Municipality	Local Municipality	KZN	LM	Proposal			
Uthukela DM EMF	Province	Province	KZN	DM	Final Report	2012	2014	Nemai
Sisonke DM EMF	Local Municipality	Local Municipality	KZN	DM	Proposal			
Vhembe Biosphere Reserve	National DEA	National DEA	LP	Regional	In progress	2015		University of Venda
Drakenstein LM	Province	Province	WC	LM	Final Report	2008	2015	Morris Environmental & Groundwater Alliances (MEGA)
Ehlanzeni EMF			MP	LM	Proposal			
East London IDZ EMF	Local Municipality	Local Municipality	EC	Regional	Adopted	2011	2012	SEF
11 Pre-2006 EMFs								
1 Para-EMF								

ANNEXURE C: LIST OF CASE STUDY INTERVIEWEES

Name	Designation	Place/Method	Date	Relevance
General				
Khanyiso Mtolo	National Department Of Environmental Affairs	Pretoria	10 June 2015	National role-player
Siyabonga Zondi	National Department Of Environmental Affairs	Pretoria	10 June 2015	National role-player
Surprise Zwane	National Department Of Environmental Affairs	Champagne Sports Resort	12 August 2015	National role-player
Danie Smit	National Department Of Environmental Affairs	<i>E-mail correspondence</i>	6 August 2015	National level user
Thivhulawi Kolani	Department Of Mineral Resources - Limpopo	Did not respond		National level user
Themba Mazibuko	Department Of Mineral Resources - Mpumalanga	Did not respond		National level user
Rudzani Mabogo	Department Of Mineral Resources - Gauteng	Did not respond		National level user
Phumudzo Nethwadzi	Department Of Mineral Resources - North West	<i>Telephonic interview</i>	9 September 2015	National level user
Simon Mafu	Gauteng Department Of Agriculture And Rural Development	<i>Telephonic interview</i>	11 September 2015	Provincial User
Garden Route EMF				
Dawie Jansen van Vuuren	Metro Gis Consulting	Pretoria	28 May 2015	Consultant
Francois Naudé	Western Cape Department Of Environmental Affairs And Development	George	23 June 2015	Provincial level user

	Planning			
Danie Swanepoel	Western Cape Department Of Environmental Affairs And Development Planning	George	23 June 2015	Provincial level user
Joclyn Fearon	Western Cape Department Of Environmental Affairs And Development Planning	Knysna	23 June 2015	Local level user
Hennie Smit	Knysna Local Municipality	<i>Telephonic interview</i>	22 July 2015	Local level user
Marteha Alant	South African National Parks Board	<i>E-mail correspondence</i>	25 August 2015	Provincial level user
Cannon Rocks to Great Kei EMF				
Warrick Stewart	Srk Consulting	Sandton	29 May 2015	Consultant
Gerry Pienaar	Eastern Cape Economic Development, Environmental Affairs And Tourism	King Williams Town	25 June 2015	Provincial level user
Fanie Fouché	Did not respond			Local level user
Siyabonga Gqalangle	Eastern Cape Economic Development, Environmental Affairs and Tourism	<i>Telephonic interview</i>	4 September 2015	Provincial level user
Madibeng LM EMF				
Ray Schaller	North West Department of Rural, Environment and Agricultural Development	Mahikeng	30 July 2015	Provincial level user
Rhulani Mathebula	North West Department of Rural, Environment and Agricultural Development	Mahikeng	30 July 2015	Provincial level user
Tharina Boshoff	North West Department of Rural,	<i>Telephonic interview</i>	28 Aug	Provincial level user

	Environment and Agricultural Development			
Adriaan van Straaten	North West Department of Rural, Environment and Agricultural Development	<i>Telephonic interview</i>	16 Sept	Provincial level user
Ngwatho Thapelo	Madibeng Local Municipality	<i>Telephonic interview</i>	16 Sept	Local level user
Gugu Dlamini	Did not respond			Consultant
Dr Pixley ka Seme LM EMF				
Selby Hlatshwayo	Mpumalanga Province: Department of Economic Development, Environment and Tourism	Champagne Castle	13 August 2015	Provincial level user
Darryl Kilian	SRK Consulting	Sandton	29 May 2015	Consultant
Mervyn Lotter	Mpumalanga Province: Department of Economic Development, Environment and Tourism	<i>E -mail correspondence</i>	12 June 2015	Provincial level user
Surgeon Marebane	Mpumalanga Province: Department of Economic Development, Environment and Tourism	<i>Telephonic and e -mail correspondence</i>	17 August 2015	Provincial level user
Gavin Cowden	Mpumalanga Province: Department of Economic Development, Environment and Tourism	<i>Telephonic interview</i>	10 September 2015	Provincial level user
Margaret Mothiba	Gert Sibande District Municipality	<i>Telephonic interview</i>	20 August 2015	Local level user
Dan Hlanyane	Gert Sibande District Municipality	<i>Telephonic interview</i>	1 September 2015	Local level user
West Rand DM EMF				

Nicola Liversage	BKS Consulting	<i>Telephonic interview</i>	17 August 2015	Consultant
Aristotelis Kapsosideris	Gauteng Department Of Agriculture And Rural Development	<i>Telephonic interview</i>	21 August 2015	Provincial level user
Willem de Lange	Gauteng Department Of Agriculture And Rural Development	<i>Telephonic interview</i>	24 August 2015	Provincial level user
Susan Stoffberg	West Rand District Municipality	<i>Telephonic interview</i>	21 August 2015	Local level user
Isabel Olivier	West Rand District Municipality	<i>E-mail correspondence</i>	20 August	Local level user
Gladys Ngwana	Randfontein Local Municipality	<i>E-mail correspondence</i>	10 September	Local level user
Waterberg DM EMF				
Sibusisiwe Hlela	National Department Of Environmental Affairs	Pretoria	10 June 2015	National level user
Dawie Jansen van Vuuren	Consultant	Pretoria	28 May 2015	Consultant
Victor Mongwe	Limpopo Department of Economic Development, Environment and Tourism	<i>Telephonic interview</i>	21 August 2015	Provincial level user
Did not respond				Local level users
Paul Claassen	Did not respond			Consultant

ANNEXURE D: META MATRIX

Key performance areas (KPA)	Key performance indicators (KPIs)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 1.1: Context	KPI 1.1.1	Green	Green	Green	Green	Yellow	Green
	KPI 1.1.2	Green	Yellow	Yellow	Yellow	Green	Yellow
	KPI 1.1.3	Green	Yellow	Green	Green	Yellow	Green
KPA 1.2: Need	KPI 1.2.1	Yellow	Green	Green	Yellow	Green	Green
KPA 1.3: Requirements and objectives	KPI 1.3.1	Green	Yellow	Green	Green	Yellow	Green
	KPI 1.3.2	Yellow	Green	Yellow	Yellow	Yellow	Yellow
	KPI 1.3.3	Yellow	Orange	Yellow	Yellow	Orange	Yellow
	KPI 1.3.4	Orange	Red	Yellow	Yellow	Orange	Green
	KPI 1.3.5	Yellow	Orange	Yellow	Green	Orange	Yellow
KPA 2.1: Structuring and execution of public participation process	KPI 2.1.1	Green	Green	Green	Green	Green	Yellow
	KPI 2.1.2	Green	Green	Green	Green	Yellow	Yellow
	KPI 2.1.3	Yellow	Yellow	Green	Green	Green	Yellow
	KPI 2.1.4	Green	Green	Green	Green	Orange	Yellow
	KPI 2.1.5	Yellow	Yellow	Green	Yellow	Yellow	Yellow
KPA 2.2: Opportunity to comment	KPI 2.2.1	Green	Green	Green	Grey	Grey	Green
	KPI 2.2.2	Green	Green	Green	Orange	Grey	Green
	KPI 2.2.3	Green	Green	Yellow	Grey	Grey	Green
KPA 2.3: Ease of access	KPI 2.3.1	Grey	Orange	Red	Red	Red	Red
	KPI 2.3.2	Orange	Orange	Orange	Orange	Orange	Orange
KPA 2.4: Consideration of comments	KPI 2.4.1	Yellow	Yellow	Yellow	Green	Red	Yellow
	KPI 2.4.2	Yellow	Green	Green	Red	Red	Red
	KPI 2.4.3	Yellow	Yellow	Grey	Red	Red	Orange
KPA 3.1: Gap analysis	KPI 3.1.1	Yellow	Red	Yellow	Yellow	Red	Yellow
	KPI 3.1.2	Red	Orange	Yellow	Yellow	Red	Yellow
	KPI 3.1.3	Red	Yellow	Yellow	Yellow	Red	Yellow
	KPI 3.1.4	Red	Red	Red	Yellow	Red	Yellow
	KPI 3.1.5	Red	Red	Red	Yellow	Red	Yellow
KPA 3.2: Data use	KPI 3.2.1	Yellow	Yellow	Orange	Orange	Yellow	Green
	KPI 3.2.2	Yellow	Yellow	Yellow	Yellow	Orange	Yellow
KPA 3.3: Metadata	KPI 3.3.1	Red	Orange	Red	Red	Red	Red
	KPI 3.3.2	Red	Red	Yellow	Red	Red	Red
KPA 4.1: Sensitivity analysis	KPI 4.1.1	Yellow	Yellow	Yellow	Green	Orange	Green
	KPI 4.1.2	Orange	Yellow	Orange	Green	Red	Green
	KPI 4.1.3	Red	Red	Orange	Green	Yellow	Green
	KPI 4.1.4	Yellow	Yellow	Yellow	Yellow	Yellow	Green
KPA 4.2: Delineation of environmental management zones	KPI 4.2.1	Yellow	Green	Green	Green	Yellow	Green
	KPI 4.2.2	Orange	Yellow	Orange	Orange	Red	Yellow
	KPI 4.2.3	Orange	Orange	Orange	Yellow	Yellow	Green
	KPI 4.2.4	Red	Orange	Orange	Yellow	Orange	Yellow
	KPI 4.2.5	Green	Orange	Orange	Yellow	Orange	Green
KPA 5.1: Description of the bio-physical environment	KPI 5.1.1	Yellow	Yellow	Yellow	Yellow	Yellow	Orange
KPA 5.2: Description of the socio-economic	KPI 5.2.1	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

Key performance areas (KPA)s	Key performance indicators (KPIs)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
environment							
KPA 5.3: Description of the legal context	KPI 5.3.1						
	KPI 5.3.2						
KPA 5.4: Description of the strategic planning context	KPI 5.4.1						
	KPI 5.4.2						
	KPI 5.4.3						
	KPI 5.4.4						
KPA 5.5: Analysis of environmental attributes	KPI 5.5.1						
	KPI 5.5.2						
	KPI 5.5.3						
	KPI 5.5.4						
	KPI 5.5.5						
KPA 6.1: Strategic objectives	KPI 6.1.1						
	KPI 6.1.2						
	KPI 6.1.3						
KPA 6.2: Describing the desired state of the environment	KPI 6.2.1						
	KPI 6.2.2						
	KPI 6.2.3						
KPA 6.3: Priorities	KPI 6.3.1						
KPA 7.1: Identification of impacts in relation to environmental attributes	KPI 7.1.1						
	KPI 7.1.2						
	KPI 7.1.3						
KPA 7.2: Desirable and undesirable land uses	KPI 7.2.1						
	KPI 7.2.2						
	KPI 7.2.3						
KPA 7.3: Thresholds, limits and cumulative impacts	KPI 7.3.1						
	KPI 7.3.2						
	KPI 7.3.3						
KPA 7.4: Management zones guidelines	KPI 7.4.1						
	KPI 7.4.2						
	KPI 7.4.3						
	KPI 7.4.4						
	KPI 7.4.5						
	KPI 7.4.6						
KPA 8.1: Planning for implementation	KPI 8.1.1						
	KPI 8.1.2						
	KPI 8.1.3						
KPA 8.2: Revision schedule	KPI 8.2.1						
	KPI 8.2.2						
KPA 9.1: Training	KPI 9.1.1						
	KPI 9.1.2						
KPA 10.1: Documentation	KPI 10.1.1						
KPA 10.2: Spatial product	KPI 10.2.1						
	KPI 10.2.2						
	KPI 10.2.3						
KPA 11.1: Monitoring	KPI 11.1.1						
	KPI 11.1.2						

Key performance areas (KPA)s	Key performance indicators (KPIs)	Cases					
		District		Local		Regional	
		#1	#2	#3	#4	#5	#6
KPA 12.1: Adoption	KPI 12.1.1	Green	Yellow	Green	Green	Orange	Yellow
	KPI 12.1.2	Green	Red	Green	Green	Green	Green
KPA 12.2: Roles and responsibilities	KPI 12.2.1	Yellow	Yellow	Yellow	Orange	Orange	Grey
	KPI 12.2.2	Orange	Yellow	Yellow	Red	Red	Grey
KPA 13.1: Influencing EA	KPI 13.1.1	Yellow	Yellow	Yellow	Yellow	Orange	Yellow
	KPI 13.1.2	Orange	Yellow	Yellow	Yellow	Yellow	Yellow
	KPI 13.1.3	Orange	Yellow	Yellow	Yellow	Orange	Yellow
	KPI 13.1.4	Red	Red	Red	Orange	Red	Orange
KPA 13.2: Influencing spatial planning and land use management systems	KPI 13.2.1	Orange	Yellow	Yellow	Yellow	Orange	Green
	KPI 13.2.2	Orange	Yellow	Orange	Orange	Orange	Orange
KPA 14.1: Sustainable development and environmental protection	KPI 14.1.1	Orange	Yellow	Yellow	Yellow	Orange	Yellow
	KPI 14.1.2	Orange	Orange	Yellow	Yellow	Orange	Yellow
		Green	Yellow	Orange	Red	Grey	
Conformance	Partial conformance	Non conformance	Not attempted at all	Could not be determined			

ANNEXURE E: REVIEW AREA PERFORMANCE ACROSS CASES

