How can the quality of South African Environmental Management Programmes be determined?

Ebenhaezer van Schalkwyk

12786624

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

Supervisor: Prof F. Retief

Assistant Supervisor: Prof A. Morrison Saunders

Potchefstroom

2012

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ACKNOWLEDGEMENTS

I would like to thank my Supervisor at the North-West University, Prof. Angus Morrison-Saunders, for providing his logic and objectivity to this process and for his willingness to oversee this work.

ABSTRACT

At the heart of Environmental Impact Assessment (EIA) lies the focus of identification and assessment of predicted impacts, with the management actions (i.e. Environmental Management Programmes) (EMPr) often being described only in illustrative terms. In order to promote effective Environmental Management (EM) it is important that the management actions arising from EIAs are clearly defined and translated into a good quality EMPr.

The thesis had three aims, (1) to determine what is regarded as high-quality criteria for EMPrs (i.e. develop an EMPr review package), (2) to determine the quality of a sample of 20 South African EMPrs by applying the EMPr review package and (3) to provide feedback on the utility of the review package.

The EMPr review package was developed by converting high quality criteria for EMPrs into a review package. The EMPr review package has been structured around five (5) Review Areas each with between two and six review categories. Review categories contain between one and eight review sub-categories informing the criteria.

The EMPrs were reviewed by applying the EMPr review package. Key shortfalls of EMPrs were found to be:

- A lack of project detail and overview to place the EMPr in context;
- Insufficient descriptions of the receiving environment and baseline environmental conditions;
- Lack of maps, layouts and facility illustrations prescribing where activities must or must not take place;
- In most cases no objectives and targets were set for management measures;
- The stakeholder engagement process was not clearly defined (who, how, when);
- The document and record keeping process was unclear;
- The process of managing emergency situations and subsequent remediation were lacking;
- No implementation timeframes were set for the implementation of mitigation measures; and
- The rehabilitation process was not described in detail.

The use of, and overall utility of the EMPr review package is simple and straight forward. A shortfall of the EMPr review package, however, is that results are likely to differ from one reviewer to another based on the reviewer's experience with EMPrs. The application of the EMPr review package might improve the quality of EMPrs and over time contribute to improved environmental performance.

Key words: Environmental Management Programmes (EMPrs),Programme Quality.

OPSOMMING

Die kern van Omgewingsinvloedsbeplanning (OIB) is die identifisering en assessering van potensiële impakte, met die bestuursaksies (Omgewingsbestuursprogramme) (OBP) dikwels slegs in teoretiese terme omskryf. Ten einde doeltreffende omgewingsbestuur te bevorder, is dit belangrik dat die bestuursaksies uit die Omgewingsimpakverslae(OIV) duidelik omskryf word in 'n goeie gehalte OBP.

Die skripsie het drie doelwitte, (1) om te bepaal wat beskou word as hoë gehalte kriteria vir Omgewingsbestuursprogramme (dws die ontwikkeling van 'n OBP evalueeringspakket, (2) om te bepaal wat die kwaliteit van 20 Suid-Afrikaanse Omgewingsbestuursprogramme is deur die toepassing van die OBP evalueeringspakket en (3) om terugvoer te gee oor die nut van die evalueeringspakket.

Die OBP evalueeringspakket is ontwikkel deur hoë gehalte kriteria vir Omgewingsbestuursprogramme te omskep in ‘n evalueeringspakket. Die OBP evalueeringspakket bestaan uit vyf (5) hoofevalueeringsareas, elk met tussen twee en ses evalueerings kategoriee. Evalueerings kategoriee bevat tussen een en agt sub-evalueerings kategoriee.

Sleuteltekorte van die Omgewingsbestuursplanne is as volg:

- Daar is ‘n gebrek aan projek oorsig en agtergrond om the OBP in konteks te plaas;
- Daar is ‘n algemene tekort in die beskrywing van die geaffekteerde omgewing en die huidige omgewingstoestande;
- Gebrek aan kaarte, uitlegte en fasiliteit illustrasies wat voorskryf waar aktiwiteite moet of nie moet plaasvind nie;
- In die meeste gevalle is geen doelwitte of teikens gestel vir die bestuursmaatreëls nie;
- Die openbare deelnameproses is nie duidelik gedefinieer nie (wat, hoe, wanneer);
- Die dokument en rekordhoudings proses is onduidelik;
- Die proses in die bestuur van noodsituasies en daaropvolgende remediëringstappe ontbreek;
- Geen implementeringstydraamwerke vir die implementering van bestuursmaatreëls is gestel nie; en
- Die rehabilitasie van geaffekteerde gebiede is nie genoegsaam beskryf nie.

Die gebruik en die nut van die OBP evalueeringspakket is eenvoudig en doelgerig. 'n Tekortkoming van die OBP hersieningspakket is dat die resultate heel waarskynlik sal verskil van persoon tot persoon op grond van kennis en agtergrond met betrekking tot Omgewingsbestuursplanne.

Die toepassing van die OBP evalueeringspakket kan die kwaliteit van Omgewingsbestuursplanne verbeter en met verloop van tyd bydra tot verbeterde omgewingbestuur en resultate.

Sleutelwoorde: Omgewingsbestuurprogramme (OBP), Verslagkwaliteit.

ACRONYMS AND ABBREVIATIONS

ALARP	As Low As Reasonably Possible
BAR	Basic Environmental Assessment
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EA	Environmental Assessment
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EM	Environmental Management
EMPr	Environmental Management Programme
EMS	Environmental Management System
IEM	Integrated Environmental Management
ISO	International Standardisation Organisation
MS	Method Statement
NEMA	National Environmental Management Act
PDCA	Plan, DO Check and Act
PM	Project Manager
RE	Resident Engineer
SD	Sustainable Development
SM	Site Manager
SOP	Stand Operating Procedure

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PREFACE

For this dissertation, the chapter format was used. This dissertation contains the following Chapters:

Chapter 1: Introduction and Problem Statement

Chapter one provided a brief description of EMPrs, what the study aims to address, the importance of the study, where EMPrs fits into the overall field of Environmental Management and the proposed research questions.

Chapter 2: Research Design and Methodology

Chapter two explained the approach to the research and the methods used in the establishment of the EMPr review package.

Chapter 3: Literature Review

Chapter three included a detailed literature review to determine what is regarded as high quality criteria for EMPrs. The literature study included a review of the Lee and Colley (Lee *et al.,* 1999) model which was used as the basis for the development of the EMPr review package.

Chapter 4: Data Analysis and Results

This chapter provided a narrative presentation on the findings of the study. The chapter firstly presented the EMPr review. The second part of this chapter discussed the findings of applying the review package to the sample of South African EMPrs and finally the chapter reflected on the utility of the EMPr review package.

Chapter 5: Conclusion and Recommendation

This chapter provided final conclusions and recommendations on the review package, the quality of the sample of South African EMPrs and the utility of the EMPr review package. Recommendations for possible further studies on this particular topic were also discussed as a final part of this chapter.

CHAPTER 1

1. INTRODUCTION AND PROBLEM STATEMENT

A suite of environmental tools and management processes are being applied internationally to promote Sustainable Development (SD). Of these, EIA has been one of the most widely used processes, largely due to EIA becoming a legislated process internationally since the 1970s and locally in South Africa since 1997. According to Weaver and Caldwell (1999), the specific functions of EIA are to reduce the frequency of unexpected change, to reduce unexpected and undesirable consequences of developments, and to develop mitigation planning for unavoidable negative changes.

In essence the Environmental Impact Report (EIR) as an output of the EIA process presents the identified environmental impacts with proposed mitigation methods (EMPrs) which is then subjected to a decision from a competent authority, on whether the development can go ahead (Glazewski, 2005). In order for a project to be approved, the EMPr should demonstrate and detail how proposed impacts as identified in the EIA will be managed to acceptable levels. Weaver and Caldwell (1999), state that planning and implementation of appropriate mitigation measures (EMPr) for adverse impacts represent important activities in the EIA process. According to the United States Environmental Protection Agency (1998), mitigation measures are part of the EIA process which leads to practical action to offsetting adverse environmental impacts of proposed projects. The Australian Department of Infrastructure, Planning and Natural Resources (DIPNR) states that EMPrs are fundamental to the EIA process to ensure that commitments given at a project's planning and assessment stage are carried through to the construction and operational phase (DIPNR, 2004).

According to the Department of Water Affairs and Forestry (DWAF) EMPrs are important tools that bridge the gap between the completion of the EIA and the implementation of the project, particularly with regard to implementing the mitigation measures recommended in the EIR and then monitoring, auditing and taking corrective actions during their implementation. Lochner (2005) confirms that EMPrs are essential tools for ensuring that the mitigation of negative impacts and enhancement of positive impacts are carried out effectively during the project life-cycle. The United Nations Economic Commission for Europe (UNECE) goes on to state that an EMPr is the most effective tool in the EIA process especially with respect to improving overall EIA performance (Hlela, 2004).

Therefore, in order to promote effective environmental management throughout the implementation life-cycle of a project, it is important that the management actions arising from EIAs are clearly defined and translated into a good quality EMPr for the design, construction, operation and/or decommissioning phases of a project (Lochner, 2005).

Various authors (Baby 2011; DEAT 2004; IFC 1998; Lochner 2005; World Bank 1999) describe an EMPr as a plan that is constructed during the EIA process to, (1) ensure sound monitoring of mitigation measures and, (2) to ensure proper environmental management throughout the life-cycle of a development project.

In the South African context an EMPr can be defined as "*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced*" (South Africa, 1998). Landcom (2010) defines an EMPr as a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.

Literature also reveals that the purpose of an EMPr is to, (1) describe how negative environmental impacts will be avoided, minimised, mitigated, managed, monitored and how positive impacts will be enhanced, (2) to ensure that the mitigation measures proposed in the EIA process are implemented during the construction and operational phases by providing detailed institutional arrangements (DEAT 2004; Sadler 1996) and (3) to ensure compliance with regulatory stipulations (Hill, 2000). It is evident that the general objectives and purpose of EMPrs as reported by various authors are very much universal and mainly consist of avoiding, mitigating and managing potential environmental impacts as identified during the EIA process by detailing sound mitigation and institutional arrangements.

The Department of Environmental Affairs and Tourism (DEAT) state that the development and implementation of a successful EMPr has benefits beyond merely meeting legal obligations. It contributes to the environmental awareness, facilitates the prevention of environmental degradation, improves community relations, facilitates progress towards environmental targets, provides a tool for continuous improvement, and it improves community relations (DEAT, 2004). The European Commission (2005) found that implementing an EMPr in an urban area improved air and noise quality, improved waste management, lowered water and energy consumption and improved the managing agencies' public image. Table 1 highlights more benefits of including EMPrs in the EIA process.

Table 1: Benefits of including EMPr in EIA

Benefits of including EMPr in EIA
The benefits of including the EMPr as part of EIA are: • encouraging applicants to be more systematic and explicit in the design and development of mitigation measures and the intended means of implementation; • encouraging authorities to check the practicality and likelihood of implementation of mitigation and monitoring measures; • ensuring that the mitigation measures are properly incorporated into the project design

and contract documentation after authorisation is granted;

- encouraging the project proponent to meet the requirements of the EMPr which now form the basis for the conditions attached to authorisation of the project; and
- forcing the project proponent to internalise environmental impacts that would otherwise become a social cost.

Source: DEAT (2004)

Despite the acknowledgement of the importance of EMPrs, most of the global EIA practice appears to be directed at the scoping and assessment stages of the EIA process. The mitigation, monitoring and management component of EIAs receive less attention at formulating and implementation level (Baby 2011; DEAT 2004). There are also persistent reports that little attention has been paid to the implementation of EIA mitigation measures and that in many instances they remain on the unread pages of the EIRs (Ecaat, 2004).

Already in 2004, the DEAT stated that attention is *now* being focused on the need to demonstrate that impacts can be monitored and managed. The EMPr is recognised as the tool that can provide the assurance that the project proponent has made suitable provision for mitigation (DEAT, 2004). Loksha (2008) confirmed in a presentation made at a training workshop that the quality of EMPr preparation and its integration into project design and operation has a strong impact on the quality of environmental compliance on the ground.

From the above it is evident that high-quality EMPrs is required to avoid, minimize, mitigate and manage environmental aspects identified in the EIA phase of a project and to give effect to environmental policies and programmes in the wider field of EM.

1.1. EMPr in the International Arena

Internationally, EMPrs are widely undertaken as part of the EIA process (Hlela 2004; Lee & George 2000; Puymbroeck 2002; US EPA 1997). The characteristics of an EIA may differ from country to country but generally it includes screening, consideration of alternatives, scoping, mitigation measures, communication, decision, and post-project analysis (PPA) (Hlela, 2004).

According to Hlela (2004), different countries use different terminology to refer to PPA. The UNECE, for example, uses the term PPA (Gilpin 1995). Nigeria refers to it as a 'follow-up programme' (Puymbroeck, 2002), while, South Africa and many other countries refer to it as an EMPr (Lee & George 2000). Despite the different terminologies used, the basic principles and objectives of EMPrs throughout the world are the same (Hlela, 2004).

Various government Departments (DERT 2008; DIPNR 2004; US EPA 1997, 2005) have released EMPr guideline documents and best practice measures for EMPrs. The World Bank, who is an independent funder of many projects world-wide, has also released a set of guidelines (World Bank, 1999). The guideline documents assist EIA practitioners to generate better EMPrs by providing guidelines in terms of content and technical aspects.

EMPrs are also developed to give effect to an organisation's environmental objectives, target and policy as part of an Environmental Management Systems (EMS) and/or as part of an Eco-Management and Audit Scheme (EMAS).

1.2. EMPr in South Africa

In South Africa, EMPrs are usually based on the findings of an EIA and, in terms of the EIA Regulations (Government Notice No. R. 544, R. 545 and R. 546 in the Government Gazette of 02 August 2010) promulgated under the National Environmental Management Act ("NEMA", Act No. 107 of 1998, as amended), is a requirement as part of the EIA Report submitted in support of an application for Environmental Authorisation (EA) (South Africa, 2010). Moreover, an EMPr also bestows a 'Duty of Care' on those who cause, have caused or may in future cause pollution or degradation of the environment, in line with Section 28(1) of the NEMA (1998).

EMPrs can, however, also be prepared as stand alone documents in line with Section 28 (1) of the NEMA (South Africa, 1998). EMPrs could also be required for areas of ecological or social value and as part of an Environmental Management System (EMS) such as the ISO14001 standard (Lochner, 2005).

Baby (2011) states that EMPrs are most effectively developed when impacts are evaluated followed by a detailed EIA completed with supporting baseline studies for the project and site. Impact evaluation signifies the importance for the mitigation measures suggested during the impact analysis or assessment phase.

In 2004 the DEAT published an information series on environmental management tools. Information series twelve (12) is dedicated to EMPrs (DEAT, 2004), providing guidelines for the general information on techniques, tools and processes for environmental assessment and management. Environmental Departments such as the DWAF and the Department of Environmental Affairs & Development Planning (DEAD&P) have also released EMPr guideline documents in an attempt to provide EIA Practitioners and authorities with guidance when it comes to the compilation and review of EMPrs.

1.3. Problem Statement

Legislation, local and international guidelines and scientific papers acknowledge the importance of EMPrs, however, despite this, various sources also confirm that EIA receives greater attention than other EIA tools and that the mitigation, monitoring and management component of EIAs (EMPr) receives less attention (Baby 2011; DEAT, 2004; Ecaat 2004).

Internationally, EIA is one of the most successful and widely adopted environmental policy implementation instruments that have emerged over the past three (3) decades. (Glasson et al., 1999; Hlela, 2004; Wood, 2003, cited in Sandham, *et.al*). Literature also reveals that the concept of an EMPr as a post EIA tool was developed to ensure that anticipated impacts as identified during the EIA process are managed to acceptable levels. An EMPr is also intended to ensure that EIAs are implemented cost-effectively by ensuring that developers and the environmental authorities carefully consider the mitigation measures to be implemented (Hlela, 2004).

According to Sandham *et al* (2008), the successful implementation of the EIA-process depends in part on the production of high-quality reports. Kennedy (1999) states that the EIA process cannot be effective without adequate mitigation measures. It can thus be argued that successful implementation of the EIA-process is interdependent on the adequacy and ultimately the quality of the EMPr in describing mitigation measures. The quality of EMPr is therefore very important to, (1) manage impacts identified during the EIA process to acceptable levels, (2) to give effect to the objectives of the EIA process and (3) to achieve a global goal of SD.

However, to date, no attempts have been made to determine the quality of EMPrs. No international or locally published studies could be found on the quality of EMPrs.

In light of the above the following problem statement was formulated:

What is the quality of a sample of South African EMPrs?

1.4. Research Questions

In view of the problem statement, the following research questions were formulated:

1) What can be regarded as high-quality criteria for EMPrs (i.e. develop an EMPr review package)?
2) What is the quality of a sample of South African EMPrs when applying the review package?
3) What is the usefulness of the EMPr review package when reviewing EMPrs?

The main hypothesis is that EMPrs are not of a high-quality and that it does not contain suitable mitigation and institutional arrangements to manage the environment effectively.

CHAPTER 2

2. RESEARCH DESIGN AND METHODOLOGY

The purpose of this chapter was to explain the research approach and rationale for this study. The chapter provided an overview of the methods that were used in which the research questions were answered.

2.1. Literature review

Literature review as a source of qualitative data was used extensively in this research to gather the required information needed to establish the EMPr review package. According to Aucamp (2008), literature review consists of reading as much of the academically published material on the research subject. According to Griffin (1999), the purpose of literature review is to concisely demonstrate your level of understanding of the research related to a topic.

2.2. Methodological process

In order to answer the research questions, the following research steps were applied:

a) An EMPr review package was established by using the principles of the Lee and Colley (Lee *et al*, 1999) review package. Criteria regarded as high-quality criteria for EMPrs as derived from the literature were used to create the EMPr review package;
b) The sample of South African EMPrs were reviewed and ranked to determine their quality by applying the EMPr review package; and
c) Feedback on the utility of the EMPr review package to review an EMPr was provided.

2.2.1. Developing the EMPr quality review package

In order to answer research question 1 ***(What can be regarded as high-quality criteria for EMPrs (i.e. develop an EMPr review package?)*** an EMPr review package was designed by developing criteria for high-quality EMPrs as derived from the literature into a review format originally developed for project-level Environmental Impact Statements (EISs), the "Lee–Colley review package" (Lee et al, 1999; Lee and Colley, 1992) (cited in Sandham *et.al*, 2008). Bonde & Cherp (2000) and Sandham *et al.* (2008) state that the most well-known and widely applied EIR quality review package in developed and developing countries, is probably the Lee and Colley review package, originally designed with particular reference to EIA applications in the UK, hence the rationale for using the structure of the Lee and review package Colley (Lee *et al*, 1999) for this study.

The following specific sources were used to develop the review package:

1. formal regulations on EMPr (South Africa, 1998);

2. research publications reflecting EMPr objectives, purpose and best practice guidelines for EMPr, such as Baby (2010), Hlela (2004), Bonde (et.al, 2000), Bryony (et.al, 2012) Fry (et.al, 2011), George (2000), Glasson (et.al, 1999) and Sowman (et.al, 1995); and
3. government guidelines published in terms of EMPr content and best practice measures such as DEAT (2004), DERT (2008), DWAF (2002), IFC (1998), Lochner (2005), Queensland Government (2003), USA EPA (1997, 2004) and World Bank (1999).

In 2005, the DEAD&P (Lochner, 2005) in the Western Cape Province of South Africa published a Guideline for EMPrs. This guideline describes the envisaged scope and content of an EMPr, covering both the preparation and implementation stages of an EMPr process, as well as the roles of key stakeholders associated with EMPrs. Further, to assist in the review of EMPrs by authorities, as well as other reviewers, a set of review criteria was also identified as part of the guideline. Some of these criteria were incorporated in the EMPr review package developed to answer research question 1 due to it being regarded as high-quality criteria for EMPrs.

2.2.2. Reviewing and Grading the EMPrs

In order to answer research question 2 ***(What is the quality of a sample of South African EMPrs when applying the review package),*** the sample EMPrs were reviewed by applying the review package developed to answer research question 1. The process started off by identifying the location of the most important material in the EMPr. Reviewing then commenced at the lowest level (sub-categories), which contains simple criteria relating to specific tasks and procedures for EMPrs. On completion of the sub-categories assessment, overall grades were determined for each review category by combining the grades scored in the sub-category levels. These combined grades were used to determine the grades for each review area. Grades scored per review area were combined to ultimately determine the overall grade scored by an EMPr.

The overall results were recorded on a spread sheet in an attempt to identify patterns. On completion of the review process, data were analysed and grouped in order to identify key shortfalls of the EMPrs reviewed. Feedback on the overall quality of the EMPr per review criteria was discussed and key shortfalls highlighted.

2.2.3. Utility of the EMPr Review Package

In order to answer research question 3 ***(What is the usefulness of the EMPr review package when reviewing EMPrs?),*** feedback on the utility of the EMPr review package to review and grade an EMPr was discussed on completion of the review process. The utility of the review package was assessed based on (1) general user friendliness and (2) its ability to derive high-quality principles from an EMPr based on the review criteria. Challenges and

shortfalls of the review package were discussed and recommendations were made to possibly improve its utility.

CHAPTER 3

3. LITERATURE REVIEW

3.1. Introduction

This chapter aimed to address research question 1 (***What can be regarded as high-quality criteria for EMPrs.*** The main focus of this chapter was to seek criteria regarded as high quality EMPr criteria in order to establish a review package whereby the quality of EMPrs can be determined. The second part of this chapter discussed report quality review literature; more specifically the Lee and Colley (Lee *et al*., 1999) review package which was used as the basis for developing the EMPr review package and the quality review process.

3.2. High-Quality Criteria for EMPrs

This section discussed high-quality criteria for EMPrs as derived from the literature. The discussion of high-quality EMPr criteria has been structured around five (5) Review Areas each with between two and six review categories. Review categories contain between one and eight review sub-categories informing the criteria. Table 2 depicts the Review Areas and sub-review categories.

Table 2: Review areas and review categories

Review Areas	Review Categories
RA 1: Project Overview	• Project Detail and Overview; • Impact Summary; • Receiving Environment & Baseline Environmental Data; • Maps, Layouts, Photos and Facility Illustrations; and • Legal Requirements.
RA 2: Institutional Arrangements	• Drafter Information; • Roles, Responsibilities and Communication; • Stakeholder Engagement; • Environmental Awareness and Training; • Environmental Management Systems; and • Management Commitment and Review.
RA 3: Implementation Strategy	• Implementation Programme; • Description of Mitigation/Management Measures; • Objective and Targets; and • Cost Estimates and Penalties and Fines.

RA 4: Checking	• Monitoring, Auditing and Reporting; and • Documentation and Record keeping.
RA 5: Corrective Actions	• Pollution/Emergency Management; and • Rehabilitation and Closure.

3.2.1. PROJECT OVERVIEW

3.2.1.1. Project Detail and Overview

Lochner (2005) states that in order to place the EMPr in **context**, a brief summary should be given of the **proposed development** and associated processes involved in both the construction and operational phases. This should cover project location, layout plans, project phases (eg. design, construction, commissioning, operations and decommissioning), construction activities, operational processes and activities. The NEMA (1998) further requires that a detailed description of the aspects of the activity that are covered by the EMPr be presented.

3.2.1.2. Impact Summary

The World Bank (1999), DERT (2008), and Lochner (2005) state that a **summary** should be given of the predicted **positive and negative impacts** (either directly or indirectly resulting from the activity) associated with the proposed project that require management actions (i.e. mitigation of negative impacts or enhancement of positive impacts).

3.2.1.3. Receiving Environment & Baseline Environmental Data

According to Lochner (2005) an EMPr should include a **brief description of the affected environment**, particularly those elements of the environment that may be impacted upon by the project. The Abu Dhabi Environmental Agency (EA) (2011) states that baseline information taken from the EIA or other specialist studies and referencing of sensitive receptors located in the vicinity of the proposed project site should be included in an EMPr.

3.2.1.4. Maps, Layouts, Photos and Facility Illustrations

According to the Australian Government (2008) and the US EPA (2007) an EMPr should include **maps and/or facility illustrations** showing where each activity takes place or where storage facilities are located etc, especially in relation to sensitive environmental features. According to the Australian DIPNR (2000), **plans and maps** are useful tools for on-site references and should be included in all EMPrs.

3.2.1.5. Legal Requirements

Lochner (2005) argues that it is important to ensure that the actions specified by the EMPr are enforced through the EMPr being given some form of **legal standing**. According to Hill (2000), the incorporation of environmental considerations into the **tender and contract** documents is a fundamental prerequisite for effective implementation of an EMPr.

The authorization to undertake the construction and operation of the project may be subject to compliance with other **environmental legislation**. It is therefore important to identify the legislation, standards, guidelines and associated permits or licences that apply to the project and are related to management activities specified in the EMPr (Lochner, 2005). The Queensland Government (2003), states that EMPrs should integrate the terms of **operational approvals,** such as **licences**, with the provisions of planning and land use development approvals and translate information in studies and scientific reports from the EIS into achievable management strategies. If any environmental permits or licences have been applied for or already obtained, this should be explained in the EMPr (Lochner, 2005).

3.2.2. INSTITUTIONAL ARRANGEMENTS

3.2.2.1. Drafter Information

The NEMA (1998) requires that detail regarding the **person who prepared** the EMPr and the **expertise of that person** be included in the EMPr. The NEMA (1998) was the only source requiring this information.

3.2.2.2. Roles and Responsibilities

The **roles and responsibilities** of the key parties involved in the implementation of the EMPr (in particular, the management actions and monitoring requirements), and in meeting the conditions of approvals, must be clearly defined (Lochner, 2005). According to Hill (2000), a problem in the effective use of EMPrs, is caused by "inadequate institutional and organisational arrangements". Roles and responsibilities of key members of the Project Proponent and Contractor’s team involved in implementing the EMPr must therefore be written up as Terms of Reference (i.e. job descriptions) for each job function (Lochner, 2005; NEMA, 1998). This in turn will increase accountability and ensure that environmental management activities are handled correctly (EPA, 2005). Responsibilities should be defined for any necessary training, supervision, monitoring of implementation, remedial action, financing and reporting (World Bank, 1999).

3.2.2.3. Stakeholder Engagement

Lochner (2005) suggests that an **Environmental Monitoring Committee** or Environmental Liaison Committee may be established to monitor progress in the implementation of the

EMPr. Hill (2000) states that the necessity for public involvement in the **project implementation phase** means that there should be a clearly identified contact office where the **public can lodge complaints**. Ongoing consultation arrangements should therefore be included in all EMPrs (DERT, 2008). Interaction between the community and the company is essential to build levels of confidence and trust (DEAT, 2004).

3.2.2.4. Environmental Awareness and Training

A number of authors (Hlela 2004; Lochner 2005; DEAT 2004; DEA 1992a) argue that **environmental awareness training** is critical for achieving the objectives specified in the EMPr. Awareness training programmes should be conducted at the tender stage so that contractors can quote for the whole project taking into account mitigation measures to be implemented on site (Hlela, 2004). Training needs should be identified based on the available and existing capacity of site and project personnel (DEAT, 2004). It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard (Lochner, 2005). The purpose of training programmes must be to emphasise that the implementation of an effective mitigation programme is more cost-effective than initiating a clean-up programme at a future date (DEA, 1992a). The NEMA (South Africa,1998) requires that the environmental **awareness plan** describe the manner in which (1) the applicant intends to inform his or her employees of any environmental risk which may result from their work and (2), the manner in which risks must be dealt with in order to avoid pollution or the degradation of the environment.

3.2.2.5. Environmental Management Systems

Lochner (2005) states that an EMPr should be linked with a proponent's existing environmental policies, guidelines and commitments. Broderick (2012) states that the most effective EIA systems are those that use follow-up processes to link EIA and EMS. According to the U.S EPA (2005), the EMPr should make provision for the PDCA model (depicted in Figure 3) for ongoing improvement, linking project design with project implementation. The PDCA cycle includes:

1. **Plan:** Planning, including identifying environmental impacts and establishing environmental goals.
2. **Do:** Implementing, including employee training and establishing operational controls.
3. **Check:** Checking, including auditing, monitoring and taking corrective action.
4. **Act:** Reviewing, including progress reviews and taking action to make needed changes.

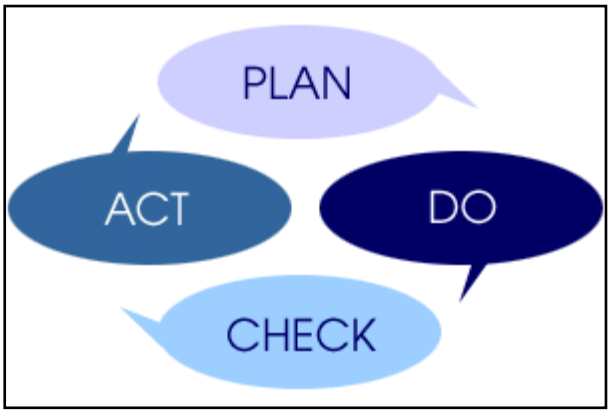


Figure 1: The Deming Model
Source: EPA (2005)

3.2.2.6. Management Commitment and Review

According to Hlela (2004) and Hill (2000) an EMPr must be viewed as a **dynamic and flexible document** and be subject to **periodic review**. During the implementation of a project there is always the possibility that unforeseen issues could arise, EMPrs should, therefore, be revised where and when necessary to mitigate unanticipated impacts (Baby, 2011). The DEAT (2004) states that an EMPr should be regularly updated to remain aligned with the project as it progresses from construction to operation and, finally to decommissioning. According to the DEAT (2004), the key to a successful EMPr is **commitment by all levels of management** and the **workforce**. The integration of the EMPr into daily operations is crucial.

3.2.3. IMPLEMENTATION STRATEGY

3.2.3.1. Implementation Programme

According to the World Bank (1999), Lochner (2005) and the NEMA (South Africa, 1998) an EMPr should include a **project schedule** within which the measures contemplated in the EMPr must be **implemented**. This schedule should show how each **mitigation measure is phased** and co-ordinated (including frequency and duration) with the overall project implementation plan. Baby (2011) argues that a vital section of an EMPr is the **implementation and execution program**. The DERT (2008) state that the primary objective of the **implementation strategy** is to direct, review and manage activities to continually reduce environmental impacts and risks to **ALARP** (As Low as Reasonably Possible), and to ensure performance objectives and standards are met over the life of the activity.

3.2.3.2. Description of Mitigation/Management Measures

Mitigation measures must be **clearly defined** and then an indication of the effectiveness of these measures must be given (Talime, 2011). The World Bank (1999) state that the

mitigation measures to be implemented should be **feasible and cost effective**, described in detail and be **accompanied by designs**, equipment descriptions, and operating procedures. The technical aspects of implementing the mitigation measures should also be described. Mitigation measures in EMPrs must be **measurable** to enable accurate monitoring and determination of successful implementation (cited in Hlela, 2004). Measures required to enhance the **positive impacts** of a development project should be emphasised and detailed in the EMPr (DWAF, 2002). According to the DWAF (2002) an EMPr should not only consider mitigation of negative impacts and enhancement of positive impacts but also consider where further **enhancement of affected communities** could be included in the project. Bryony and Wilde (2012) state that EMPrs should include monitoring and management of **any climate-related risks** and adaptation measures. Mitchell highlights the main elements of mitigation in the EIA process as **Avoidance, Minimization and Compensation**. Figure 2 depicts Mitchell's hierarchy for mitigation measures (cited in Umar, 2010).

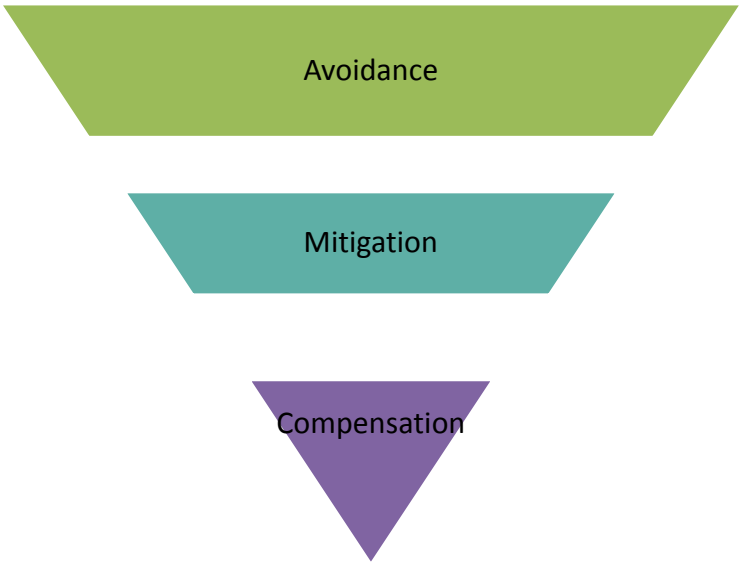


Figure 2: Mitchell's Mitigation Hierarchy

Source: Based on and cited in Umar (2010)

Table 2 provides overarching principles and objectives for mitigation measures. Although more levels exist, the principles are the same as those of Mitchell's model with avoidance being the most preferred and compensation the lease preferred option.

Table 3: Objectives of mitigation actions aimed at reducing adverse impacts

Objectives of mitigation actions aimed at reducing adverse impacts
Mitigation measures are aimed at eliminating, offsetting, or reducing adverse environmental impacts and could have a range of objectives, such as: ***Avoidance:*** Avoiding projects or activities that could result in adverse impacts; avoiding certain types of resources or areas considered to be environmentally sensitive. This

approach is most effective when applied in the earliest stages of project planning.

Prevention: Measures aimed at preventing the occurrence of negative environmental impacts and/or preventing such an occurrence having harmful environmental and social impacts.

Preservation: Preventing any future actions that might adversely affect an environmental resource. This is typically achieved by extending legal protection to selected resources beyond the immediate needs of the project.

Minimisation: Limiting or reducing the degree, extent, magnitude or duration of adverse impacts. This can be achieved by scaling down, relocating, or redesigning elements of a project.

Rehabilitation: Repairing or enhancing affected resources, such as natural habitats or water sources, particularly when previous development has resulted in significant resource degradation.

Restoration: Restoring affected resources to an earlier (and possibly more stable and productive) state, typically a 'pristine' condition.

Compensation: Creation, enhancement, or protection of the same type of resource at another suitable and acceptable location, compensating for lost resources. It should be noted that compensation may be a suitable mitigation measure for certain impacts of certain projects, but is often not a sustainable measure to implement.

Source: CSIR (2002) cited in Lochner (2005)

Table 2 highlighted the requirements for mitigation measures to ensure that implementation thereof will warrant sound environmental management. In order for mitigation measures to be successful, they must follow the Mitchell principles and link these principles to the requirements as depicted in Table 3 such as, to be **written, dated, and time and space specific**.

Table 4: Requirements for determining whether management actions are clearly defined

Requirements for determining whether management actions are clearly defined
To determine whether the management actions are adequately defined they need to satisfy the following key requirements: ***Written***: Management actions should be stipulated in writing, this forces the formulators to think through each action carefully. ***Dated:*** A management action must indicate a specific time by when the action should be implemented. ***Risk- or impact-specific:*** Each management action must link to a specific impact (either positive or negative) or environmental risk, and should be worded in specific terms rather than in general terms. ***Time and space specific:*** An indication must be given as to the conditions under which

the management action applies (continuously or only in the event of contingencies). The time (such as the season or time of day) and location of the application of the management action.

***Measurable**:* Management actions must, where possible, be quantitatively defined. A standard with which performance can be compared, must thus be set. Objectives and targets of the management action must be clearly stated.

Achievable: The management action must be realistic, feasible and hence achievable.

Reasonable: The management action must be readily implementable within the time and budget constraints of a project.

Timely: Measures must be put in place to coincide with specific project activities.

Understandable: Management actions must be described simply, using clear, non-technical language where possible.

Source: CSIR (2002) cited in Lochner (2005)

3.2.3.3. Objective and Targets

According to the DEAT (2004) an EMPr should contain environmental **objectives and targets** which the project proponent or developer needs to achieve. Various authors (DERT 2008; World Bank 1999; US EPA 1997) state that for each **objective** and its standards, specifically related **measurable criteria** should be included in order to **measure environmental performance**. Performance specifications must be provided for each management action, in order to assess whether the actions have been effective (Lochner, 2005). The measurement criteria should allow for direct measurement of performance by **inspection or audit**. Table 4 provides an example of how **objectives, targets and Indicators** should be allocated for each specific environmental aspect covered in an EMPr.

Table 5: Example of Environmental Objectives, Targets, and Indicators

Objective	• To work proactively to comply with all applicable environmental laws and regulations.
Environmental Indicators	• Regulatory Violations. • Facility Site Visits. • Compliance Assessments
Targets	• No violations or fines. • No uncontrolled environmental releases. • All facilities with environmental aspects inspected biennially.

Source: Anon (2012)

3.2.3.4. Cost Estimates and Penalties and Fines

Several authors (Hlela 2004; Wood 1999; Hill 2000; Puymbroeck 2002) note that a major problem negatively impacting on the use of EMPrs are (1) the lack **of financial resources**

or under-funding, and (2) the weaknesses of human and professional capacity (cited in Hlela, 2004). Baby (2011) and the World Bank (1999) therefore states that an EMPr should make provision for **cost estimates** for once off and reoccurring costs.

Hlela (2004) and Lochner (2005) suggest that the introduction of a **bonus and penalty system** (i.e. incentives or disincentives for conformance and non-conformance with the EMPr requirements) provide an excellent incentive to the contractor to adhere to the specifications, and would be a deterrent to ignoring them. A bonus system should, however, be planned properly to avoid financial and logistical problems (Hlela, 2004). Lochner (2005) goes on to state that the **bonus and penalty** system should be included in the tender documents and contracts, and be made clear to all project workers.

3.2.4. CHECKING

3.2.4.1. Monitoring, Auditing and Reporting

According to the DEAT (2004) the success of an EMPr lies in its effective implementation and that c**ompliance monitoring** is therefore crucial. Monitoring ensures that the environmental requirements stipulated in the EMPr are being complied with. The City of Seattle (1999) states that the **monitoring of environmental performance** is a key management tool for focusing attention on what gets measured, gets managed. It is also a critical aspect of the feedback loop (Plan, Do, Check, Act) because it provides information on whether programmes are achieving their intended results. In addition, monitoring provides a forewarning that negative impacts, whether predicted or not, are occurring. The NEMA (South Africa, 1998) therefore requires that proposed **mechanisms for monitoring compliance** with and performance assessment against the EMPr and **reporting thereon** be detailed in the EMPr.

Lochner (2005) and Sowman *et.al,* (1995) state that a **monitoring programme** should be prepared to determine the effectiveness of the management actions and to understand the actual residual impact of the construction and/or operations on the environment. The **monitoring programme** should clearly indicate the linkages between impacts, indicators to be measured, measurement methods and definition of thresholds that will signal the need for corrective actions (World Bank, 1999). By instituting **regular monitoring**, environmental impacts can be detected early and remedial action implemented (DEAT, 2004).

The DEAT (2004) confirm that **auditing** provides an opportunity and means by which to learn from experience, and to improve project design and implementation measures. Auditing also provides, more especially for regulatory authorities, a framework for checking compliance with, and performance of an EMPr (cited in Hlela, 2004). According Fry and Scott (2011), *a*uditing the documented outputs of impact assessment regimes is arguably

one of the most effective methods of ensuring efficient implementation of the process. The **timing and frequency of audits** should be included in the implementation schedule in the EMPr (Lochner, 2005). Sowman et al. (1995) further argue that periodic audits provide constructive feedback on the adequacy and effectiveness of an EMPr.

3.2.4.2. Documentation and Record keeping

Lochner (2005) and the Abu Dhabi EA (2010) state that an EMPr should include requirements for **record keeping and document control**. Copies of the EMPr, approvals, plans contained within the EMPr, training records or rosters, audits, monitoring data, and reports submitted to authorities must be kept and updated. These documents should be easily accessible for inspection.

3.2.5. CORRECTIVE ACTIONS

3.2.5.1. Pollution/Emergency Management

According to the Abu Dhabi EA (2010) an EMPr should outline the procedures established to respond to **emergencies** during construction and operational activities. The NEMA (1998) requires that an EMPr include, (1) a description of the manner in which it intends to **modify, remedy, control or stop any action**, activity or process which **causes pollution** or environmental degradation, (2) to **remedy the cause of pollution** or degradation and migration of pollutants and (3) the **process for managing any environmental damage and pollution** as a result of undertaking a listed activity.

3.2.5.2. Rehabilitation and Closure

The NEMA (South Africa, 1998) states that as far as reasonably practicable, **measures to rehabilitate the effected environment** including, where appropriate, **concurrent or progressive rehabilitation** measures must be included in an EMPr. Suitable **financial** provision for these rehabilitation activities should also be included in an EMPr (NEMA 1998; World Bank 1999). Where appropriate, **closure plans**, including closure objectives should also be included (NEMA, 1998).

3.3. Report Quality Review

3.3.1. The Lee and Colley Review Model

The Lee and Colley review package is designed to be self-contained and consist of advice for reviewers, a list of criteria to be used to evaluate each EIA report, and a collation sheet on which the findings should be recorded (Lee *et al*., 1999).

The reviewer commences the review at the lowest level, i.e. the base of the pyramid, which contains simple criteria relating to specific tasks and procedures. Then, drawing upon these assessments, he/she progressively moves upwards from one level to another in the pyramid applying more complex criteria to broader tasks and procedures in the process until the overall assessment of the ES has been completed (Lee *et al*., 1999).

The quality review involves evaluating how well a number of assessment tasks (sub-categories, categories and areas) have been performed. The reviewer commences the review at the lowest level (sub-categories), which contains simple criteria relating to specific tasks and procedures (Lee *et al*., 1999). Figure 4 depicts the different assessment levels of the Lee and Colley (Lee *et al*., 1999) review package.

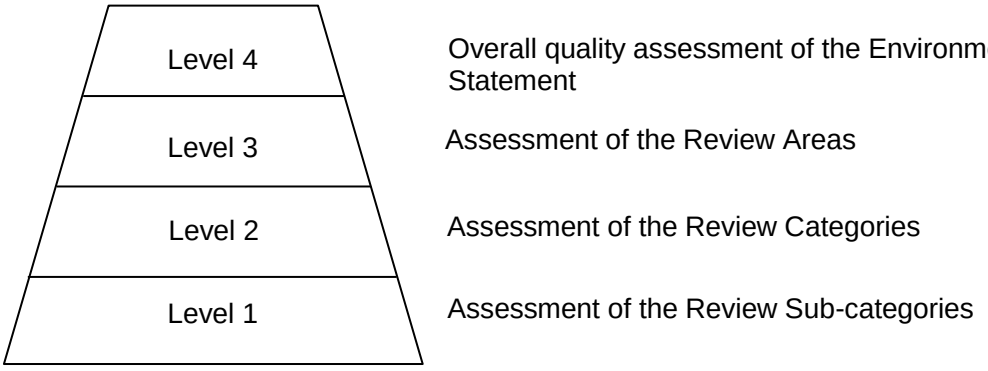


Figure 3: Hierarchical structure of Lee and Colley review package
Source: Lee *et al.* (2009)

The reviewer evaluates each review topic based on the criteria as depicted in Table 5. The review topics are assessed on a scale of A–F. The Scores of A–C reflect a satisfactory quality and D–F an unsatisfactory quality (Lee *et al*., 1999).

Table 6: List of assessment symbols

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

Source: Lee *et al.* (1999)

CHAPTER 4

4. DATA ANALYSIS AND RESULTS

This chapter presented the result for research question 1 (***What can be regarded as high-quality criteria for EMPrs? i.e. The EMPr review package)***, research question 2 ***(What is the quality of a sample of South African EMPrs when applying the review package?)*** and research question 3 ***(What is the usefulness of the EMPr review package when reviewing EMPrs?)***.

4.1. The EMPr quality review package

This section presents the EMPr review package and thereby answers research question 1 (***What can be regarded as high-quality criteria for EMPrs?).*** The review package contains criteria regarded as high quality criteria for EMPrs as derived from the literature. The review sub-categories depicted in Table 7 were derived from the requirements as discussed per review area in section 3.2.

Table 7: The EMPr quality review package

NO.	EMPr QUALITY CRITERIA DEVELOPED
Review Area 1: Project Overview	
1.1	**Project Detail and Overview**
1.1.1	A brief **description of the project** must be provided in order to place the EMPr in context, including its **location, coordinates and a full property description** (reference should be made to EIA reports, if relevant).
1.1.2	A detailed **description of the aspects of the activity** that are covered by the EMPr must be provided pre-feasibility, feasibility, detailed engineering and design, implementation (construction), operational, decommissioning. **Activities** associated with the **different phases should be clearly defined** and associated impacts documented.
1. 1.3	**Preliminary designs** (if available), infrastructural requirements and size of the development should be included. (Reference should be made to EIA reports, if relevant).
1.2	**Impact Summary**
1.2.1	A **summary** should be provided of the predicted **positive and negative impacts** (either directly or indirectly resulting from the activity) associated with the proposed project that requires management actions.
1.3	**Receiving Environment & Baseline Environmental Data**
1.3.1	The EMPr should include a description of **baseline environmental conditions** at the project site and surrounding area, including biological and socio-economic conditions. (Reference should be made to EIA reports, if relevant).

NO.	EMPr QUALITY CRITERIA DEVELOPED
1.4	**Maps, Layouts, Photos and Facility Illustrations**
1.4.1	The EMPr should provide maps that show the **geographic location** (Locality Maps) of the project area and its **surrounding**s (Reference should be made to EIA reports, if relevant).
1.4.2	**Maps and possibly photographs** should include detailed **site layouts prescribing the site camp area, lay down areas and spoil sites as well as its location to sensitive receptors** (reference should be made to EIA reports, if relevant).
1.5	**Legal Requirements**
1.5.1	The EMPr should **identify legislation, standards, guidelines** and **associated licenses/permits** that apply to the project and are related to management activities specified in the EMPr.
1.5.2	EMPrs should **integrate the terms of operational approvals, such as permits and licences**. Information on any **permit and licence** requirements must be included in the EMPr. Reference should be made to approvals and requirements.
Review Area 2: Institutional Arrangements	
2.1	**Drafter Information**
2.1.1	The EMPr **drafter's qualifications and expertise** must be displayed in the EMPr.
2.2	**Roles, Responsibilities and Communication**
2.2.1	The **roles and responsibilities** of the persons who will be responsible for the implementation of the mitigation measures should be clearly defined.
2.2.2	The EMPr should detail the **communication channels** to be followed as well as **responsibilities in term of communication** (internal and external) (who communicates what).
2.2.3	The EMPr should make provision for **regular environmental site meetings** to update all parties on the environmental compliance of the project.
2.3	**Stakeholder Engagement**
2.3.1	The EMPr should specify the **stakeholder engagement process** to be followed during EMPr implementation.
2.3.2	The EMPr should make provision for **sufficient public involvement** i.e. environmental monitoring committees and forums for **stakeholders to raise their concerns**.
2.4	**Environmental Awareness and Training**
2.4.1	The EMPr should specify the requirements in terms of **training and environmental awareness (Awareness Programme)** for all site and other project personnel to ensure that the actions specified in the EMPr are implemented effectively and efficiently.

NO.	EMPr QUALITY CRITERIA DEVELOPED
2.5	**Environmental Management Systems**
2.5.1	The EMPr should link to the Project Proponent's **existing policies, guidelines** and commitments relating to health, safety and environment (If applicable).
2.5.2	The EMPr should make provision for the **"Plan, Do, Check, Act"** model for ongoing improvement and where applicable link to the proponent EMS.
2.6	**Management Commitment and Review**
2.6.1	Provision should be made for **reviews of the EMPr at key stages** in the life-cycle of the project to revise the EMPr.
2.6.2	Provision must be made to ensure **commitment by all levels of managemen**t and the **workforce**.
Review Area 3: Implementation Strategy and Management Measures	
3.1	**Implementation Programme**
3.1.1	**Clear timeframes** should be depicted within which the measures contemplated in the EMPr must be implemented.
3.2	**Description of Mitigation/Management Measures**
3.2.1	The EMPr should contain information on any proposed **management or mitigation measures** that will be taken to address the environmental impacts that have been identified **for all phases** of a project.
3.2.2	Mitigation measures should make provision for ***Avoidance, Prevention, Preservation, Minimisation, Rehabilitation, Restoration and finally Compensation***.
3.2.3	Mitigation measures must be ***Measurable*****,** ***Achievable*****,** ***Reasonable*****,** ***Time and space specific.***
3.2.4	Mitigation measures must be **site specific**, **practical, feasible and cost effective,** described in detail and **accompanied by designs** where applicable.
3.2.5	The management/mitigation measures should make provision to **enhance the benefits** of the project.
3.2.6	Mitigation measures must make provision for the monitoring and management of **climate change-related risk** (extreme flooding, extreme droughts, rising water levels).
3.2.7	The EMPr should consider where **further enhancement of affected communities** could be included in the project **(community projects, use of local labour).**
3.2.8	To improve the implementation of mitigation measures, **MSs or SOPs** should be developed for all activities on site.

NO.	EMPr QUALITY CRITERIA DEVELOPED
3.3	**Objective and Targets**
3.3.1	EMPrs should include environmental performance **objectives, standards and measurement criteria** that address the legislative and other controls that manage the environmental features of the activity.
3.3.2	For each **objective and its standard**, specifically related **measurable criteria** should be included in order to measure environmental performance.
3.4	**Cost Estimates and Penalties and Fines**
3.4.1	The EMPr should make provision for **cost estimates** for **initial and recurring expenses** for implementation of the EMPr, including provision for: mitigation and enhancement actions, training and environmental awareness requirements, monitoring, auditing, corrective actions and rehabilitation.
3.4.2	Provision must be made **for budgetary requirements** for achieving all identified EMPr activities during project implementation.
3.4.3	The EMPr should include **a bonus and penalty system** to encourage good compliance.
Review Area 4: Checking	
4.1	**Monitoring, Auditing and Reporting**
4.1.1	The proposed **methods for monitoring compliance** with and performance assessment against the environmental management programme and reporting thereon should be included.
4.1.2	The **monitoring programme** should clearly indicate the link between impacts, indicators to be measured and measurement methods.
4.1.3	The **timing and frequency of internal and external audits** should be included in the implementation schedule in the EMPr.
4.1.4	The EMPr should stipulate the **reporting procedures** and practices to be followed during EMPr implementation.
4.2	**Documentation and Record keeping**
4.2.1	The EMPr should **stipulate the document handling and record keeping system** that is to be followed for all EMPr documentation (**Incident registers, complaints register, training records, monitoring and auditing reports, and Waste documentation**).
Review Area 5: Corrective Action	
5.1	**Pollution/Emergency Management**
5.1.1	**Emergency management measures** should be included to **modify, control or stop** any action, activity or process which causes pollution or environmental degradation.

NO.	EMPr QUALITY CRITERIA DEVELOPED
5.1.2	Provision should be made to **remedy the cause of pollution** or degradation and migration of pollutants.
5.1.3	Clear **communication channels** must be identified in the case of unexpected events that require **rapid remedial action**.
5.2	**Rehabilitation and Closure**
5.2.1	The EMPr should include, as far as reasonably practicable, measures to **rehabilitate** the environment affected by the undertaking of the listed activity (Reference should be made to EIA reports, if relevant).
5.2.2	The EMPr should contain where appropriate, **closure plans, including closure objectives**.

4.2. Application of Review Package to SA EMPrs (i.e. quality of EMPrs in SA)

This section presented the results of the EMPrs on completion of the review process and thereby answers research question 2 ***(What is the quality of a sample of South African EMPrs when applying the review package?)***. Key shortfalls of the EMPrs were discussed and are depicted in table/figure format. Trends and patterns have been investigated and reported on.

4.2.1. Overall Results and Analysis

Twenty (20) South African EMPrs from the following sectors, (1) Residential, (2) Linear and (3) Waste Water were reviewed based on the criteria of the EMPr review package. The sample included EMPrs from the following provinces: Gauteng Province, Western Cape Province, Mpumalanga Province and Limpopo Province. The majority of the EMPrs reviewed were compiled as part of an EIA process, either a full EIA or a Basic Environmental Assessment (BAR) (17 of the EMPrs). Two of the EMPrs were compiled for activities that did not trigger any listed activities and one (1) EMPr was submitted as part of an exemption application under the 2006 NEMA (South Africa, 1998) regulations. As a result of the above, information contained in the EIRs & BARs should be seen as an extension of the content of the EMPrs. These documents were, however, not reviewed as part of the EMPr review process. The review process did, however, make provision for the inclusion of all areas where the EMPrs referred to content or supplementary documents such as the EIR, BAR and specialists studies.

4.2.2. Overall Quality of the EMPrs

The analysis of the overall quality of the EMPrs revealed that only five (5) EMPrs were graded as satisfactory (A-C), with C being the highest grade. Six (6) of the EMPrs achieved

a grade of D whilst none of the EMPrs could be described as well performed (A-B). Eight (8) of the 20) EMPrs graded unsatisfactory, scoring E grades; with one (1) EMPr grading an F. Overall it can be concluded that only five of the EMPrs have adequate information, or close to adequate information, for sound environmental management. Figure 5 depicts the overall grades of the sampled EMPrs.

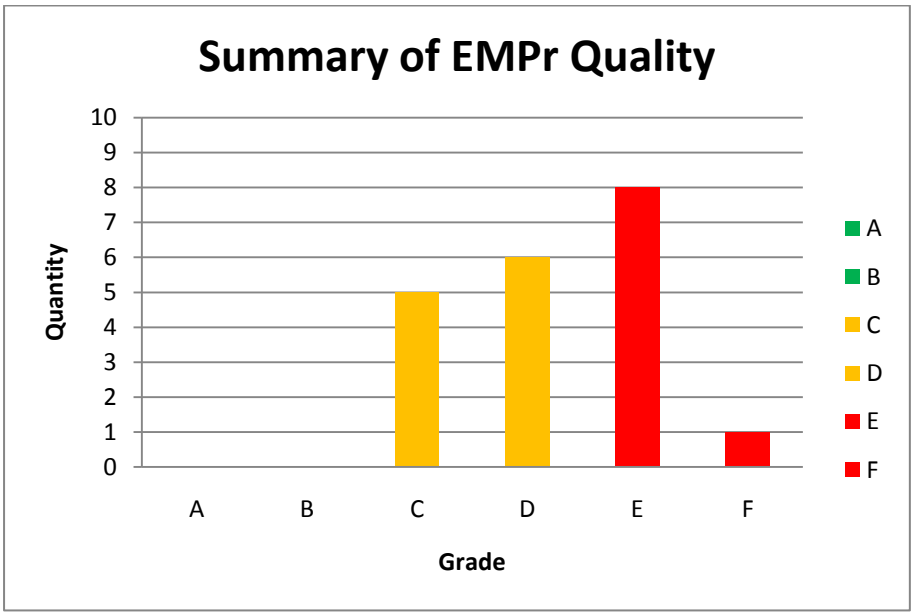


Figure 4: Summary of EMPr quality

Overall the EMPrs did not perform very well. There is no clear evidence that the EMPrs compiled as part of an EIA process performed better that those EMPrs that were compiled as stand alone documents. The two stand alone (not part of EIA) EMPrs scored a D and an E grades respectively. Eight (8) of the EMPrs that where prepared as part of an EIA process scored an E grade, and one scored an F grade. The two best performing EMPrs were both from the Waste Water sector. The EMPr that received the poorest grade, an (F), was for the construction of a road.

In general it appears that the quality of the EMPrs was largely depended on the firm and possibly the skill level of the person who prepared the EMPr, as the quality of EMPrs from firm to firm was clearly evident. According to Sandham *et al.,* (2008) the poor performance in the mitigation section of EIRs could be attributed to the drafter's skill level as predictions based on scientific data must be made in these sections. Sandham et al. (2008a) also state that differences of opinion or skill may begin to play a role in how well an EIR is compiled. Bonde and Cherp (2000), who reviewed the quality of SEA reports, also found that one of the major factors perceived as determining the quality of SEA reports was the expertise and the motivation of the staff involved in the preparation of SEAs. It appears that the same can be said for when it comes to the compilation of EMPrs as the quality of EMPrs differed significantly in terms of high-quality input.

Of the 20 EMPrs that were reviewed, three (3) linked in some form and level to the proponent EMS. These three (3) EMPrs scored C, D and D grades respectively, on average performing better than the rest of the EMPrs. The lack of applying the principles of the Deming Model i.e. Plan, Do, Check and Act (PDCA) in all the EMPrs are clearly evident, which might explain the poor performance. Linking and incorporating EMS principles into EMPr development has the potential to improve the quality of an EMPr.

Table 8 highlights the key strengths and weaknesses of the sample EMPrs reviewed. These strengths and weaknesses are, however, not strengths as defined by the Lee and Colley (Lee *et al*., 1999) grading scale, but rather a summary of the best and worst performing criteria of the sample EMPrs.

Table 8: Strengths and Weaknesses of the South African EMPrs

STRENGTHS	WEAKNESSES
• Roles and Responsibilities; • Training and Awareness; • Legal requirements; and • Description of mitigation measures.	• Project detail and Overview; • Baseline Environmental conditions; • Maps, Layouts and Facility Illustrations; • Objectives and Targets; • Emergency Management Procedures; • Stakeholder engagement; • Implementation Timeframes; • Documentation and record Keeping; • Rehabilitation and Closure.

In analysing the scores of the five review areas, it is evident from Figure 6 that Review Area 3 (Implementation Strategy and Management Measures) had the lowest satisfactory score, with 0% of the scores between A and C. The second lowest percentage of A-C scored was for Review Area 4 (Checking). Review area 1 (Overview) and review area 2 (Institutional Arrangement) both scored 30% satisfactory scores with review area 5 (Corrective Action) performing the best, scoring 45%.

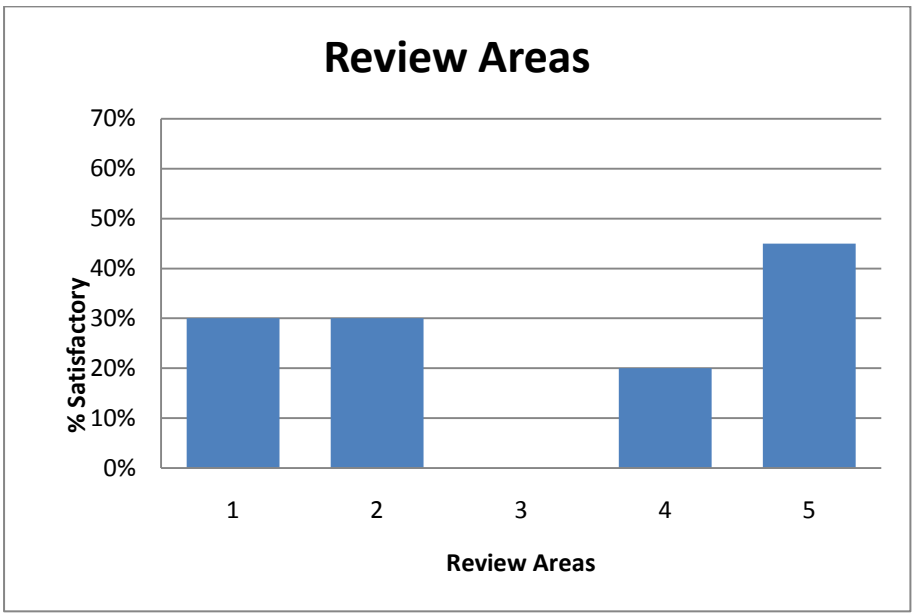


Figure 5: Percentage scores for A-C (satisfactory scores) of the five review areas

4.2.3. Summary of Findings

Table 9 provides a summary of the scores for all the categories assessed with the associated satisfactory percentage (scores between A–C) for each criteria. Please refer to Appendix A for a complete set of grades for each Review Area, Review Category and Review Sub-Category.

Table 9: Summary of Results

Summary of Scores - Review Area 1		A	B	C	D	E	F	NA	%A-C
1.1	Project Detail and Overview	1	2	3	5	6	3	0	30%
1.2	Impact Summary	1	5	0	14	0	0	0	30%
1.3	Receiving Environment & Baseline Environmental Data	3	3	2	0	0	12	0	40%
1.4	Maps, Layouts, Photos and Facility Illustrations	0	1	1	5	3	10	0	10%
1.5	Legal Requirements	1	1	3	5	8	2	0	25%
Summary of Scores - Review Area 2		**A**	**B**	**C**	**D**	**E**	**F**	**NA**	**%A-C**
2.1	Drafter Information	5	0	1	1	0	13	0	30%
2.2	Roles, Responsibilities and Communication	1	1	5	8	4	1	0	35%
2.3	Stakeholder Engagement	3	3	6	0	0	8	0	60%
2.4	Environmental Awareness and Training	4	6	3	3	2	2	0	65%
2.5	Environmental Management Systems	0	0	2	4	2	12	0	10%
2.6	Management Commitment and Review	0	0	2	4	2	12	0	10%
Summary of Scores - Review Area 3		**A**	**B**	**C**	**D**	**E**	**F**	**NA**	**%A-C**
3.1	Implementation Programme	0	0	0	0	0	20	0	0%

3.2	Description of Mitigation/Management Measures	0	2	4	7	7	0	0	30%
3.3	Objective and Targets	3	0	0	0	11	6	0	15%
3.4	Cost Estimates and Penalties and Fines	0	0	1	2	8	9	0	5%
Summary of Scores - Review Area 4		**A**	**B**	**C**	**D**	**E**	**F**	**NA**	**%A-C**
4.1	Monitoring, Auditing and Reporting	0	0	4	5	10	1	0	20%
4.2	Documentation and Record keeping	1	4	5	7	3	0	0	50%
Summary of Scores - Review Area 5		**A**	**B**	**C**	**D**	**E**	**F**	**NA**	**%A-C**
5.1	Pollution/Emergency Management	0	6	1	4	6	3	0	35%
5.2	Rehabilitation and Closure	1	4	7	3	2	2	1	60%

From Table 9 it is evident that only three (3) of the review categories scored 60% or higher, whilst the majority of the scores are below 50%. These were discussed in more detail in section 4.3.

4.3. Analysis and Discussion per Review Area

4.3.1. Review Area 1 - Project Overview

Review Area 1 contains the criteria for the evaluation of information of the description of the project. These include project detail and overview, impact summary, receiving environment and baseline environmental data, maps, layouts, photos and facility Illustrations and legal requirements. These criteria provide important information needed to place the EMPr in context. The analyses of the review categories are reflected in Figure 7. The scores are depicted in percentage satisfactory scores (A-C) of each of the five review categories.

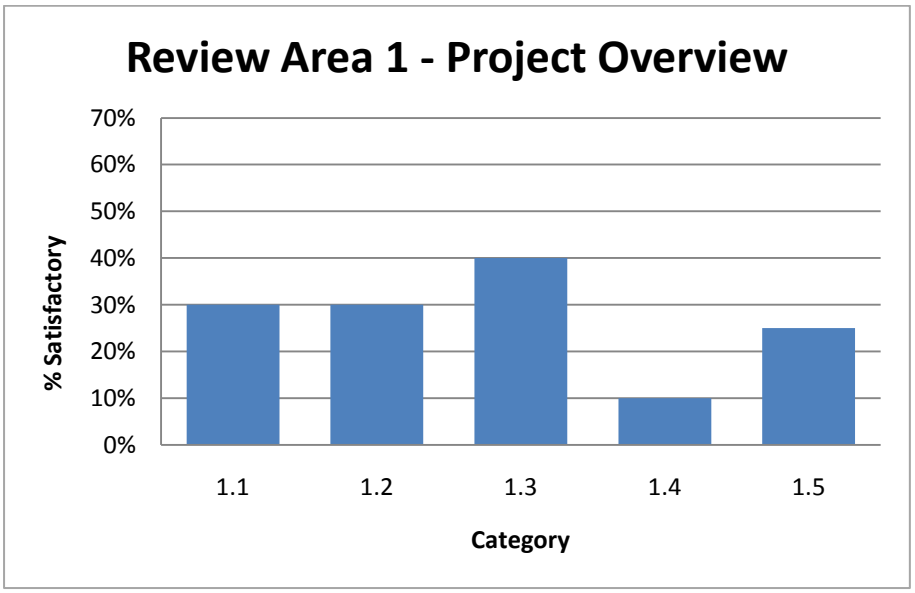


Figure 6: Percentage scores for A-C (satisfactory scores) of Review Area 1

Based on the analysis of the result, the following have been concluded for each review category assessed under review area 1.

4.3.1.1. Project Detail and Overview - Category 1.1

Only 30% of the EMPrs scored a satisfactory (A-C) grade, with the majority of the EMPrs not providing sufficient information with regards to project detail and overview. In most of the instances it was unclear as to what activities the EMPr is suppose to manage. Most of the EMPrs never discussed the activities that will have an impact on the environment. Only 5% of the EMPrs referred to the BAR for additional information.

Case studies that underwent a quality review assessment based on the Lee and Colley (Lee *et al*., 1999) review package, found that the description of the project and the environment tended to be better performed areas (European Commission, 1996; Lee, 2000, cited in Van der Vyver, 2008). Van Heerden (2010) also found that the project and environmental description review area are the best performing review area amongst South African EIR reports when comparing 1997 and 2006 EIR reports. The lack of project detail in the EMPrs is therefore the opposite than those of the EIRs. It appears that the information contained in the EIRs is not sufficiently transferred and included in the EMPrs.

4.3.1.2. Impact Summary - Category 1.2

Only 30% of the EMPrs scored a satisfactory (A-C) grade, providing a summary of the impacts anticipated. The majority of the EMPrs did not quantify impacts in terms of it being positive and negative, direct or indirect, long term and short term, recurring and non-recurring, regional and local, cumulative and non-cumulative, reversible and irreversible. No references were made in the EMPrs to any EIA documents whatsoever to put this section into context, except for 5%.

Van der Vyver (2008) found that EIRs for the explosive industry scored poorly in terms of the executive summary of main findings and executive summary of main issues. Van Heerden (2010) confirmed that the identification of key impacts were the poorest with a lack of specific information and information on impacts derived from deviation from baseline conditions. The lack of providing a summary of key impacts in the EMPrs could possibly be linked to the lack of detail in the EIRs.

4.3.1.3. Receiving Environment and Baseline Environmental Data - Category 1.3

Only 40% of the EMPrs scored a satisfactory (A-C) grade, sufficiently describing the receiving environment and the baseline environmental conditions to put the sensitivity of the project into context. EMPrs lacking this detail did not make reference to any EIA documents. The reader is unable to obtain a holistic overview of the project due to the lack of

information. Van Heerden (2010), however, concluded that the description of the baseline conditions amongst EIRs in South Africa performed the best. Sandham *et.al* (2008a), also found that the description of the development, local environment and base line studies were well done.

From the above South African case studies it appears that the receiving environment and baseline environmental data in South African EIRs is of a good quality. The same can, however, not be said for South African EMPrs. Information contained in EIRs is once again not sufficiently incorporated into EMPrs to provide the user with sound information.

4.3.1.4. Maps, Layouts, Photos and Facility Illustrations - Category 1.4

Only 10 % of the EMPrs scored a satisfactory (A-C) grade, with 35% of the EMPrs including some maps and diagrams. Only 5% of the EMPrs referred to the BAR for additional information. Although preliminary designs and plans should be included in EIRs and BARs very little or no designs were found in the EMPrs providing the user with suitable information. There are no indications of sensitive or no-go areas. No references are made to specialists reports either.

The EMPrs do not include any form of site layout maps indicating where i.e. site offices or the workers labour camps must be erected by considering environmental sensitivities. This action is left for the project manager to decide. The EAP, should based on the information collected during the EIA process, prescribe what should happen where. It appears that the environmental impacts of these areas during the construction phases of a project are not sufficiently considered as mitigation measures do not prescribe where what should happen.

The lack of detail during the EIA phase in terms of the construction method etc. is a reality, however, the EAP at the time of drafting the EIR knows where sensitive areas exist on the project site and can, based on that information, prescribe and produce a map of areas that should be avoided.

4.3.1.5. Legal Requirements - Category 1.5

In general, all of the EMPrs made reference at some level to environmental legislation applicable to the project. However, only 10% of the EMPr scored a satisfactory (A-C) grade, describing these requirements in sufficient detail, making provision for the integration of operational approvals, such as permits and licences into the EMPr.

It is acknowledged that not all of the EMPrs, at the time of being drafted/amended had additional approvals such as Record of Decision, Environmental Authorisation or Water Use License etc. hence these requirements could not have been included in the EMPr. However,

the majority of the EMPrs did not mention that an approval will be/might be obtained and that it should form part of the EMPr and project requirements.

4.3.2. Review Area 2 - Institutional Arrangements

Review Area 2 contains the criteria for the evaluation of institutional arrangements. These include the drafter's information, roles, responsibilities and communication, stakeholder engagement, environmental awareness and training, environmental management systems, management commitment and review. These criteria provide important information needed to ensure that all the measures (skill, commitment etc) required for the sound implementation of the EMPr have been considered. The analyses of the review categories are reflected in Figure 8. The scores are depicted in percentage satisfactory scores (A-C) of each of the six review categories.

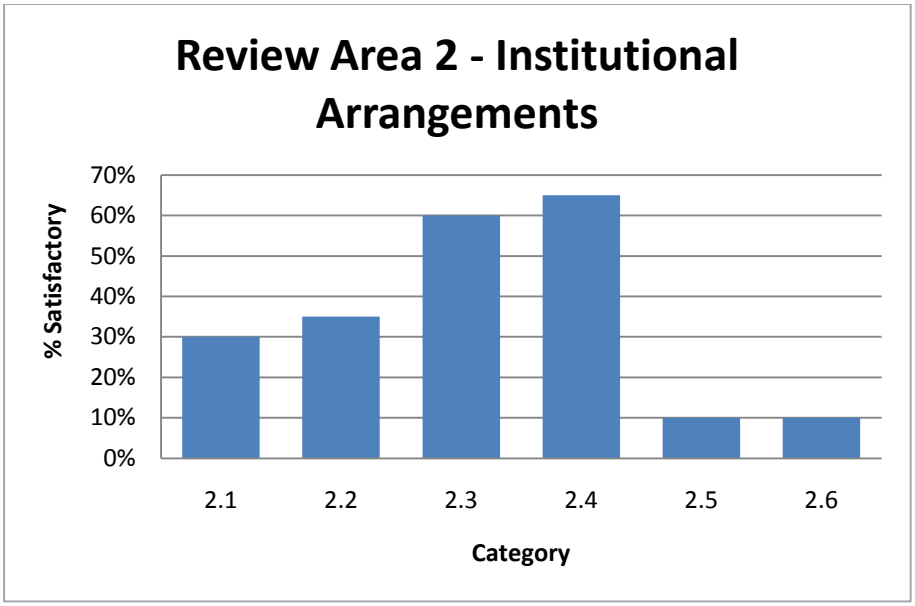


Figure 7: Percentage scores for A-C (satisfactory scores) of Review Area 2
Source: Own Creation (2012)

Based on the analysis of the result, the following have been concluded for each review category assessed under Review Area 2.

4.3.2.1. Drafter Information - Category 2.1

Only 30% of the EMPrs scored a satisfactory (A-C) grade for review category 2.1. Although the requirement for the inclusion of the drafter's qualification and experience only became a requirement with the publication of the NEMA (1998) amendments in August 2010, a number of EMPrs which predate the enactment date included this information. On the other hand, EMPrs compiled after the 2010 amendments to the NEMA (1998) did not include the drafter's information despite it being a NEMA (1998) requirement.

4.3.2.2. Roles, Responsibilities and Communication - Category 2.2

Roles and Responsibilities for the implementation of the EMPrs were mostly only generally described with 35% of the EMPrs scored a satisfactory (A-C) grade. Only 15% of the EMPrs made no mention of roles and responsibilities at all. A general concern, however, with the roles and responsibilities sections of the EMPrs is the way in which responsibilities which are environmental related are transferred to, for example the Site Manager (SM) or the Resident Engineer (RE). For instance, an EMPr would state that no-go areas shall be determined by the RE. REs and SMs are not necessarily qualified environmentalists and are not familiar with environmental legislation; therefore they cannot have such responsibilities.

Internal and external communication was not always clearly defined, especially during emergency situations (in the event of major pollution) and when the authority should be consulted.

4.3.2.3. Stakeholder Engagement - Category 2.3

Although 60% of the EMPrs scored a satisfying grade, in general the stakeholder engagement process throughout the EMPrs seemed to be lacking. Only 15% of the EMPrs clearly described how and in what manner stakeholder engagement will take place. Generally the entire stakeholder engagement process seems to be a part of the management process which receives less attention than other aspects. Most of the EMPrs refer to a stakeholder complaints register that will be updated but the engagement processes are not clearly defined.

4.3.2.4. Environmental Awareness and Training - Category 2.4

Even thought 65% of the EMPrs scored a satisfactory (A-C) grade, the level of detail is insufficient. A number of the EMPrs stated that an environmental awareness programme must be developed either by the Contractor or the Project Manager (PM). The EAP should, based on the sensitivity of the project, prescribe who should receive what level of training. This should not be left for a Contractor or PM to decide.

4.3.2.5. Environmental Management Systems - Category 2.5

Only 10 % of the EMPrs scored a satisfactory (A-C) grade, with only 15% of the EMPrs linking in some form and level to the proponent’s EMS. The overall quality of these EMPrs was on average better compared to the rest of the EMPrs. This could be attributed to the fact that these EMPrs are compiled in line with the overarching principle of an EMS.

4.3.2.6. Management Commitment and Review - Category 2.6

Only 10 % of the EMPrs scored a satisfactory (A-C) grade, making suitable provision for ongoing review and updating of the EMPr at key stages of the project or when unexpected incidents occurred that were not sufficiently addressed by the EMPr. The rest of the EMPrs did not make any reference to updating the EMPrs.

Another area that was absent throughout all of the EMPrs reviewed, were the lack of commitment from all levels of the project team to ensure that the requirements of the EMPr are being adhered to at all times.

4.3.3. Review Area 3 - Implementation Strategy and Management Measures

Review Area 3 contains the criteria for the evaluation of the proposed implementation strategy and management measures required to mitigate environmental impacts. These include implementation programme, description of mitigation/management measures, objective and targets, cost estimates and penalties and fines. These criteria provide important information needed to ensure that mitigation measures are implemented within set timeframes to avoid, minimise and mitigate the anticipated impacts. The analyses of the review categories are reflected in Figure 9. The scores are depicted in percentage satisfactory scores (A-C) of each of the four review categories.

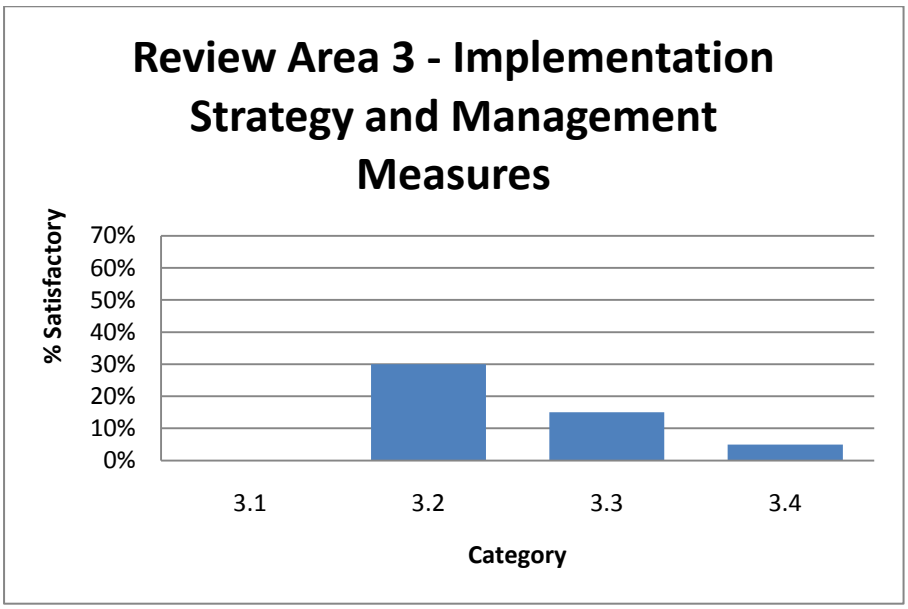


Figure 8: Percentage scores for A-C (satisfactory scores) of Review Area 3

Based on the analysis of the result, the following have been concluded for each review category assessed under review area 3.

4.3.3.1. Implementation Programme - Category 3.1

For review category 3.1, none of the EMPrs scored a satisfactory (A-C) grade. One of the requirements of the NEMA (1998) is that clear timeframes should be depicted within which the measures contemplated in the EMPr must be implemented. None of the EMPrs made any reference to implementation timeframes. The poor performance of all of the EMPrs in the implementation programme section could be as a result of the uncertainty and lack of information available during the EIA phase of a project.

4.3.3.2. Description of Mitigation/Management Measures - Category 3.2

For review category 3.2, 30% of the EMPrs scored a satisfactory (A-C) grade, even though all of the EMPrs included proposed management/mitigation measures. The levels of detail of each proposed mitigation measures, however, differed significantly from EMPr to EMPr. Most of the time, proposed mitigation measures focused more on remediation of impacts rather than avoidance and prevention (i.e. managing impacts and not aspects). A number of the proposed mitigation measures cannot be measured, making monitoring and audit impossible. According to Nadeem & Hameed (2006), who reviewed the adequacy of EIA reports from Pakistan, the scope of the effectiveness of mitigation measures embraced both the construction and operation stages but were limited to environmental impacts and in 50% of the cases to human health.

The majority of the mitigation measures in the EMPrs reviewed were generic and not site specific. Mitigation measures were vague and did not provide sufficient detail to the reader. EAPs are not prescriptive enough when defining mitigation measures. In a number of instances a mitigation measure would state that for example, “no-go area must be demarcated prior to the commencement of construction”. EAPs must state that “based on the finding of the specialist studies, the area next to the river must be demarcated and be seen as a no-go area”. Mitigation measures should be more prescriptive. Two (2) of the 20 EMPrs had mitigation measures that were accompanied by designs. These designs were either by means of photographs from previously implemented mitigation measures or simple illustrative drawings. Mitigation measures are much clearer when accompanied by basic illustrations or photographs.

A key shortfall of the majority of the EMPrs is the lack of mitigation measures in promoting the enhancement of positive aspects of a project. One (5%) of the EMPrs included the local community by getting them involved in the eradication of alien vegetation and producing firewood. The lack of guidance from the EAP in this regard is once again evident. All other EMPrs did not consider enhancement at all.

Although climate change and its incorporation into the EIA process is a fairly new concept, none of the EMPrs made any provision for climate change related risks. Six (6) of the twenty (20) the EMPrs ranked were for WWTW. All of these WWTW are constructed within river floodplains and low-lying areas; however no provision was made in the event of a major flood which might cause the works to shut down completely, causing major pollution. where residential units are being construction with the 1:100 year floodline, EMPrs also did not consider climate change risks such as flooding and rising water levels.

Case studies that underwent a quality review assessment based on the Lee and Colley (Lee *et al*., 1999) review package, found that the mitigation section of international EIRs tended to be less well performed (European Commission, 1996; Lee, 2000, cited in Van der Vyver, 2008). Kabir et.al (2010) also found that in Bangladesh, EIR reports performed the worst in the impact assessment and management measures sections. Results on the quality of Lesotho EIR reports concluded that non-specific mitigation measures and the lack of commitment to implement mitigation measures were the main cause for poor performance (Talime, 2011).

An assessment of EIRs for projects with the potential of affecting wetlands in South Africa by Sandham *et.al* (2008a), confirmed these result. Review Area 3 (Alternatives and mitigation of impacts) and Review Area 2 (Identification and evaluation of key impacts) were the weakest. Van Heerden (2010) found that commitment to mitigation and record of commitment to mitigation measures performed the worst. It could thus be assumed that the lack of detailed and specific information on impact identification and mitigation measures in EMPrs is as a result of the poor performance of these specific sections in EIRs.

A quality review on EIRs done by Van der Vyfer (2008), for EIRs in the explosive industry projects in South Africa, concluded that mitigation measures and how mitigating measures should be implemented as well as the effectiveness of these measures were of poor quality. It appears that the lack of detail in proposed mitigation measures to manage anticipated impacts are a fairly general problem. A study done by Sandham *et.al* (2008b), on the quality of EIRs in the mining sector of South Africa found that the mitigation section of the EIRs was the weakest.

Method Statements (MS) were noted to be fairly common and popular throughout the EMPrs to assist in the management of specific work related activities that require additional management measures. A concern however with method statements, is the fact that in many instances the project manager of the resident engineer with no formal environmental training must approve the method statements.

4.3.3.3. Objectives and Targets - Category 3.3

Only 15% of the EMPrs scored a satisfactory (A-C) grade and included objectives and targets for each aspect being managed. Overall the objective and target sections of the EMPrs were inadequate. Clear objectives, targets and indicators must be set for each mitigation area.

4.3.3.4. Cost Estimates and Penalties and Fines - Category 3.4

Review Area 3.4 received the lowest grades with only 5% of the EMPrs scoring a satisfactory (A-C) grade, making suitable provision for initial and recurring expenses for the implementation of the EMPr. No mention was made of rehabilitation cost or rectification cost due to impacts that occurred as a result of negligence.

Most of the EMPrs somewhere mentioned that some form of budgeting should be considered to ensure that the EMPr can be implemented. However, it is vague, unclear and does not provide the tendering project team with sufficient guidelines in term of the monies needed to implement the EMPr. According to Umar (2010), EIA practitioners should endeavour to include in the EIA reports the cost-benefit analysis of implementing mitigation measures such that developers are aware of the costs involved right from project design before approval by the Authority.

Although a number of EMPrs made reference to some form of a bonus and penalty system, only one EMPr described the process in detail. In various instances, the EMPr heading will state “Bonuses and Penalties”; however, the description that followed only described a penalty system with no references to bonuses or incentives. The lack of providing adequate incentives should be considered as this will change behaviour and compliance.

4.3.4. Review Area 4 - Checking

Review Area 4 contains the criteria for the evaluation of whether the EMPr is being implemented according to specification and to evaluate implementation performance. These include monitoring, auditing and reporting and documentation and record keeping. These criteria provide important information needed to verify whether or not objectives and targets are being met and if the proposed management measures are effectively managing the anticipated impacts. The analyses of the review categories are reflected in Figure 10. The scores are depicted in percentage satisfactory scores (A-C) of the two review categories.

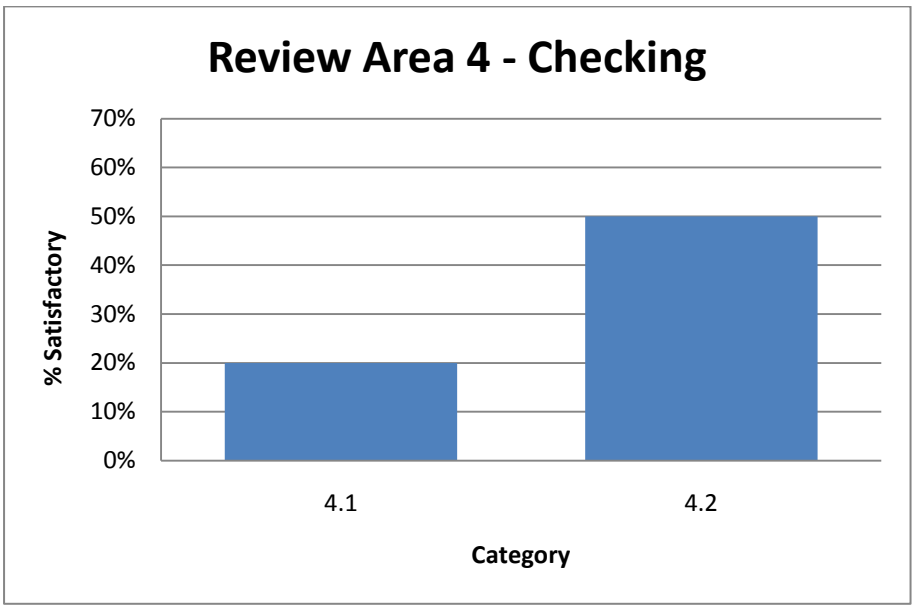


Figure 9: Percentage scores for A-C (satisfactory scores) of review area 4

Based on the analysis of the result, the following have been concluded for each review category assessed under review area 4.

4.3.4.1. Monitoring, Auditing and Reporting - Category 4.1

In general, the majority of the EMPrs made reference at some level as to how monitoring, auditing and reporting will take place; however only 20% of the EMPrs graded satisfactory (A-C). Only 5% of the EMPrs had a well established monitoring programme where the link between impacts, indicators to be measured and measurement methods were clearly defined. Most of the EMPrs did not make specific reference as to how, when and by whom environmental monitoring will be undertaken. Van Heerden (2010) found that the monitoring arrangements proposed in South African EIRs were one of the worst scoring categories.

The timing and frequency of internal and external audits were not well defined and once again left to the discretion of the Site Manager or the Resident Engineer. Generally the reporting requirements were defined, however in some instances the level of reporting was not well defined.

4.3.4.2. Documentation and Record keeping - Category 4.2

A weak area throughout the EMPrs is the documentation and record keeping process to be followed. As depicted in Figure 10, 50% of the EMPrs graded as satisfactory. The process of documenting and keeping record of environmental activities on site is not clear. The entire document and record keeping process is not being used to improve environmental performance, but rather just as a recording procedure. It appears that the principles of the Deming model (i.e. plan, do, check, and act) are not being applied at EMPr level.

4.3.5. Review Area 5 - Corrective Action

Review Area 5 contains the criteria for the evaluation of whether sufficient provision has been made to manage emergency situations and subsequently to remediate affected areas. The analyses of the review categories are reflected in Figure 11. The scores are depicted in percentage satisfactory scores (A-C) of the two review categories.

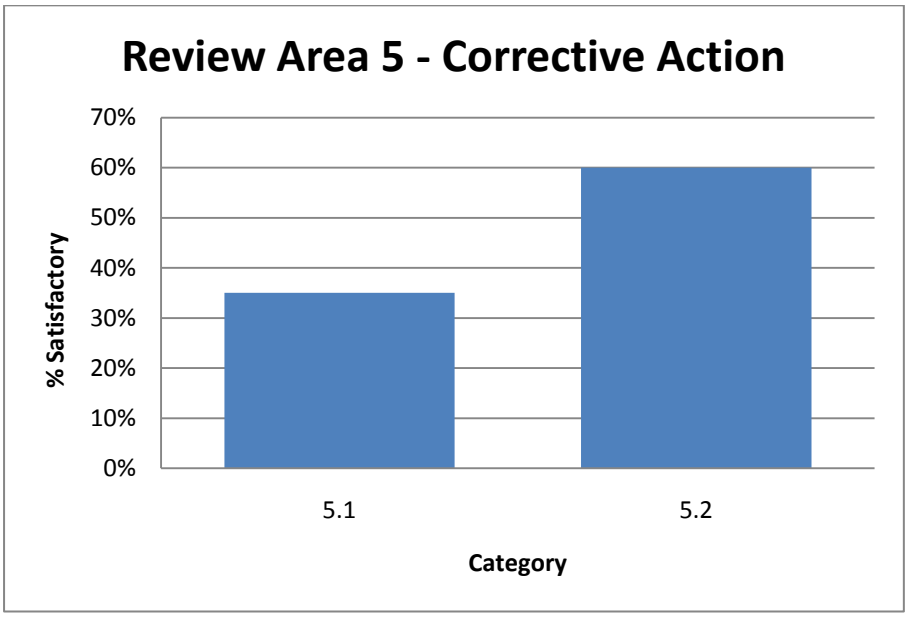


Figure 10: Percentage scores for A-C (satisfactory scores) of review area 5

Based on the analysis of the result, the following have been concluded for each review category assessed under review area 5.

4.3.5.1. Pollution/Emergency Management

For review category 5.1 only 35% of the EMPrs graded satisfactory (A-C), clearly detailing the steps to be followed in case of an emergency event. These EMPrs were also the only once providing suitable remedial measures to be implemented to remediate the affected environment. The majority of the EMPrs did not on any level prescribe what procedure to be followed to modify, control or stop the cause of pollution and subsequently to remediate the polluted areas.

4.3.5.2. Rehabilitation and Closure

One specific requirement of the NEMA (1998) requires that measures to rehabilitate the environment affected by the undertaking of any listed activity be undertaken. Only 25% of the EMPrs sufficiently addressed rehabilitation. The majority of the EMPrs were lacking detail and no reference was made to specialists' studies to guide the rehabilitation process. The lack of adequate budgeting for rehabilitation was a weak area throughout the EMPrs.

4.4. Reflections on the utility of the EMPr Review Package

This section addressed research question 3 (***What is the usefulness of the EMPr review package when reviewing EMPrs?***). Findings were based on information collected during the EMPr review process. The main challenges and positive aspects with regards to the utility of the EMPr review package were discussed and recommendation for improvement proposed.

A weakness of the review packed is the fact that results are likely to differ from one reviewer to another based on the reviewer's experience with EMPrs. According to Bonde and Cherp (2011), the results of assessments by different reviewers were not always in full agreement, especially when the reviewers had different backgrounds and perspectives. It appears that this is a common occurrence and in order to reduce such inaccuracies it is suggested that the current review package be elaborated on by including more specific details per review criteria. For instance sub-category 2.4 of the review package currently requires the following:

Sub-category 2.4: The EMPr should specify the requirements in terms of ***training and environmental awareness (Awareness Programme)*** *for all site and other project personnel to ensure that the actions specified in the EMPr are implemented effectively and efficiently.*

Although the criterion is quite comprehensive, someone with little experience working with EMPrs might grade a particular EMPr differently, due to the detail that is missing in the criteria. The requirement could for instance be elaborated on to include sub-categories such as:

1. The EMPr must describe the level of training that will be undertaken for the different level of staff on site;
2. The EMPr must detail the type of training that will be provided at each level;
3. The EMPr must detail who shall present the training and to whom at what level;
4. The EMPr must detail when and how often refresher courses will be undertaken.

By including these more detailed requirements per review criteria, the accuracy of the results from person to person using the review package will be more consistent. The detail provided will also improve the evaluation process, providing more accurate results.

CHAPTER 5

5. CONCLUSION & RECOMMENDATIONS

5.1. Conclusion

The thesis had three aims, (1) to establish an EMPr review package by developing review criteria based on high-quality criteria for EMPrs, (2) to determine how a sample of 20 South African EMPrs scored by applying the review package and (3) to provide feedback on the utility of the review package.

From the literature review it was concluded that various criteria exist which can be regarded as high-quality EMPr criteria. The discussion of high-quality EMPr criteria were structured around five (5) Review Areas each with between two and six review categories. Each review category contained between one and eight review sub-categories informing the criteria.

From the application of the review package it can be concluded that only five (5) of the South African EMPrs reviewed, scored a grade of C which can be considered just satisfactory despite omissions and/or minor inadequacies. Six (6) of the EMPrs received a D grade, suggesting that some parts are well attempted but must, as a whole, be considered just unsatisfactory because of slightly more omissions or inadequacies. Eight (8) of the EMPrs scored an E grade, suggesting that the majority of the requirements are not being met with significant omissions or inadequacies. One (1) of the EMPrs scored an F which concludes that the EMPr is very unsatisfactory, with important task(s) poorly done or not attempted at all. None of the EMPrs scored an A or B grade. There is no clear evidence that the EMPrs compiled as part of an EIA process performed better that those EMPrs that were compiled as standalone documents. The two best performing EMPrs were both from the Waste Water sector. The EMPr scoring the poorest grade (F) was for the construction of a road. Overall it appears that the quality of the EMPrs was largely dependent on the person/firm who prepared the EMPr as significant quality differences were recorded from one EMPr to another. Only three (3) of the EMPrs that were reviewed linked in some form and level to the proponent's EMS. Although the grades scored by these EMPrs was not the best, on average they performed better than the rest of the EMPrs. The overall lack of applying the principles of the Deming model (PDCA) at EMPr level is of concern. It is clear that the platform for continual improvement is not set by the EMPrs reviewed.

The utility of the review package was tested by applying the review criteria to the South African EMPrs. The use of, and overall utility of the review package is simple and straight forward. The test application of the review package seems to indicate that it sets a sufficiently high standard for the quality of EMPrs as the overall scores of the EMPr were not high.

5.2. Recommendations

In order for EMPr quality, and ultimately its ability to improve environmental performance, it is suggested that EMPrs adopt a similar structure to what is being applied to EMS by implementing the PDCA cycle which makes provision for continual improvement. Recent literature suggests that the legislative regime of the EIA system “is maturing” and embedding follow-up and monitoring, which is where EMPrs and EMS should be considered (Broderick, 2012). EMPrs could be compiled as a “basic” or “watered down” EMS with sufficient provision for document and record keeping in an attempt to provide a suitable platform for continual improvement.

In order to reduce inaccuracies during the review process it is suggested that the current review package be elaborated on by including more sub-review criteria per main review criteria. This will improve accuracy and ensure better overall consistency in the review results.

This review package can be used as a checklist to aid consultants, proponents and authorities drafting and reviewing EMPrs. It is hoped that the application of this review package and the amended versions to follow will over time improve the quality of EMPrs and ultimately contribute to better environmental management and performance.

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APPENDIX A – Raw Data Sheet

Sector	*Housing Developments*					*Linear Developments*								*Waste Water Treatment Works*						
EMPr	Fleurhof	Jabulani	Sunrise Villa	Kaalbooi	Pelican Park	Mokolo Pipe	Eskom Cable	DR08125 Road	DR 1205 Road	R25 Road	R35 Road	Vlakfontein Canal	Transnet Railway	Rooiwal	Ekangala	Temba	BABELEGI	TEMBA	Welgedacht	Lethabo Weir
Over All Score	**E**	**E**	**C**	**E**	**D**	**C**	**D**	**D**	**C**	**F**	**E**	**D**	**D**	**E**	**D**	**C**	**E**	**E**	**C**	**E**
Review Area 1	**E**	**E**	**C**	**E**	**C**	**C**	**E**	**E**	**C**	**E**	**E**	**E**	**D**	**D**	**E**	**B**	**F**	**E**	**B**	**D**
1.1	**E**	**D**	**A**	**D**	**B**	**C**	**D**	**E**	**D**	**E**	**F**	**E**	**D**	**E**	**E**	**B**	**F**	**F**	**C**	**C**
1.1.1	E	B	A	B	A	A	B	C	A	B	E	E	C	B	C	A	F	F	B	B
1.1.2	D	D	B	D	C	A	F	F	F	F	F	E	E	F	F	B	F	F	C	C
1.1.3	F	E	A	F	A	E	F	F	E	F	F	F	B	F	F	C	F	F	C	C
1.2	**D**	**D**	**D**	**D**	**D**	**B**	**D**	**D**	**D**	**D**	**D**	**B**	**D**	**B**	**D**	**B**	**D**	**D**	**A**	**B**
1.2.1	D	D	D	D	D	B	D	D	D	D	D	B	D	B	D	B	D	D	A	B
1.3	**F**	**F**	**A**	**F**	**A**	**C**	**F**	**F**	**A**	**F**	**F**	**F**	**B**	**C**	**F**	**B**	**F**	**F**	**B**	**F**
1.3.1	F	F	A	F	A	C	F	F	A	F	F	F	B	C	F	B	F	F	B	F
1.4	**F**	**F**	**D**	**E**	**D**	**F**	**F**	**F**	**E**	**F**	**F**	**F**	**D**	**F**	**D**	**D**	**F**	**E**	**B**	**C**
1.4.1	F	F	B	C	A	F	F	F	D	F	F	F	D	F	B	B	F	F	B	B
1.4.2	F	F	E	F	F	F	F	F	F	F	F	F	D	F	F	F	F	D	B	C
1.5	**F**	**E**	**C**	**E**	**E**	**B**	**E**	**D**	**C**	**E**	**D**	**D**	**D**	**E**	**E**	**A**	**F**	**E**	**C**	**D**
1.5.1	F	D	D	D	D	A	D	C	E	E	D	C	D	D	E	A	F	D	C	C
1.5.2	F	F	B	F	F	B	F	D	A	F	D	D	D	E	E	A	F	F	C	F
Review Area 2	**E**	**E**	**C**	**E**	**C**	**C**	**D**	**D**	**C**	**F**	**E**	**D**	**D**	**D**	**D**	**C**	**E**	**E**	**C**	**D**
2.1	**F**	**F**	**F**	**F**	**A**	**A**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**A**	**A**	**A**	**F**	**F**	**D**	**C**
2.1.1	F	F	F	F	A	A	F	F	F	F	F	F	F	A	A	A	F	F	D	C
2.2	C	D	A	C	C	C	D	D	B	F	D	E	D	E	D	E	D	D	C	E
2.2.1	A	B	A	A	A	A	C	C	A	F	B	E	B	F	D	A	D	C	A	C
2.2.2	E	E	A	C	B	B	E	E	B	E	E	E	C	D	D	F	E	E	B	E
2.2.3	F	F	A	F	D	C	C	C	B	F	C	E	F	E	F	F	C	D	D	F
2.3	**F**	**F**	**C**	**F**	**C**	**B**	**C**	**C**	**B**	**F**	**F**	**B**	**A**	**F**	**F**	**A**	**C**	**F**	**A**	**C**
2.3.1	F	F	C	F	C	B	C	C	B	F	F	B	A	F	F	A	B	F	A	C
2.3.2	F	F	C	F	C	B	C	B	B	F	F	B	A	F	F	A	C	F	A	C
2.4	**E**	**D**	**B**	**E**	**B**	**B**	**C**	**B**	**A**	**F**	**B**	**B**	**A**	**C**	**C**	**A**	**F**	**D**	**A**	**D**
2.4.1	E	D	B	E	B	B	C	B	A	F	B	B	A	C	C	A	F	D	A	D
2.5	**D**	**D**	**C**	**D**	**C**	**C**	**D**	**D**	**C**	**E**	**D**	**D**	**C**	**E**	**D**	**C**	**D**	**D**	**C**	**E**

Sector	*Housing Developments*					*Linear Developments*								*Waste Water Treatment Works*						
EMPr	Fleurhof	Jabulani	Sunrise Villa	Kaalbooi	Pelican Park	Mokolo Pipe	Eskom Cable	DR08125 Road	DR 1205 Road	R25 Road	R35 Road	Vlakfontein Canal	Transnet Railway	Rooiwal	Ekangala	Temba	BABELEGI	TEMBA	Welgedacht	Lethabo Weir
2.5.1	NA	NA	NA	NA	NA	A	NA	NA	NA	NA	NA	D	C	NA	NA	NA	NA	NA	NA	NA
2.5.2	D	D	C	D	C	C	D	D	C	E	D	D	C	E	D	C	D	D	C	E
2.6	**F**	**F**	**E**	**F**	**E**	**D**	**F**	**F**	**D**	**F**	**F**	**D**	**F**	**F**	**F**	**F**	**D**	**C**	**C**	**F**
2.6.1	F	F	D	F	D	B	F	F	B	F	F	B	F	F	F	F	C	A	A	NA
2.6.2	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
Review Area 3	**E**	**E**	**E**	**E**	**D**	**D**	**F**	**E**	**E**	**F**	**F**	**E**	**E**	**F**	**F**	**D**	**F**	**F**	**D**	**F**
3.1	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
3.1.1	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3.2	**D**	**D**	**C**	**E**	**C**	**B**	**D**	**E**	**C**	**E**	**E**	**D**	**D**	**D**	**D**	**C**	**E**	**E**	**B**	**E**
3.2.1	A	A	A	B	A	A	A	B	A	C	B	A	A	A	A	A	B	B	A	A
3.2.2	C	C	C	D	C	B	C	C	B	D	D	C	C	C	C	B	D	C	B	C
3.2.3	C	C	C	D	C	B	C	C	C	D	D	C	C	C	C	B	D	D	B	C
3.2.4	C	C	C	D	C	B	D	D	B	D	D	B	B	D	D	B	D	D	B	C
3.2.5	F	F	F	F	F	F	F	F	D	F	F	F	F	F	F	F	F	F	A	F
3.2.6	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3.2.7	D	F	A	F	A	A	C	F	A	F	F	F	F	F	F	C	F	F	D	F
3.2.8	D	A	A	E	A	B	D	A	A	E	D	D	B	A	A	A	F	F	A	F
3.3	**F**	**E**	**E**	**E**	**E**	**A**	**F**	**E**	**E**	**E**	**F**	**E**	**E**	**F**	**F**	**A**	**E**	**E**	**A**	**F**
3.3.1	F	C	C	C	C	A	E	D	D	D	F	D	D	F	F	A	D	D	A	E
3.3.2	F	F	F	F	F	A	F	F	F	F	F	F	F	F	F	A	F	F	A	F
3.4	**D**	**E**	**D**	**E**	**C**	**F**	**F**	**E**	**E**	**F**	**E**	**F**	**E**	**F**	**F**	**E**	**F**	**F**	**F**	**E**
3.4.1	F	F	F	F	C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3.4.2	B	F	D	C	B	F	F	F	D	F	C	F	D	F	F	C	F	E	F	F
3.4.3	D	D	B	F	C	F	F	C	C	E	E	F	F	F	E	D	F	F	F	D
Review Area 4	**E**	**D**	**D**	**D**	**D**	**C**	**D**	**D**	**C**	**F**	**E**	**E**	**D**	**E**	**E**	**B**	**D**	**E**	**C**	**E**
4.1	**E**	**E**	**E**	**D**	**D**	**C**	**D**	**E**	**C**	**F**	**E**	**E**	**D**	**E**	**E**	**C**	**D**	**E**	**C**	**E**
4.1.1	D	D	D	D	C	B	C	D	B	E	D	C	B	E	D	A	C	D	B	D
4.1.2	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	A	F
4.1.3	C	D	D	B	B	A	C	C	B	F	D	D	A	F	F	A	D	D	D	D
4.1.4	D	D	C	C	C	B	C	D	B	E	C	D	D	D	D	C	D	D	B	D
4.2	**D**	**C**	**B**	**C**	**C**	**B**	**D**	**C**	**B**	**E**	**D**	**D**	**C**	**D**	**D**	**A**	**D**	**E**	**B**	**E**

Sector	*Housing Developments*					*Linear Developments*								*Waste Water Treatment Works*						
EMPr	Fleurhof	Jabulani	Sunrise Villa	Kaalbooi	Pelican Park	Mokolo Pipe	Eskom Cable	DR08125 Road	DR 1205 Road	R25 Road	R35 Road	Vlakfontein Canal	Transnet Railway	Rooiwal	Ekangala	Temba	BABELEGI	TEMBA	Welgedacht	Lethabo Weir
4.2.1	D	C	B	C	C	B	D	C	B	E	D	D	C	D	D	A	D	E	B	E
Review Area 5	**D**	**D**	**C**	**E**	**E**	**B**	**C**	**C**	**D**	**F**	**E**	**B**	**D**	**F**	**C**	**C**	**E**	**D**	**C**	**C**
5.1	**E**	**E**	**B**	**D**	**D**	**B**	**C**	**B**	**E**	**F**	**F**	**B**	**D**	**F**	**E**	**B**	**E**	**D**	**B**	**E**
5.1.1	E	E	B	E	C	B	C	B	E	F	F	B	D	F	D	B	D	D	B	D
5.1.2	C	C	B	C	D	B	C	B	E	F	F	B	D	F	D	B	D	D	B	D
5.1.3	F	F	C	C	C	B	B	D	F	F	F	B	E	F	F	B	F	E	C	F
5.2	**C**	**B**	**D**	**F**	**E**	**B**	**C**	**C**	**B**	**E**	**C**	**B**	**C**	**F**	**A**	**C**	**D**	**D**	**C**	**NA**
5.2.1	C	B	D	F	E	A	C	C	B	E	C	B	C	F	A	C	D	D	C	NA
5.2.2	NA	NA	NA	NA	NA	C	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA