A critical analysis of the quality of EIA reports for filling stations in South Africa

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Expression of thanks

A special word of thanks to:

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ABSTRACT SUMMARY

A critical analysis of the quality of EIA reports for filling stations in South Africa.

In order to make decisions to approve filling stations, an environmental impact assessment (EIA) needs to be conducted and evaluated by the competent authority. Although numerous filling stations have been authorised for operation, the quality of the EIA reports that form the basis for decision making has never been evaluated. The evaluation of the quality of EIA reports on filling station developments by means of an adapted Lee-Colley review package formed the basis of this research. The main conclusion was that the quality of the EIA reports for filling station developments, as reviewed by the adapted review package, is generally of a poor standard. This means that a decision to approve a new filling station is generally based on just enough information to the competent authority. The main deficiencies in the EIA reports related to site description, cumulative impacts and mitigation measures, while the environment description, identification of impacts, scoping of impacts, assessment of impact significance and emphasis (impacts) in the reports were of good quality. The results from the reviewed EIA's correspond mostly with the literature on the review of EIA reports.

Keywords: Environmental Impact Assessment (EIA); Environmental Impact Report (EIR); Quality; Filling station; Review package; South Africa

OPSOMMING

'n Kritiese analise van die kwaliteit van OIB verslae vir die Vulstasies in Suid-Afrika.

Ten einde 'n besluite te maak om vulstasies goed te keur, moet 'n omgewingsimpakstudie (OIB) gedoen en geëvalueer word deur die bevoegde owerheid. Die kwaliteit van OIB verslae op vulstasie, waarop die keuse vir goedkeuring gebaseer word, was nog nooit geëvalueer nie alhoewel talle vulstasies al goedgekeur is. Die evaluering van die kwaliteit van die OIB-verslae op vulstasie is gemeet deur die ontwikkeling van 'n aangepaste Lee-Colley oorsig pakket en vorm die basis van hierdie navorsing. Die belangrikste gevolgtrekking was dat die gehalte van die OIB verslae , soos deur die aangepaste hersieningpakket hersien is, in die algemeen van 'n swak gehalte is. Dit beteken dat 'n besluit om 'n nuwe vulstasie goed te keur oor die algemeen gebaseer op net genoeg inligting aan die bevoegde owerheid. Die belangrikste leemtes in die OIB verslae is die wat verband hou met area beskrywing, kumulatiewe impakte en versagtende maatreëls, terwyl die omgewingbeskrywing, identifisering van die impak, bestekopname van impakte, assessering van impak

en betekenis en klem (impak) in die verslae van goeie gehalte was. Die resultate van die hersienende OIB verslae stem meestal ooreen met die literatuur verslae.

Sleutelwoorde: Omgewingsinvloedbepaling (OIB); Omgewingsimpakverslag (OIV), Kwaliteit, vulstasie, hersieningpakket, Suid-Afrika

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List of Abbreviations

BAR	Basic Assessment Report
CONNEPP	Consultative National Environmental Policy Process
DEAT	Department of Environmental Affairs and Tourism, South Africa
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (Act 100 of 1982) and Environment Conservation Act 1989 (Act 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FRA	Fuel Retailers Association
GDACEL	Gauteng Department of Agriculture, Conservation, Environment and Land Affairs
GDARD	Gauteng Department of Agriculture and Rural Development
GNR	Government Notice Regulations
IEM	Integrated Environmental Management
MDACE	Mpumalanga Department of Agriculture, Conservation and Environment
NEMA	National Environmental Management Act (Act 107 of 1998)
PPA	Petroleum Products Act (Act 120 of 1977) and Petroleum Products Amendment Act (Act 2 of 2005)
SA	South Africa
SCA	Supreme Court of Appeal

Chapter 1: Introduction

1.1 Background

The interaction between humankind and the environment results from our attempts to satisfy real and perceived needs and wants. The specific actions that cause environmental problems can be traced back to humankind's underlying behaviour to deliberately or inadvertently misuse or abuse the natural environment (Middleton, 1999:12). In our attempt to rectify these impacts, investigations need to be carried out to determine these factors or impacts on the environment. These assessments on projects are referred to as Environmental Impact Assessments (EIA).

EIA is a planning and management tool that can be used to promote sustainable development and is aimed at providing decision makers with enough information on the consequences of projects, especially those with a potentially high impact as in the case of filling stations. EIA is therefore a crucial step toward a cleaner and healthier environment without compromising the need for development (Pretorius and Sandham, 2006:29).

Sustainable development can be defined as development that caters for the needs of people without compromising the needs for the future generations (Barrow, 2006:12). To achieve sustainable development a set of 'tools', of which EIA is one, are needed. EIA needs to include the social, participatory and economic issues alongside the environmental issues. If these elements are included, the key links between EIA and sustainable development could be addressed. In the past, EIA has incorporated the three elements (Figure 1 page 2) of sustainable development inappropriately or on a limited basis. However, there is a drive to incorporate the elements into each study as is also shown in the court ruling, discussed later on in section 1.4. The economic impact of a filling station development is of particular importance, as it is evident that development cannot be sustainable if one of these systems is not incorporated (Dalal-Clayton, 1992:134).

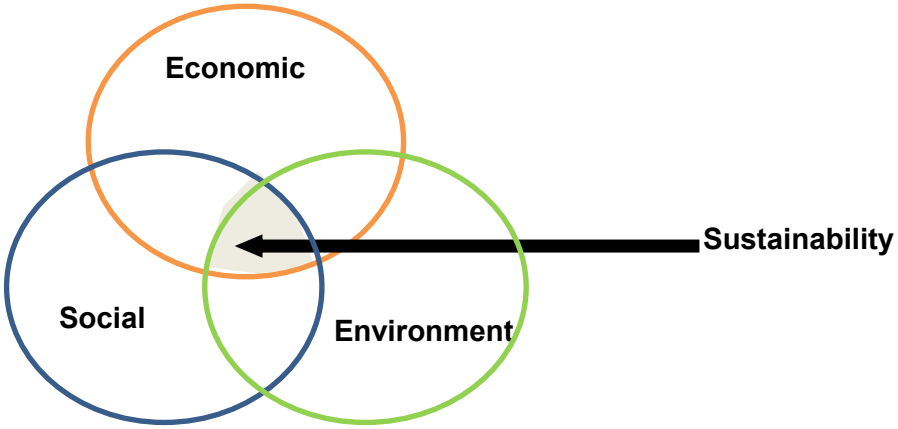

Figure 1 The Sustainable Development System

The need for the development of filling stations must always be balanced with the need to protect the environment (Govender, 2009:1). As with other infrastructure developments, the development of filling stations forms part of a growing South African economy. An increase in development also results in an increase in employment opportunities, which results in a greater proportion of the population owning cars and utilising public transportation systems, including taxis. In turn, filling stations need to be developed to cater for the needs of the larger amount of cars on the road networks (Govender, 2009:1). This should however be conducted in a sustainable manner rather than Filling stations around every corner. This can only be determined if feasibility studies for the Filling station is conducted prior to the EIA being initiated.

One of the major problems with filling stations is groundwater contamination with hydrocarbons. The spilling and leakage of diesel fuels, gasoline and oil from filling station activities is a widespread problem and results in the contamination of surrounding groundwater resources and land (Mbhele, 2007:1). The need for development of this nature must be balanced against the right of individuals to have a clean water supply and a clean environment as stated in Section 24 of the Constitution of the Republic of South Africa (Act 108 of 1996) (Hereafter referred to as The Constitution) (South Africa, 1996). This section states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

- prevent pollution and ecological degradation;
- promote conservation; and

- secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

Section 24 also guarantees the protection of the environment through reasonable legislative (and other measures) and such legislation is continuously in the process of being promulgated (South Africa, 1996).

The 2010 regulations now promulgated under GNR 543, 544, 545 and 546 state that a filling station requires a basic assessment process when the tank capacity is between 80 – 500 cubic meters (GNR 544) and a Scoping and EIA when above 500 cubic meters (GNR 545). Listing notice 3 (GNR 546) applies for small filling stations of between 30 - 80 cubic meters identified in geographically sensitive areas.

These EIA's however, need to comply with certain levels of information in order to provide the competent authority with enough information to make an informed decision. Therefore, review criteria need to be developed and also adhered to by consultants and authorities to enable informed decisions which will lead to a sustainable amount of development.

1.2 Problem Statement and Substantiation

EIA is a process that seeks to reduce the negative environmental impacts, including socio-economic, of listed development activities which could have a detrimental effect on the environment, as in the case of filling stations, with the storage of dangerous goods. For the EIA system to function effectively, continual EIA report quality review should be conducted to measure the quality of the information which is used in decision making (Sadler, 1996; Glasson *et al.*, 1999:p22; Weston, 2000).

For the purpose of EIA report review, various review packages and guidelines have been developed around the world, of which the new edition Lee-Colley package (Lee and Colley, 1992) is probably the most well-known and broadly applied. Although the generic package can be widely used, the review criteria need to be adapted for different contexts and sectors.

In South Africa, a number of review packages have been developed based on the Lee-Colley package, for the evaluation of EIA reports for different types of activities, such as projects with the potential to affect wetlands (Sandham *et al*., 2008a), mining sector applications (Sandham *et al*., 2008b) and biological pest control (Sandham *et al*., 2010). A package has also been developed to specifically review EIA reports in the North-West province (Sandham and

Pretorius, 2008), Limpopo Province (Sandham *et al*., 2005) and the Free State Province (Kruger and Chapman, 2005). Results from these studies show that essential information about impact identification and evaluation and subsequent mitigation and monitoring is mostly insufficient in EIA reports in South Africa (Sandham and Pretorius, 2008; Sandham *et al*., 2008a; Sandham *et al*., 2008b; Sandham *et al*., 2010).

Since 1997, a statutory EIA must be carried out before the construction of a filling station can take place, as filling stations are considered to have potentially significant impacts on the environment. The EIA's done for filling station developments therefore need to present sufficient information to facilitate proper decision making as well as proper mitigation of impacts.

1.3 Research Aim and Objective

In view of the problem statement the main aim for the research is:

To critically analyse the quality of Environmental Impact Assessment Reports for proposed filling stations.

The objective of the study is to determine if the EIA's conducted on filling stations comply with the best practice standards, guidelines and legislative requirements.

In this mini-dissertation, the quality of twenty NEMA filling station EIA reports compiled between 2006 and 2010 was evaluated to determine if these reports conform to minimum legal requirements (NEMA) and best practice(Lee-Colley and GDACEL Guideline).

To address the above-mentioned research aim and objective, the following sub-research questions need to be answered:

1. What are the international and national perspectives and debates relating to EIA report review?
2. What are the environmental aspects to consider with regard to filling stations?
3. How should the existing Lee-Colley review package be adapted to review the quality of EIA reports for filling stations?
4. What is the quality of EIA reports on filling stations?

1.4 Structure of Mini-dissertation

To facilitate the interpretation and comprehension of results, this mini-dissertation is arranged in five chapters, each linked to a particular objective.

Chapter 2 describes the literature review component and addresses research question 1 and 2.

Chapter 3 deals with the research design and methodology and answers research question 3.

Chapter 4 provides the data analysis on the quality of the filling station EIA reports. The results deal with research question 4 through the application of the research design and techniques described in chapter 3.

Chapter 5 is for the discussion and conclusions. This chapter demonstrates that the research aim and objective described in section 1.6 have been addressed.

Chapter 2: Literature Review

This chapter aims to address research question 1 and 2:

- What are the international and national perspectives and debates relating to EIA report review?
- What are the environmental aspects to consider with regards to filling stations?

This chapter is divided into three sections. The first two sections deal with the literature related to EIA report quality review and the third section deals with the environmental aspects that need to be considered with regards to the filling station EIA's.

2.1 South African Legislative Context

The measures as mentioned above, that are taken up in section 24 of The Constitution; promote justifiable or feasible economic and social development. The Petroleum Products Act 1977 (PPA) as amended in 2006, also controls the number of filling stations to make sure the optimal number in the area is not exceeded because this will subsequently lead to a high negative economic impact on other filling stations (South Africa, 1977).

In addition, the NEMA also has a broad list of principles for decision-making on matters affecting the environment. These principles, which are based on the environmental and other basic fundamental rights in The Constitution, apply to the actions of all organs of state that may significantly affect the environment. These actions include authorising certain developments. These principles state (South Africa, 1998; Govender, 2009:6):

- Principle 2: *"environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably"*.
- Principle 3: *"development must be socially, environmentally and economically sustainable"*.
- Principle 4(a) of Section 2 of NEMA involves the consideration of various factors to ensure sustainable development. The most important consideration with regard to filling station developments is that *"a risk averse and cautious approach must be applied, which takes into account the limits of current knowledge about the consequences of decisions and actions"*.

- According to Govender, other relevant considerations include:
    - The avoidance, minimisation or remediation of biodiversity loss and ecosystem disturbance;
    - The avoidance, minimisation or remediation of pollution and environmental degradation;
    - The avoidance, minimisation or remediation of disturbance of landscapes and sites constituting the nation's cultural heritage;
    - Negative impacts on the environment and on people's environmental rights must be anticipated and prevented, or if not preventable, avoided, minimised or remedied.

For the reason listed above and due to the legislative requirement placed upon South Africans by The Constitution, a filling station development is a listed activity under the National Environmental Management Act, Act 107 of 1998 (NEMA) and the associated regulations. The filling station developments reviewed in this study fall under the ambient of the 2006 Regulations, namely Government Notice Regulations (GNR) 385, 386 and 387 of 21 April 2006 (South Africa, 2006). New filling station developments under the 2006 regulations trigger Activity 3 in the Second Schedule of NEMA regulations (South Africa, 2006). This stipulates that prior to the development of a filling station both a scoping and EIA must be undertaken. The reports must be submitted to the competent provincial department and authorisation needs to be obtained.

2.2 EIA in South Africa

EIA's have been conducted since the 1970's, however the first South African EIA regulations were promulgated in September 1997 as required in Sections 21, 22 and 26 of the Environment Conservation Act (Act 73 of 1989) (ECA). These regulations described activities for which an EIA is required and outlined the process to be followed (DEAT, 1998). This process includes an open and transparent public participation process.

The NEMA followed the ECA and also stated that an EIA process should be conducted for activities that could have a potential negative impact on the environment (Naidu, 2006). The NEMA was amended to include regulations for the undertaking of an EIA. These regulations were promulgated in July 2006 and have replaced the ECA EIA regulations. In 2010 a new set of EIA regulations was promulgated under the NEMA. Table 1 summarises the policy for EIA in South Africa.

Table 1 Summary of Benchmark Environmental Law and Policy for EIA in South Africa

(Adapted from Kidd and Retief, 2008:974-975 and Govender, 2009:7-8)

Date	Policy/Legislation	Comment
1976	South African Council of the Environment Report	Proposed methods and procedures for Environmental evaluation in South Africa.
1979	Symposium "Shaping our environment"	Value of EIA to manage environmental change to incorporate principles of EIA into the planning professionals guidelines is emphasised.
1982	Environment Conservation Act, Act 100 of 1982	Limited scope, established the Council for the Environment, and contained provisions relating to natural areas.
1989	Environment Conservation Act (amended); Act 73 of 1989	More comprehensive but no requirements for EIAs.
1989	IEM process	Integrated Environmental Management (IEM) procedures were introduced. Compliance was voluntary.
1992	The IEM Procedure	Formal IEM process guidelines in 6 volumes. Compliance still voluntary but was gaining increasing credibility.
1992	Minerals and Mining Act	Introduced Environmental Management Programmes for mining industry. Compliance voluntary but was gaining credibility within the industry.
1995	Consultative National Environmental Policy Process (CONNEPP)	The purpose was to develop a new environmental policy for South Africa with emphasis on an integrated framework, which forms the basis for strategic action plans and a new framework for legislation through which the policy can be implemented.
1996	White Paper on Sustainable Forest Development in South Africa (now legislated)	Key implications for the forestry sector, in that, under the Afforestation Permit System, EIAs may be required.
1997	White Paper on a National Water Policy for South Africa (now legislated)	Key implications for EIAs in regard to water resource use and management as well as fostering the philosophy of both public good and sustainability.

Date	Policy/Legislation	Comment
1997	White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity	Policy pertaining to the use, management and preservation of genetic species, ecosystems and landscape diversity.
1997	EIA Regulations (GNR 1182, 1183 & 1184)	Making EIAs mandatory for the first time in South Africa.
1998	White Paper on Environmental Management Policy for South Africa	More comprehensive than the Environment Conservation Act of 1992, but still lacking in key areas.
1998	Discussion Document: A National Strategy for IEM in South Africa	Major deficiency of the 1992 IEM procedure was a focus on discrete events. Most environmental impacts result from activities other than individual project level developments. Aimed at promoting legislation of integrated management approaches.
1998	NEMA, Act 107 of 1998	Trying to promote co-operative governance among different levels of government involved in environmental management. Allows for enforcement of environmental laws by the public. Introduced the need for environmental considerations at a policy level.
1998	National Water Act, Act 36 of 1998	To provide for the reform of law related to water resources. A water use licence might be required as part of the EIA process. Needs to be evaluated for each project
2004	NEM: Biodiversity Act, Act 10 of 2004	Legislation pertaining to the importance of conserving biological diversity. Should protected trees be found on site the correct procedures need to be followed.
2004	NEM: Air Quality Act, Act 39 of 2004	The aim of this Act is to reform the law regulating air quality to protect the environment by providing reasonable measures for the prevention of pollution.
2005	Amendment of NEMA	Resulted in the Act becoming the overarching framework for environmental management in South Africa.
2006	NEMA: EIA Regulations	Reinstates the importance of EIAs in promoting

Date	Policy/Legislation	Comment
	2006 (GNR 385, 386 and 387)	responsible business practices in South Africa.
2010	NEMA: EIA Regulations 2010 (GNR 543, 544, 545 and 546)	Promulgated due to interpretation problems with the old regulations and also because of the changing legal regime. Changes were made to the procedural requirements of the EIA process. New definitions attempt to clarify previous uncertainties.

With the promulgation of the new NEMA:EIA regulations on Monday the 2nd of August 2010, filling station EIA's were delisted as activities that need a full environmental impact assessment. The delisting of filling stations in favour of the storage tanks made it more difficult to ensure that the impacts of the new filling station on other filling stations are taken into account. For example the new regulations do not require a filling station with tank capacities of under 80 cubic meters to conduct an EIA, the Fuel Retailers Association (FRA) is worried that it will make it much easier for smaller filling stations to "*spring up all over the place*" (FRA, 2010).

However, filling stations above 80 cubic meters, up to 500 cubic meters will need to undergo a basic assessment process which could also lead to some impacts not being discussed properly, as would have been done in a full EIA process.

2.3 Filling Station Challenge & Case Law

Due to filling station competitiveness, the EIA administrative guideline: Guideline for the Construction and Upgrade of Filling Stations and Associated Tank Installation (hereafter referred to as GDACEL guideline), was developed by the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL) (now Gauteng Department of Agriculture and Rural Development (GDARD)) in 2001. These guidelines were developed to ensure that a new filling station does not negatively affect existing filling stations and that new filling stations need to prove feasible before they can proceed. Although this is a Gauteng based guideline, the guideline covers best practice approach regarding filling stations. The Gauteng guideline has been mentioned and referred to even in the court case, described below, in Mpumalanga. It can therefore not only be seen as guideline only for Gauteng based Filling stations but for Filling stations around the country.

The Supreme Court of Appeal (SCA) affirmed in 2005 that the Gauteng guidelines for Filling station developments as lawful used to refuse the Sasol Oil (Pty) Ltd authorisation to build a filling station in Randpark Ridge on the grounds that the construction would possibly be harmful to the environment. The SCA on 16 September 2005 allowed an appeal from the Johannesburg High Court, which had decided that the MEC had no power to regulate construction of filling stations. The SCA has set this judgment aside, ruling that the MEC does have this power.

In 2007, the Constitutional Court of South Africa handed down judgment in the matter of the FRA versus the Director-General: Environmental Management, Department of Agriculture, Conservation and Environment (MDACE), Mpumalanga Province and others. The case surrounded an application to the MDACE for a filling station in White River, Mpumalanga by Inama Trust. The FRA, who is the representative of the existing filling station owners, brought the objection to the Constitutional Court. The objection was based on the fact that they feel the MDACE should consider whether the filling station is socially, environmentally and economically sustainable as required by the laws governing the protection of the environment (Constitutional Court, 2007; Sampson, 2010).

The judgment by Sachs J. Ngcobo stated that the obligation of the environmental authorities to consider socio-economic factors includes the obligation to consider the impact of the increase in filling stations and of proposed filling stations on existing ones. This obligation realises the need to assess cumulative impacts on the environment of the proposed development (Constitutional Court, 2007; Sampson, 2010).

The reasoning behind the judgment was that an unsustainable development in itself is detrimental to the environment, such as in the case of a filling station which could have a substantial impact on the environment. Judge Ngcobo also stated that the necessity to evaluate the impact on existing filling stations are not to end competition but rather to ensure the economic, social and environmental sustainability of all developments (Constitutional Court, 2007; Sampson, 2010).

Judge Ngcobo held that the authorities misinterpreted the nature of their duties and as a consequence failed to comply with a compulsory and material condition prescribed by the law for granting authorisation to establish a filling station (Constitutional Court, 2007; Sampson, 2010). According to the Constitutional Courts ruling:

"*based on need and desirability, the applicant relied on the Gauteng Provincial Government Guidelines (GDACEL Guidelines) which were developed by the Gauteng province to ensure that its responsibilities in respect of the protection of the environment are carried out in an efficient and considered manner. One of the general guidelines provides that new filling stations will generally not be approved where they will be "within three (3) kilometres of an existing filling station in urban, built-up or residential areas". This limitation on the distance between filling stations was influenced by international experience, views of interested persons and the legislative obligations under ECA and NEMA*".

Retief and Kotze (2009), however, criticised the court for treating Integrated Environmental Management (IEM) as a synonym for EIA. The authors stated that no single governance mechanism can deliver sustainability and therefore IEM was developed. EIA is only but one tool in the broader IEM process. In the court ruling the court wanted EIA to cover all aspects of sustainable development instead of covering the function it is meant to and realistically can. In the ruling of the Constitutional Court, the court did not take into account the legislation governing the fuel industry, nor the co-operative governance as set out in the NEMA and The Constitution. The EIA process is only one mechanism for measuring sustainable development and needs to be fed into broader and co-operative decision-making processes that could determine the sustainability. Therefore, it is not only EIA and the environmental authorities that need to take the sustainability of a filling station into account, but rather a combination of authorities and tools (Retief and Kotze, 2008; Sampson, 2010).

Nonetheless, the GDACEL guideline, places the need to evaluate the impact of a new filling station in the EIA process. In this dissertation the author will therefore for best practice reasons take into account the best practice criteria provided in the GDACEL guideline mentioned above as well as legislative requirements.

2.4 Consideration and Evaluation Criteria for EIA Reports

EIA report quality evaluation by means of review packages as used in this research is only one of a range of methods that can be used for determining the quality of the EIA reports (UNEP, 2002). Other methods according to Pretorius and Sandham (2006), include:

- General checklist - compliance with EIA legislation or guidelines as starting point;
- Project specific checklist – adapted to provide a review package for a specific sector (as is being done as part of this study);

- EIA review frameworks;
- Expert and accredited reviewers;
- Public hearings; and
- Comprehensive review of the whole EIA process – EIA systems review.

The main areas of consideration in an EIA report are described by Sadler (1996), as the "triple A-test". These include appropriateness, adequacy and action ability. Appropriateness refers to the coverage of key issues and impacts, adequacy refers to impacts analysis and action ability refers to the basis of information that needs to be enough to make an informed decision (Pretorius and Sandham, 2006). These form the basis of most of the review packages.

2.4.1 The Lee-Colley review package

The Lee-Colley review package was specifically designed to review the quality of environmental appraisals (EIA's) of the United Kingdom development plans (Lee *et al.,* 1999). It is now used as an international best practice guideline by Environmental Assessment Practitioners (EAP) around the world to evaluate their reports against predetermined criteria. However, these guidelines can be elaborated on to include country specific regulations.

The Lee-Colley package is not only designed for use by the EAP, but also for decision making authorities, researchers and non-governmental organisations.

The structural and methodological clarity of the Lee-Colley package and its familiarity to many professionals in the field of project level EIA, is one of the reasons why it has been used widely and has been adapted to suit many countries, (Ibrahim, 1992; Lee *et al.*, 1999; Rout, 1994; Mwalyosi and Hughes, 1998; Rzeszot, 1999; Sandham *et al.*, 2005; Simpson, 2000). According to Lee *et al.* (1999), a large volume of literature is available that describes the effectiveness of the Lee-Colley package. Other packages have also been created that are based on the Lee-Colley package, including the Oxford-Brookes and Bonde and Simpson packages and is discussed in section 2.5.2 below.

As the Lee-Colley package is the most widely used around the world, it will also form the basis of the package designed for this specific study. Refer to Chapter 3 for a more details discussion of this method.

2.4.2 Other review packages

Various review packages have been developed, mostly based on the Lee-Colley package.

2.4.2.1 The Oxford-Brookes review package

The Oxford-Brookes package is also known as the Impact Assessment Unit (IAU) review package which was developed by Glasson and others at Oxford University. The package has been used for research and by consultants to review EIA's. Oxford-Brookes is similar to the Lee-Colley package as it uses the same grading system, but it differs in the fact that it only has three levels in the hierarchy of review categories (Pretorius and Sandham, 2006).

2.4.2.2 Review Checklist for South Africa

According to DEAT (2004), the easiest and most effective way to review an EIA is by using a checklist technique with predefined questions. The checklist is however, only useful for review of completeness and not for quality of the information in the EIA. The sub-sections of the South African Institute for Environmental Assessment checklist include (DEAT, 2004):

1) Methodology utilised in compiling the EIA report
2) Description of the project
3) Assessment of alternatives to the project
4) Description of the environment
5) Description of impacts
6) Consideration of measures to mitigate impacts
7) Non-technical summary
8) General approach

2.5 Quality of EIA Reports

EIA ensures sustainable development by analysis, examination and assessment of planned activities and can therefore be regarded as an effective management tool for the environment (Wood, 2003; Pretorius and Sandham, 2006; Snell and Cowell, 2006). The EIA is therefore used to identify the type, probability, duration, scale and magnitude of impact as a result of the

activity. This information is then relayed to the competent authority to base a decision upon (Toro *et al.*, 2010).

According to Toro *et al*. (2010), the evaluation of EIA's and EIA systems is highly recommended to enhance EIA effectiveness and quality. The quality of an EIA report is one component of an effective translation of an EIA policy into practice (Glasson *et al*., 2005:p222). This evaluation process is one of the "checks and balances" that needs to be built into the EIA process (UNEP, 2002). Continually reviewing EIA reports and learning from these reviews could assist in restoring public confidence in the EIA process (Pretorius and Sandham, 2006).

From the above it is evident that an EIA of good quality is important to make an informed decision and protect the environment.

2.5.1 International EIA review packages quality

Internationally there have been various review packages and guidelines developed and the quality of various EIA's determined with regard to those review packages. The table (**Error! Reference source not found.**) below provides a brief overview of some of the EIA quality studies over time, which has been undertaken around the world and the findings of each.

Lee and Colley (1990) conducted review on EIA report in the UK using the first version of the Lee-Colley review package. During the study 12 EIA reports where evaluated. These EIA were conducted from 1988 to 1889. Of the reports evaluated only 25% of the reports scored satisfactory (Lee and Colley 1990). In 1991 a study of 24 EIA reports were evaluated by Lee and Jones on EIA reports conducted during the same period. These EIA's showed a 37% satisfactory score. This proves that more case studies and different reviewers could have an effect on the results.

Lee and Brown (1992) conducted a review of 83 EIA reports. These reports were conducted between 1989 and 1991. The results of the study are shown in table 2. Lee et al (1994) also conducted a review of 47 reports using the Lee-Colley review package for reports in 1988-1989 and reports during 1990-1991. This study showed a 17% and 47 % satisfactory score respectively. This could be due to EIA report quality getting better over time.

During 1993 Lee and Dancy conducted a study of 41 EIA reports conducted during 1989-1992 in Ireland. Thereafter another study was conducted during 1996 by Wood et al on 38 EIA

reports over the period of 1994-1996. The first study showed a 41% satisfactory score while the second showed a 75% satisfactory score. This could also show improvement of EIA reports over a period.

Canelas et al (2004) conducted a review of EIA reports in Portugal and Spain using the Guidance on EIA-EIS review Jun 2001 package. This study showed that during a period from 1998 to 2003 EIA report in Portugal scored 78% and 65% of reports in Spain scored satisfactory.

Table 2 Summary of Environmental Impact Assessment Quality around the world

Authors, year of study and country ⇨	Lee and Colley (1990) - UK	Wood and Jones (1991) - UK	Lee and Brown (1992) - UK	Lee *et al.* (1994) - UK	Lee and Dancy (1993) and Wood *et al* (1996) - Ireland	Canelas *et al*. (2004) – Portugal	Canelas *et al*. (2004) - Spain
Years over which EIA's were prepared ⇩	**The quality of satisfactory EIA's in percentage (Satisfactory is A,B and C of evaluation criteria)*						
1988-1989	25%	37%	34%	17%			
1989-1990			48%				
1989-1992					41%		
1990-1991			60%	47%			
1988-1993						78%	
1994-1996					75%		
1998-2003							65%

From Table 2 it is evident that the quality of the EIA's in selected evaluated countries improved after the late 1980's. It also shows that the EIA's after the late 1980's in Portugal and Spain in particular were the ones that had a higher amount of satisfactory EIA scores. This could however also be due to different reviewers having an influence on the evaluations. With the exception of the Portugal studies, the studies had more than 30% unsatisfactory scores and were in need of improvement. The EIA's could improve over time as the EIA systems got better developed and EIA practitioners gained more experience overall in the field

of EIA. Alternatives, monitoring and mitigation have improved. The monitoring and mitigation however, is still not totally satisfactory (C/D) (Glasson *et al*., 2005:222).

Various EIA quality review studies have also been conducted using other review packages. Studies conducted using the Oxford-Brooks method showed a 36% of EIA report with the sufficient information prior to 1991 and 44% after 1991. The Oxford-Brooks method however only has a yes/no answer; this could be seen as crude or perhaps over-harsh review of EIA report quality (Glasson et al., 2005:223)

2.5.2 South African EIA quality

In South Africa, studies conducted and reviewed previously have mostly been under the ECA regime and have shown weaknesses within the EIA reports produced. These reports were reviewed using altered versions of the Lee-Colley packages to either fit to the specific sector being targeted, for example wetlands, mining and biological pest control (Sandham *et al.,* 2008a; Sandham *et al.,* 2008b; Sandham *et al.,* 2010) or to suit the South African context better, e.g. Quality of EIA reports in the North West, Free state and Limpopo Provinces.

The main weaknesses from these studies were the identification and analysis of impacts, the ranking of significance and the proposing of sound alternatives and workable monitoring and mitigation measures. This correlates with international findings. It was also found that the EIA's reviewed, focussed more on the biophysical environment than the social and economic inputs (Kidd and Retief, 2008). A summary table has been compiled by Kidd and Retief and has been adapted for this study (Table 3).

Table 3 Summary of research results related to quality of EIA reports in South Africa

	Provincial context	**Sectoral**		
	North west Province (Sandham et al, 2002; Sandham et al 2007)	**Biological Pest Control** (Carrol 2006)	**Wetlands** (Moloto, 2006)	**Mining** Hoffmann, 2007)
Percentage of	81 % satisfactory	None of the EIA report scored	100 & satisfactory	85% satisfactory scored EIA

satisfactory grades (A-C) (according to the Lee-Colley review criteria)	scored EIA reports	and overall satisfactory score	scores for EIA reports. With 3 B and one C for overall scores	reports

2.6 Aspects to Consider with Regard to Filling Stations

It has been shown that filling stations are major sources of pollution which can lead to severe impacts unless there are appropriate measures in place (GDACEL, 2001). GDACEL (2001) identified the following effects associated with such a development:

- *"Natural ecosystems and habitats, and the renewable and non-renewable natural resources such as air, water, land and all forms of life.*
- *Ecosystems, habitats and spatial surroundings modified or constructed by people, including urbanised areas, agricultural and rural landscapes, places of cultural significance and the qualities that contribute to their value*." (GDACEL, 2001)

According to GDACEL (2001) the following aspects should be considered when evaluating filling station impacts:

1. Groundwater contamination

Spills and leaks due to filling station activities could result in pollution of the surrounding water resources and land. Groundwater assimilation and soil leaching to ground water, exposure pathways that can exist at filling stations due to delivery, storage and dispensing of fuel and is illustrated in Figure 2.

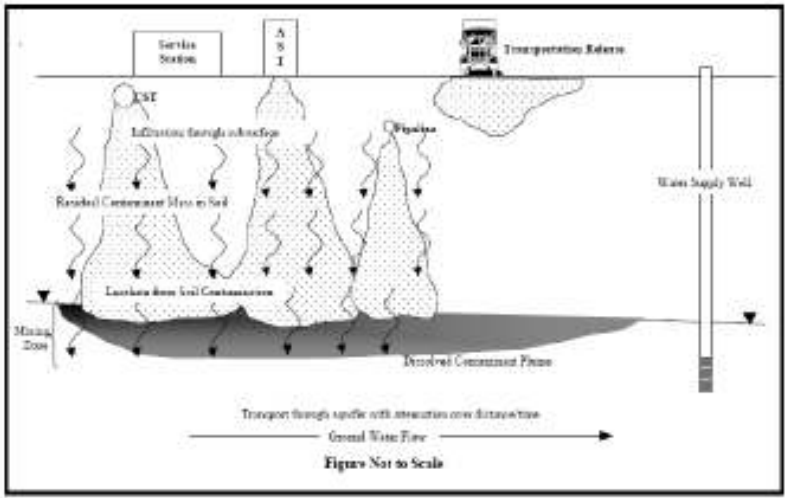

Figure 2 Illustration of enclosed space inhalation exposure pathways of possible filling station contaminations by hydrocarbons

Reference: Govender, 2009:6

2. Air quality (Volatile Organic compounds (VOC))

While there are mainy compounds associated with gasoline and diesel fuel, the main compounds raising pollution problems associated with gas stations are the following (Anon, 2009):

- Benzene
- Toluene
- Ethylbeneze
- Xylenes
- Lead
- MTBE
- Ethylene dichloride (EDC)
- Naphthalene

These are not only air quality related but can also be present in groundwater.

3. Social Impacts

It has been shown that filling stations can have impacts on citizens and businesses in close proximity to them. These include:

- Noise impacts.

- Reduction in land value and real estate properties in the proximity of filling stations.
- Impact on the safety and security of an area and specifically adjacent properties.
- Probable increases in diesel prices due to the need for higher profit margins to ensure the feasibility of the large number of filling stations.
- Impacts associated with traffic.
- Impact on the feasibility of filling stations in close proximity and job-security of its employees should they lose business (GDACEL, 2001).

4. Noise impacts

A filling station can be a source of noise which could be disturbing to occupants in the area. In some instances, they can even exceed the municipal bylaws of the specific area, depending on the designated zone (for instance a rural residential area). The noise associated with filling station areas mostly originate from motor cars and trucks braking and accelerating (GDACEL, 2001).

5. Cumulative Effects

Due to a substantial increase in the number of applications for filling stations, especially during 2001 and up to 2010, section 2(4a) vii of the NEMA ("*that a risk averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions*" (South Africa, 1998)) to ensure that cumulative impacts are addressed or avoided, became of particular importance. Should there be proliferation of filling stations in proximity to each other; the following cumulative impacts can arise according to GDACEL (2001):

- Groundwater and soil contamination.
- Visual intrusion and lighting.
- Traffic disruptions.
- Sense of place and character of the area.
- Increased significance of social impacts.

6. Irreversible impacts

Significant irreversible impacts can be caused by filling stations where the character, diversity or generative capacity of the environment is permanently lost within a given area. Decommissioning of a filling station is of particular concern as there are limited to no alternative uses afterwards. Moreover, the rehabilitation of a filling station can require substantial funding, which is rarely available or provided for (GDACEL, 2001).

7. Feasibility / Sustainability

New filling station developments need to take into account the economic pressure that will be experienced by existing filling stations. According to GDACEL (2001), filling station owners demanded an increase in their profit margin on the sale of fuel in order to prevent job losses. Based on the above, the following needs to be properly investigated when conducting a EIA for a new filling station:

- There is not a high enough demand to make all new filling stations feasible.
- Existing filling stations are also experiencing difficulty to maintain feasibility/sustainability.

Therefore, a proper feasibility study needs to accompany an EIA for a new filling station. In addition, filling stations do not generate new traffic, so there needs to be an existing high demand for a filling station in order to make it sustainable (GDACEL, 2001).

8. Desirability

The rights of the public and the developer need to be protected, although the public in the area of the proposed development are more important than the developer. The EIA needs to take the rights of the public into consideration and not only focus on the developer. If only the developer is taken into account, it is in contravention of Section 2(2) of the NEMA which requires the needs of people to be put at the forefront. The affected communities need to be able to make inputs regarding the need for a filling station and determine what impact it will have on them (GDACEL, 2001).

Chapter 3: Research Design and Methodology

This chapter aims to address research question 3:

- How should the existing Lee-Colley review package be adapted to review the quality of EIA reports for filling stations?

This chapter consists of five sections. The first section briefly describes the research design of the study. In the second section, the author gives an overview of existing EIA quality review methodology. Section three describes the adapted Lee-Colley review package in detail, with specific reference to the structure of the package, legal compliance and other specific requirements that need to form part of the review package to effectively adapt the Lee-Colley package to deal with filling station EIA's. The fourth section describes the data gathering and review procedures, followed by section five that explains where data has been obtained as well as what data was used.

3.1 Research Design

In order to derive a package suitable for use in the filling station industry, a detailed study was conducted in order to identify the differences and similarities between:

- Government Regulation 385 (2006) and Government Regulation 543 (2010) from the DEAT;
- The EIA case law surrounding filling stations and the Fuel Retailers Association (FRA);
- The Gauteng EIA Administrative Guideline: Guideline for the Construction and Upgrade of Filling Stations and Associated Tank Installations (2001).

The package and criteria were then used to evaluate the quality of the selected sample of EIA reports.

This sample of EIA reports was obtained from environmental consultants conducting the EIA's on filling stations.

3.2 EIA Report Quality Review

The systematic review of EIA report quality forms part of any well-functioning EIA system (Asplund and Hilding-Rydevik, 1996; Sadler, 1996; Curran *et al.*, 1998; Bonde and Cherp, 2000; Lee and George, 2000). To review EIA reports or statements, various packages and

guidelines have been developed as discussed in section 2.4 (Lee and Colley, 1992; European Commission - EC, 1994; Glasson, 1996:p231; Institute for Environmental Assessment, 1996; Lawrence, 1997).

Report quality review has been widely and successfully applied around the world to determine the status and standard of project level EIA's (Jones and Bull, 1997; Thompson *et al*., 1997; Weston *et al*., 1997).

The Lee-Colley package is one of the most widely applied packages, due to the ease of adapting the package as well as the systematic structure it provides (Ibrahim, 1992; Rout, 1994; Mwalyosi and Hughes, 1998; Sandham *et al*., 2005). Sandham *et al.* (2004) adapted the package for the South African context. It was shown in this study that the Lee-Colley package can easily be used in South Africa as it provides practically achievable goals for the EIA's in South Africa. The package can however, not be generically imported for use in South Africa and sector specific contexts and therefore need to be adapted to suit specific sectors purposely (Sandham *et al.*, 2004).

3.3 Adaptation of Lee-Colley Package

A review package with a systematic and structured approach was needed as a basis. The Lee-Colley review package was identified as providing these qualities and was also shown to be easily adapted to specific countries and sectors. The review package however, needed to be adapted to suit the evaluation of the quality of EIA's conducted for filling stations (Ibrahim 1992; Rout, 1994; Lee *et al.*, 1999; Mwalyosi and Hughes, 1998; Rzeszot, 1999; Simpson, 2000; Sandham *et al.*, 2005).

3.3.1 Structure of review package

No fundamental changes to the structure of the review package are made. The adapted review is still conducted in a hierarchical/pyramidal manner (Figure 4 page 36) (Lee *et al*., 1999). The review starts with the evaluation of the sub-categories. After the review of the sub-categories, the reviewer progresses to the evaluation of the categories. The categories are reviewed by taking into account the evaluations of the sub-categories. The review areas are then evaluated from the category review. The category review determines the overall assessment of the EIA report. A schematic view of the hierarchical/pyramidal review structure

is shown in Figure 4 (page 36) (Lee *et al*., 1999). The review assessment symbols are shown in Table 6 (page 37).

3.3.2 Adaptation of review areas and categories

The review areas, categories and sub-categories of the Lee-Colley review package was adapted to suit both the South African context and the requirement for specific essential information that should be in a filling station EIA. However, the structure of the Lee-Colley review package was maintained. Some general criteria relating to mitigation measures and communication of information were retained from the Lee-Colley review package.

The following literature/guidelines were analysed to adapt the review criteria
(review areas, categories and sub-categories):

- Legal requirements in terms of the NEMA and associated regulations (GNR 385 and GNR 543).
- EIA administrative guideline: Guideline for Construction and Upgrade of Filling Stations and Associated Tank Installation that have been developed in 2001 by GDACEL.

The review areas, categories and sub-categories, as adapted for the review of EIA reports on filling stations are reflected in Appendix B.
The main review areas are:

1. Description of the proposed activity, including capacities of tanks and baseline information on the site.
2. Identification and evaluation of key impacts.
3. Alternatives and mitigation of impacts.
4. Communication of results.

3.3.3 Legal compliance

When evaluating EIA report quality, it is important to take the legal requirements with regards to the content of the report into consideration. This could be challenging because the information required can differ for each specific case (Sandham *et al*,. 2010).

According to the 2006 and 2010 NEMA EIA Regulations, respectively (GNR 385 and GNR 543), an EIA report needs to have at least the following information (Table 4) so that a proper decision can be made on the project:

Table 4 Summary of Environmental Impact Assessment Criteria as per the NEMA EIA regulations GNR385 (of 2006) and the corresponding sub-categories in the adapted review package

Reference: South Africa, 2006

EIA Regulations (2006)	Corresponding sub-category in adapted review package
details of – (i) the Environmental Assessment Practitioner (EAP) who compiled the report; and (ii) the expertise of the EAP to carry out an environmental impact assessment;	1.1.1
a detailed description of the proposed activity;	1.1.3
a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is – (i) a linear activity, a description of the route of the activity; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken;	1.1.3 - 1.1.4
a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;	1.4.1-1.4.3
details of the public participation process conducted in terms of sub-regulation (1), including – (i) steps undertaken in accordance with the plan of study; (ii) a list of persons, organisations and organs of state that were registered as interested and affected parties; (iii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and (iv) copies of any representations, objections and comments received from registered interested and affected parties;	2.3.1
a description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;	1.1.8
an indication of the methodology used in determining the significance of potential environmental impacts;	2.1.4
a description and comparative assessment of all alternatives identified during the environmental impact assessment process;	3.1.1 and 3.1.2
a summary of the findings and recommendations of any specialist report or report on a specialised process;	2.3.2 and 2.4.1

EIA Regulations (2006)	Corresponding sub-category in adapted review package
a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;	2.1.1; 2.3.2; 2.5.1; 2.5.3; 2.5.4 and 2.5.5
an assessment of each identified potentially significant impact, including – (i) cumulative impacts; (ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated;	2.1.1; 2.1.2 and 2.2
a description of any assumptions, uncertainties and gaps in knowledge;	2.4.1
an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	4.3.2
an environmental impact statement which contains – (i) a summary of the key findings of the environmental impact assessment; and (ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;	4.4.1
a draft environmental management plan that complies with regulation 34;	Not applicable
copies of any specialist reports and reports on specialised processes complying with regulation 33; and	Not applicable
any specific information that may be required by the competent authority.	Not applicable

In Table 4 the requirements for EIA as presented in the GNR 385 (2006) are summarised, with the corresponding sub-category in the adapted review package indicated. The 2010 regulations have not been taken into account as the EIA reports that have been reviewed were all conducted under the 2006 regulations.

Should these sub-categories be rated as satisfactory (A, B or C) or 'not applicable' (NA), the EIA report will at least be compliant with legislative requirements. Should a symbol D, E of F however be given then it is evident that the EIA report does not comply with legislative requirements.

3.3.4 Other requirements

The most important requirements for filling station EIA reports are described in the EIA administrative guideline: Guideline for Construction and Upgrade of Filling Stations and Associated Tank Installation, which was developed in 2001 by GDACEL. According to GDACEL (2001), these guidelines ensure the following:

- That the Departmental requirements are met.
- That the evaluation or review period is reduced.
- That all impacts have been addressed through commitment of the petroleum industry.
- The implementation and maintenance of minimum requirements for the development that contribute to sustainable development.
- Measures to improve the quality of life.

In Table 5 the requirements for EIA as presented in the Gauteng guidelines are summarised with the corresponding sub-category in the adapted review package.

This guideline although compiled in Gauteng can be used across South Africa to ensure best practice is conducted when an EIA is done for a filling station.

Table 5 Requirements for the EIA according to the Gauteng Guidelines with the corresponding sub-category in the adapted review package

Reference GDACEL, 2001

Gauteng guidelines for Filling station EIA's	Corresponding sub-category in adapted review package
A 1:50 000 map and street map;	1.1.6
detailed site development plans; and must indicate the following: location of the site in relation and the distance of the tank/s from council boundaries; lay-out of adjacent properties; current land use and zoning of the area; major roads, railways, open spaces; environmentally sensitive/significant features; places of social and cultural importance; seep lines, channels, dams, rivers and other water bodies; existing filling station within a 5 or 25 km radius (that which is applicable);	1.1.2; 1.1.5; 1.4.2 and 1.4.3
description of the geology of the site with a description of the soil types in terms of compatibility;	1.2.1
detailed motivation on the need and desirability of the proposed development;	1.1.8
depth of the water table should be provided with a baseline reference of groundwater quality of the site and surrounding areas;	1.5.1

Gauteng guidelines for Filling station EIA's	Corresponding sub-category in adapted review package
the location of wells and boreholes on the site and neighbouring properties with an indication of the level of reliance of the neighbouring properties on ground water resources;	1.2.2
a description of other environmental issues (eg. socio-economic aspects related to the sense of place, visual impact, etc.) as a result of the construction, upgrade or the operation of the filling station;	1.4.3
a description of the public participation process prescribed by the EIA regulation;	2.3.1
method of waste disposal from the premises. Details (quantity, quality and method);	1.3.1
specific site design and recommendations for installation of underground tanks in relation to the receiving environment;	1.1.9
if the proposed filling station will include a car wash, the following must be taken into account: Manual vs. automated systems; water recycling practices; quantity and quality of the effluent discharged into the sewer must be determined in consultation with the relevant local authority;	1.1.10
a comparative assessment (benefits vs. disadvantages) of alternatives, specifically location, land-use and the no-go option;	3.1.2
in the case where there are existing filling stations in proximity, an assessment of the cumulative impacts on the environment, as a result of combined impacts from all filling stations in the applicable radius (5 or 25 km), must be undertaken: • the ability of the natural and social environment to assimilate cumulative stresses placed on them; • the likelihood of negative synergistic effects; • whether the proposed development has a significant impact on, or is constrained by existing or future development rights in the area; • the feed flow and anticipated traffic volume; • a feasibility study which includes the information in 3.4, but not entirely based upon it; • the demand (necessity) and desirability of the proposed development; with an indication of the potential of the proposed filling station in terms of fulfilling the need of the targeted consumer; • impact on the feasibility of existing filling stations; the no-go option as an alternative	2.2.1 – 2.2.7

3.4 Data Gathering and Analysis

This section defines how data were gathered and captured (i.e. the review components and review procedure). It also reflects on how the data were examined and final conclusions reached.

3.4.1 Components of the review package

The components of the adapted review package are in the form of a self-contained package. The components include the following (Lee *et al*., 1999):

- Advice for reviewers (i.e. necessary background information and guidance on the use of review criteria) (Appendix A);
- A list of criteria (review areas, categories and sub-categories) to be used to evaluate each EIA report (Appendix B);
- A collation sheet on which the findings should be recorded (Appendix B).

3.4.2 Review procedure

To conduct a review of EIA reports, a reviewer must undertake the following list of thirteen steps consecutively (adapted from Lee *et al.*, 1999):

1. Read the appendix on "Conducting a review" (Appendix A) to ensure that the reviewer understands the review package and what it will entail.
2. Thoroughly read the review topics as in the collation sheet (Appendix B) to familiarise oneself with the review areas, categories and sub-categories as well as the data that will be required in the EIA for each of the review topics.
3. Briefly scan through the EIA report to familiarise oneself with the layout and the arrangement of essential information.
4. Thoroughly read the list of assessment symbols (Table 6). The most relevant assessment symbol should be chosen to reflect the way the tasks in the sub-categories were performed in the EIA report.
5. Thoroughly read the review criteria and its component sub-categories. The sub categories are the actions that need to be undertaken in order for the requirements to be met.
6. Assess each of the sub-categories from the EIA report. Note that the information will not always be located in the same location for each of the EIA's.
7. Record the appropriate assessment symbol (Table 6) of the sub-category in the collation sheet in Appendix B. A task should be seen as satisfactorily handled if sufficient information is provided in the report for a decision maker to make an informed decision without having to request further information. It is important that appropriate information is not connected to the amount of information but rather to the appropriateness and quality of information given. When data on a specific topic is

not explicitly provided but is explicit on other topics, the reviewer may decide to rate it as satisfactory. It should however be recorded in the summary of the review.

8. The reviewer should use the assessment symbols of the sub-categories 1.1.1 - 1.1.10, and any other information in the EIA report to assess the review category 1.1. This category symbol should not just be an average but should take into account the importance of the information provided.
9. Proceed to the next review category (1.2) and evaluate it in the same way as was done for review category 1.
10. Continue until all the review categories in the review area have also been assessed in the same manner.
11. Your evaluation of these review categories can now be used to assess the review area 1 in the same way in which they themselves were derived from the review sub-category assessments. For example, the assessment of review area 1 is to be based on the assessments of review categories 1.1 - 1.5. This assessment symbol is to be marked in the space next to “FINAL GRADE REVIEW AREA 1”. Again, a simple averaging of the assessments of the component sub-categories should not derive the assessment of the review category.
12. Assess review areas 2, 3 and 4 in the same manner as review area 1. When all review areas have been assessed, the environmental impact report as a whole can be assigned an assessment symbol. The final assessment symbol is to be marked in the space next to “FINAL GRADE REVIEW FOR EIA” under the appropriate symbol.
13. The overall assessment should be supplemented with a brief summary (one or two paragraphs) of the strengths and weaknesses of the environmental impact report, highlighting, in particular, any key deficiencies which would require correction to bring the report up to an overall satisfactory standard (“C” or above).

Table 6 shows the assessment symbols with their associated descriptions.

Table 6 List of assessment symbols of the Lee-Colley review criteria

Reference Lee et al., 1999

Symbol	Explanation
A	Generally well performed, no important tasks left incomplete
B	Generally satisfactory and complete, only minor omissions and inadequacies
C	Can be considered satisfactory despite omissions and/or inadequacies
D	Parts are well attempted but must, as a whole, be considered unsatisfactory because of omissions or inadequacies

Symbol	Explanation
E	Not satisfactory, significant omissions or inadequacies
F	Very unsatisfactory, important task(s) poorly done or not attempted
N/A	Not applicable. The review topic is not applicable or irrelevant in the context of this EA report

A schematic diagram of the review hierarchy is presented in Figure 3 and Figure 4.

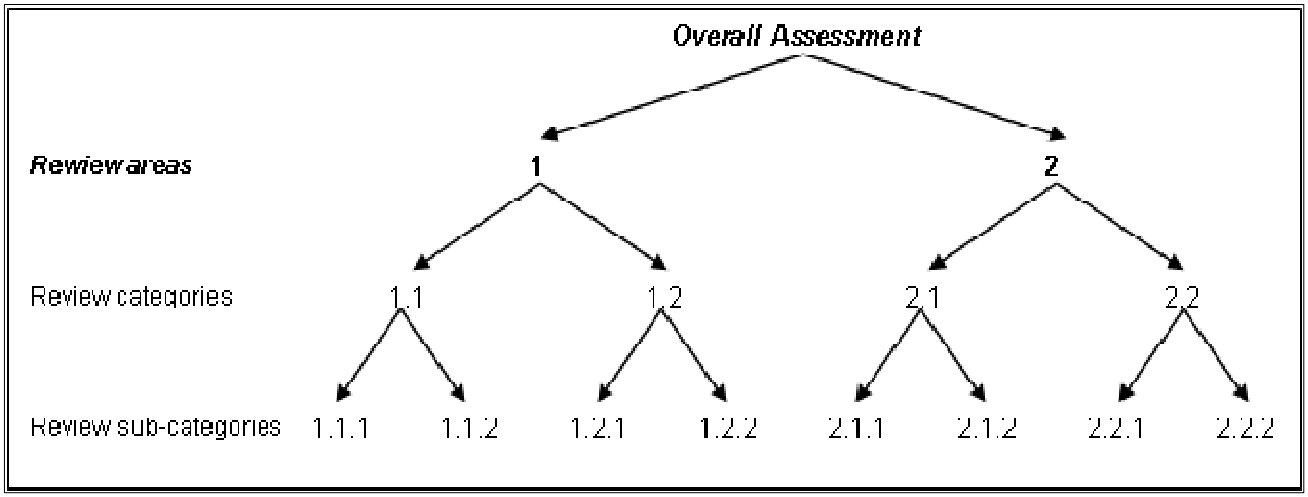

Figure 3 A schematic representation of the Review topics hierarchy in Review Areas 1 and 2

Reference: Lee et al., 1999

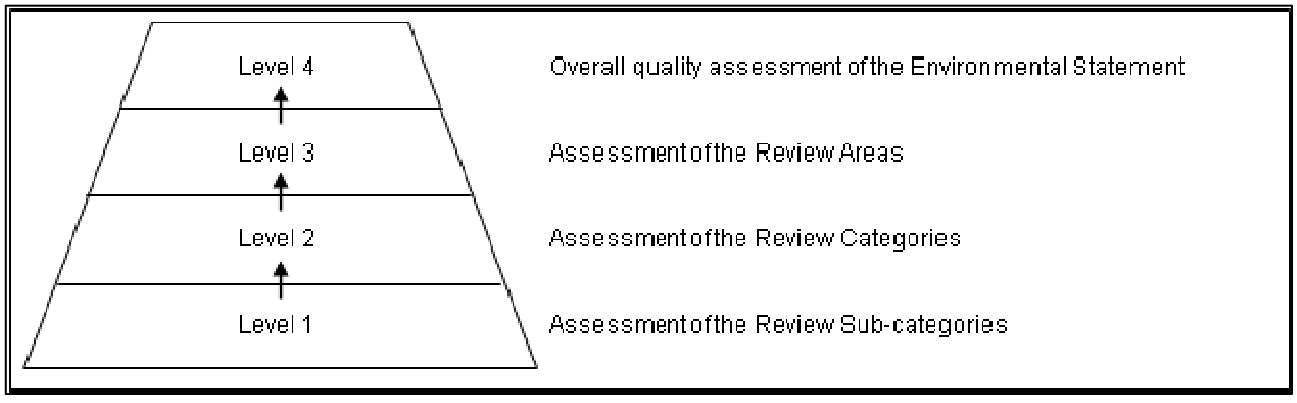

Figure 4 The Hierarchical/Pyramidal Structure of the Lee-Colley Review Package

Reference: Lee et al., 1999

The final assessment symbol for the overall EIA needs to be summarised in a paragraph or two. This must include the strengths and weaknesses of the EIA report especially the

omissions which will need to be addressed. This paragraph will also briefly give feedback on whether the EIA report has been compiled according to the legislative requirements.

3.5 Multiple Case Study Selection

Case study research is a widely accepted valid approach to quality review (Sandham *et al*, 2008). The main challenges presented by this approach relate primarily to selection of suitable cases and secondly to appropriate generalisation of results. Conclusions reached should demonstrate external validity by avoiding broad generalisations as in a statistical survey approach. Rather, the research follows a so-called 'replication logic' (Yin, 2003) which argues that results could be expected to repeat under similar conditions within the South African context.

For the study, twenty EIA reports on filling stations were reviewed by the researcher with the adapted review package:

1. Bushmans – Filling station
2. Komatipoort – Filling station and retail
3. Doornpoort 1 – Filling station
4. Doornpoort 2 – Filling station
5. Highveld – Filling station
6. Allandale – Filling station
7. George – new filling station
8. Graaff-Reinet – rebuild of filling station
9. Groblersdal – new filling station
10. Hartenbosch – residential and filling station
11. Heidelberg – upgrade of filling station
12. Mbizana – filling station and business development
13. Monwood – new filling station and retail
14. Notefull – new filling station
15. Stapelton – new filling station
16. Stutterheim – filling station and tourism centre
17. Tonga – new filling station
18. Umbongotwini – expansion of filling station
19. Waterfall – new filling station
20. Willowglen – new filling station

These reports were obtained from the EAP that conducted the EIA's[1]. The Government Departments have been approached with a request for information. They have however not responded back with access to the information, or requested a lengthy access to information application, by the time the study was conducted. Therefore the author relied solely on consultants to make available the reports reviewed. This however in itself had challenges as consultants where not comfortable with providing these report, which should be according to NEMA public information.

[1] To protect the names of their respective companies, the names of the EAP's that conducted the EIA's will not be made available and generic location names have been given to the projects.

Chapter 4: Data Analysis

This chapter aims to address research question 4:

➢What is the quality of EIA reports on filling stations?

In this chapter the author deals with the analysis of the data and this is done by dividing the chapter into 3 sections. The first section deals with the overall cross case analysis, after which section 2 deals with the specific categories and sub-categories for review area 1 to 4 in more detail (Section 4.2). The last section (Section 4.3) of the chapter concludes with the analysis of the legal compliance achieved by the EIA reports, by evaluating those review criteria identified in Chapter 3.

4.1 Analysis of Overall EIA Scores

According to the chart (Figure 5) representing the overall percentage of the overall EIA evaluation, it is evident that 55% of the EIA's scored C (which can be considered satisfactory despite omissions and/or inadequacies). Only 10% of the evaluated EIA's scored a B (generally satisfactory and complete, only minor omissions and inadequacies). Of the twenty EIA's evaluated, 35% scored a D symbol for the overall EIA (parts are well attempted but must, as a whole, be considered unsatisfactory because of omissions or inadequacies). This means that of the EIA's evaluated, the reviewer can conclude that 65% of the EIA's (or 13 EIA's) have adequate information, or close to adequate information, for the competent authority to be able to make an informed decision on the proposed filling station development.

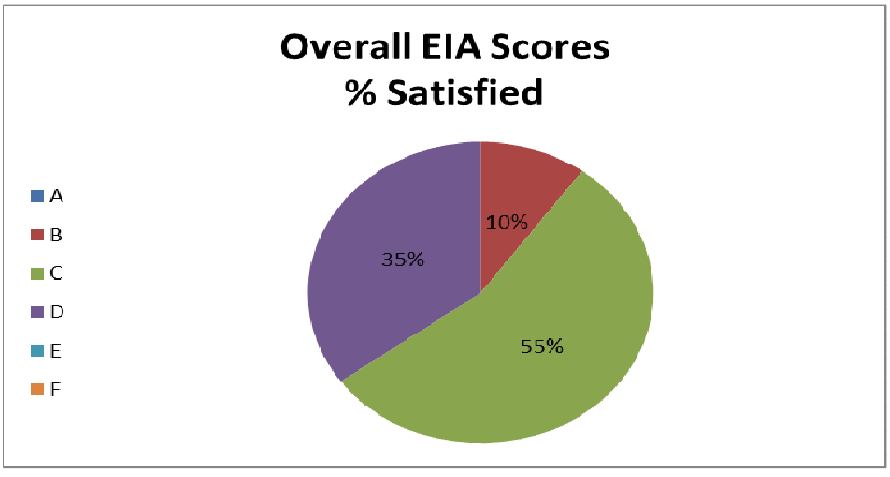

Figure 5 The percentage of A-F scores graded on the overall EIA's

The filling stations were classified as either a new filling station (green as in Table 6) in the case where the project is a greenfields project or a first time filling station on the site. Rebuild or upgrades (blue) are for existing filling stations that are undergoing a rebuild and capacity increase. These capacity increases are also represented in the EIA administrative guideline: Guideline for Construction and Upgrade of Filling Stations and Associated Tank Installation that was developed in 2001 by GDACEL. The filling station developments with associated developments (yellow) are filling stations that are not being evaluated alone but together with a business, residential or associated development. In these types of EIA's the emphasis is not only on the filling station. This approach is mostly not accepted by the competent authority as they prefer separate applications.

In Table 7, the overall EIA scores are summarised and reference is made to the type of development that the EIA covered as mentioned above. From the data it is evident that the mixed developments all scored a "satisfactory" C overall, which means that adequate information was given to make a decision. This may be due to the development covering other aspects and therefore a broader approach with more information was taken.

The new filling stations showed a 50% satisfactory score with 50% of the EIA's scoring an "unsatisfactory" D score. This is of concern as these are the projects that should have focussed specifically on the guidelines and regulations.

The rebuild and upgrades of the EIA's showed B or D scores. This could be because most of the EAP's did not see the need to describe certain areas in enough detail (this will be discussed in more detail in the next section).

Table 7 Overall EIA scores per filling station project and the associated type of development

Filling station name	Type of development	Overall EIA symbol
Bushmans	New filling station	D
Komatipoort	New filling station	B
Highveld	New filling station	D
Allandale	New filling station	D
Doornpoort 1	New filling station	C
Doornpoort 2	New filling station	C
George	New filling station	C
Graaff-Reinet	Rebuild of filling station	D
Groblersdal	New filling station	C

Filling station name	Type of development	Overall EIA symbol
Hartenbosch	Residential and filling station	C
Heidelberg	Upgrade of filling station	B
Mbizana	Filling station and business development	C
Monwood	New filling station and retail	C
Notefull	New filling station	D
Stapelton	New filling station	C
Stutterheim	Filling station and tourism centre	C
Tonga	New filling station	D
Umbongotwini	Expansion of filling station	D
Waterfall	New filling station	C
Willowglen	New filling station	C

In analysing the scores of the four review areas, leading to the overall score of the EIA, it is evident from Figure 6 that review area 3 (alternative and commitment to mitigation) had the lowest satisfactory scores, with 20% of the scores between A and C. The second lowest percentage of A-C was in review area 1 (description of the development). Review area 2 (identification and evaluation of key impacts) and review area 4 (communication of results) both scored 80% satisfactory scores.

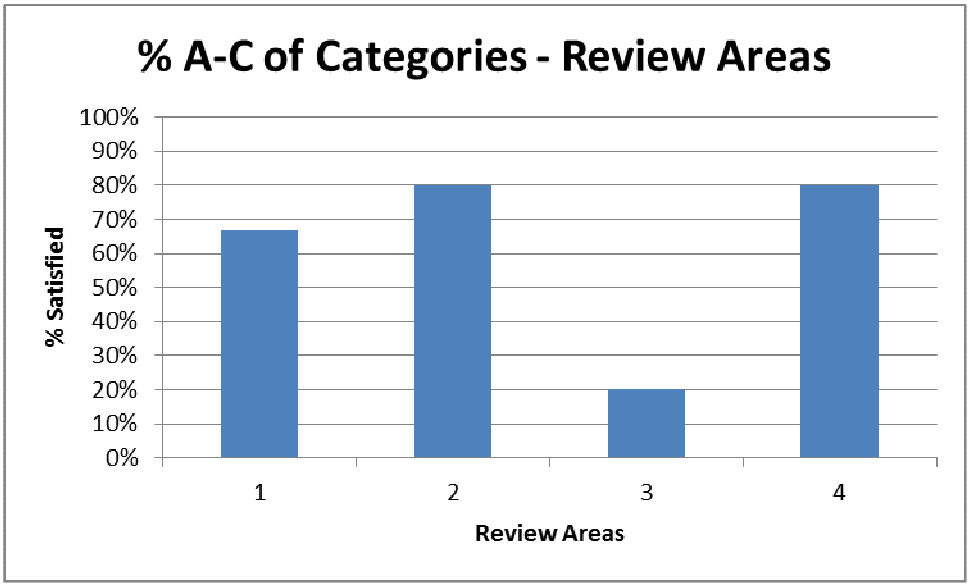

Figure 6 Graph to show the percentage scores for A-C (satisfactory scores) of each of the four review areas.

The reasons for the overall scores and review area scores will be further evaluated in the next section when discussing the review categories. This will be needed to identify the specific information lacking in the EIA's.

4.2 Analysis of Review Area 1, 2, 3 and 4

In analysing the review categories and sub-categories the reasons for the scores of the review areas and the overall EIA's can be determined in depth. In Table 8 the summary of the scores for the categories for all EIA's is depicted with the associated satisfactory percentage (scores between A–C). In the table all the satisfactory scores below 60% are marked with purple, since a 60% satisfactory score is border line to adequate information being present.

Table 8 Summary of category scores for all reviewed EIA's and the % satisfactory

Summary of Preliminary Grades – Review Area 1		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**	**%A-C**
1.1	Description of the Development	0	3	10	6	1	0	0	65%
1.2	Site Description	0	3	6	5	6	0	0	45%
1.3	Wastes & Emissions	0	2	4	4	7	3	0	30%
1.4	Environment Description	10	7	3	0	0	0	0	100%
1.5	Baseline Conditions	4	1	6	1	3	5	0	55%
Summary of Preliminary Grades – Review Area 2		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**	**%A-C**
2.1	Definition of Potential Impacts	5	10	2	2	1	0	0	85%
2.2	Cumulative Impacts	0	2	3	4	9	2	0	25%
2.3	Identification of Impacts	5	8	7	0	0	0	0	100%
2.4	Scoping	5	7	8	0	0	0	0	100%
2.5	Assessment of Impact Significance	7	8	5	0	0	0	0	100%
Summary of Preliminary Grades – Review Area 3		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**	**%A-C**
3.1	Alternatives	10	1	4	1	4	0	0	75%
3.2	Commitment to Mitigation	2	2	2	10	4	0	0	30%
Summary of Preliminary Grades – Review Area 4		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**	**%A-C**
4.1	Layout (Information)	8	5	5	2	0	0	0	90%
4.2	Presentation (Information)	6	7	3	4	0	0	0	80%
4.3	Emphasis (Impacts)	1	10	9	0	0	0	0	100%
4.4	Non-Technical Summary	7	2	2	0	5	4	0	55%
Summary of All Review Areas		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**	**%A-C**
1	Description	0	2	11	5	2	0	0	67%
2	Identification & Evaluation of Key Impacts	0	4	11	5	0	0	0	80%
3	Alternative & Mitigation	1	0	3	12	4	0	0	25%
4	Communication of Results	0	5	10	5	0	0	0	80%
Final Grade for EIA		**0**	**3**	**10**	**7**	**0**	**0**	**0**	**67%**

It is evident that six of the review categories scored a 60% or below on the satisfactory scores and five review categories scored a 100% satisfactory score. This will be discussed in more detail in sections 4.2.1 to 4.2.5.

4.2.1 Analysis of Review Area 1

Review Area 1 contains the criteria for the evaluation of information of the description of the project including the need and desirability, which also needs to take into account the surrounding uses and surrounding filling stations in the target area. This is important to provide a background to the proposed filling station development. 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.

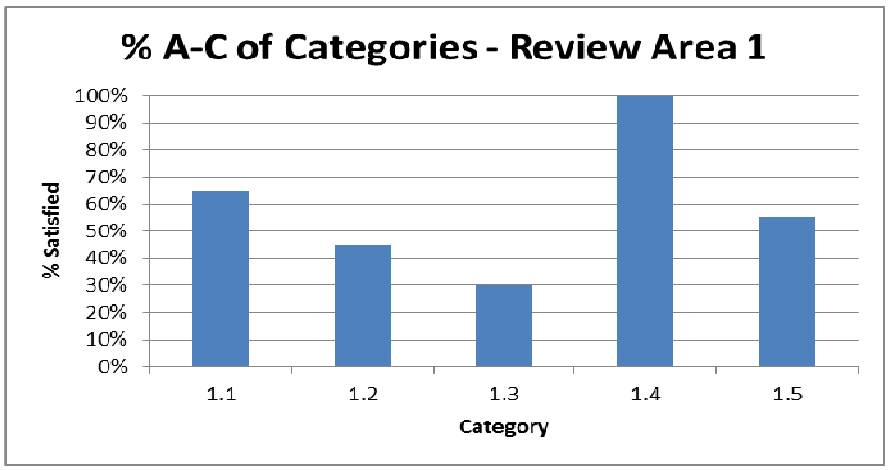

Figure 7 Graph showing the percentage scores for A-C (satisfactory scores) of review area 1.

Review category 1.4 (Description of the environment) had a 100% satisfactory rating. This category describes the environment on site. This includes:

- The environment expected to be affected by the development should be indicated with the aid of a suitable map of the area.
- Biophysical description of the site, including the physical (relevant physical features and characteristics, such as landscape features. dynamics and patterns).
- Social characteristics (such as patterns of land use, resources use, present land uses and patterns of other human disturbance).

The second best score was obtained for review category 1.1. This category describes the description of the development. This area includes the description of other filling stations, the type and quantity of fuel that will be kept on site as well as information on a car wash, should it

be included in the application. The descriptions of surrounding filling stations (1.1.2) and the car wash (1.1.10) (as per the GDACEL guidelines) were rated the lowest and is mostly the reason why 25% of the criteria reviewed in review category 1.1 was not satisfactory. The existing filling stations description is one of the most important sub-categories as the GDACEL guidelines do not in principal approve filling stations within 3 km's from one another in an urban area, or in a 25 km radius outside urban areas. Leaving out the information, or not properly describing this information, could either be due to a lack of proper feasibility studies on the applicant's part or a way to disguise the information by the EAP.

Review categories 1.2 and 1.3 both had a score of below 50%. The lowest satisfactory score was obtained for 1.3, with only 30% information satisfactory on the wastes and emission produced by the development. Review category 1.2, site description, showed 45% satisfactory information. Without a proper baseline of the area or site it is hard to determine what the impact will be once the development is operational. The lowest scoring sub-category in review category 1.2 was a referral to the groundwater level on the site as well as to a proper hydrosensus of the area to assist in determining the impact a possible fuel leakage would have on the surrounding area. Without the borehole uses, groundwater levels and groundwater flow the impact on groundwater cannot be determined sufficiently.

Review category 1.5 also refers to groundwater baseline information and shows only 53% sufficient information.

4.2.2 Analysis of Review Area 2

Review Area 2 is based on the identification and evaluation of key impacts. This includes the:

2.1. Definition of Potential Impacts
2.2. Cumulative Impacts
2.3. Identification of Impacts
2.4. Scoping
2.5. Assessment of Impact Significance

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 five review categories.

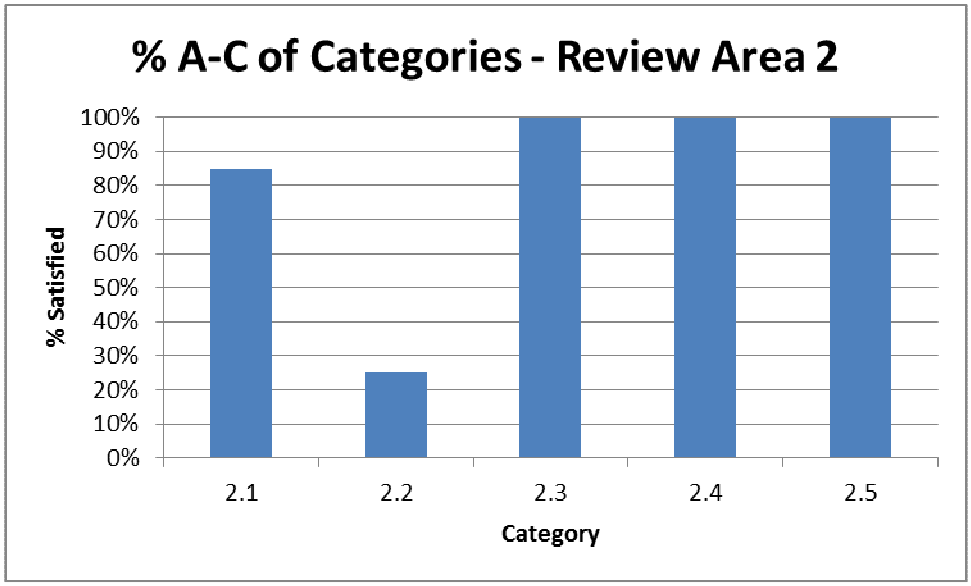

Figure 8 Graph showing the percentage scores for A-C (satisfactory scores) of review area 2

Review categories 2.3, 2.4 and 2.5 all scored a 100% satisfactory score. These review categories are based on the public consultation process in assisting in the impact identification, method of predicting impacts and the prediction of impacts. The inclusion of public participation and keeping record of the comment and concerns is a legal requirement and was therefore included in all the reviewed EIA's. However, a 100% satisfactory score does not mean that all the information was present; it only means that although there are omissions or inadequacies a decision can still be made based on the information.

The review category that performed forth best is review category 2.1 which defines the potential impact. This review category had an 85% satisfactory score. The identification of impacts is an important part of this review area. If an impact is not identified, for instance the impact on the socio-economic aspects of the area, then there is an omission in the EIA. This leads to the cumulative impact of the development, which in particular needs to take the impact of another filling station, into consideration. Review category 2.2 (Cumulative Impacts) scored a very low 24%. This was mainly because the information was either inadequate or due to some consultants not addressing the cumulative impact at all. It is a legal requirement for an EIA to take into account the cumulative impact of a development, which is a major concern if it is not addressed. The cumulative impact omission is also the major point addressed in the case of the FRA against MDACE (see section 2.3).

4.2.3 Analysis of Review Area 3

In reviewing Review Area 3 the reviewer evaluated the level of satisfactory information on the alternatives and commitment to mitigation. The analyses of the review categories are reflected in Figure 9. The scores have been depicted in percentage satisfactory scores (A-C) of each of the five review categories.

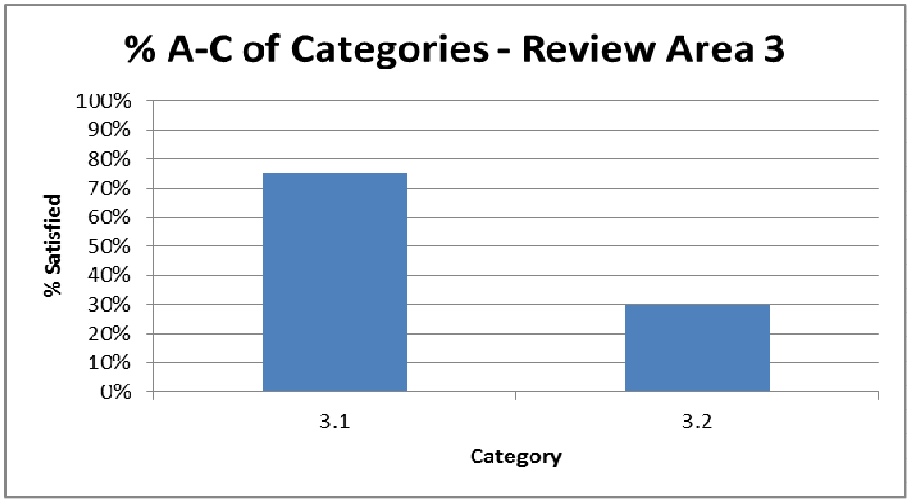

Figure 9 Graph to show the percentage scores for A-C (satisfactory scores) of review area 3

Review category 3.1 (alternative) had a 72% satisfactory score on the identification of alternatives and the description of the advantages and disadvantages of the alternatives. Most of the EIA clearly described both the advantages and disadvantages of each of the alternatives presented.

Review category 3.2 (The commitment to mitigation measures), although a legal requirement through the implementation of the Environmental Management Plan (EMP), was not adequately addressed. One can argue that it is not needed as an EMP needs to accompany the EIA and will form a legal binding document. It is however necessary to, at least in the main report, add mitigation measures that refer to a monitoring or audit protocol or appointment of an Environmental Control Officer (ECO) to evaluate the compliance with the EMP. The commitment to the mitigation measures therefore only obtained a 30% satisfactory score.

4.2.4 Analysis of Review Area 4

Review Area 4 is for the evaluation of the overall layout and presentation of the EIA. This review category should not be seen as a legal requirement, but rather as a best practice category. By placing the data in a logical formation it makes the review of the data by the

competent authority less challenging. The analyses of the review categories are reflected in Figure 10.

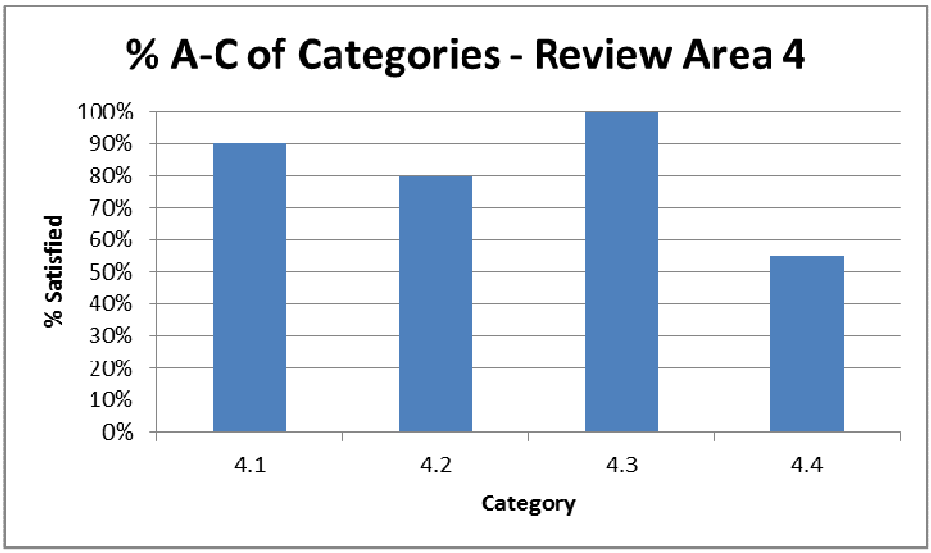

Figure 10 Graph to show the percentage scores for A-C (satisfactory scores) of review area 4

The review categories in review area 4 include:

4.1. Layout (Information)

4.2. Presentation (Information)

4.3. Emphasis (Impacts)

4.4. Non-Technical Summary

Review category 4.3 (Emphasis (Impacts)) had a 100% satisfactory score. The lowest scoring sub-category in the category was the unbiased approach to the EIA. It seems in some cases that the EAP's are rather promoting the project than evaluating impacts on the data available. This is of great concern as the NEMA regulations calls for an independent EAP to conduct the EIA.

Review categories 4.1 and 4.2 on the layout and presentation of the EIA scored 90% and 80% respectively. Technical terms and references seem to be the biggest problem of unsatisfactory scores within these categories. The EIA's very rarely referred to the data used in the EIA to determine certain statements made.

The lowest satisfactory score was given to review category 4.4 (Non-Technical Summary). The review criteria scored 55%. Nearly half of the EIA's reviewed did not include an executive summary or conclusion on the information provided in the EIA report.

4.2.5 Overall analysis of the four review categories

From the above analysis and the graph below (Figure 11) it is evident which of the categories within the overall EIA has performed the worst or unsatisfactory. These included:

- 1.3 – Waste and emissions
- 2.2 – Cumulative impacts
- 3.2 - Commitment to mitigation measures

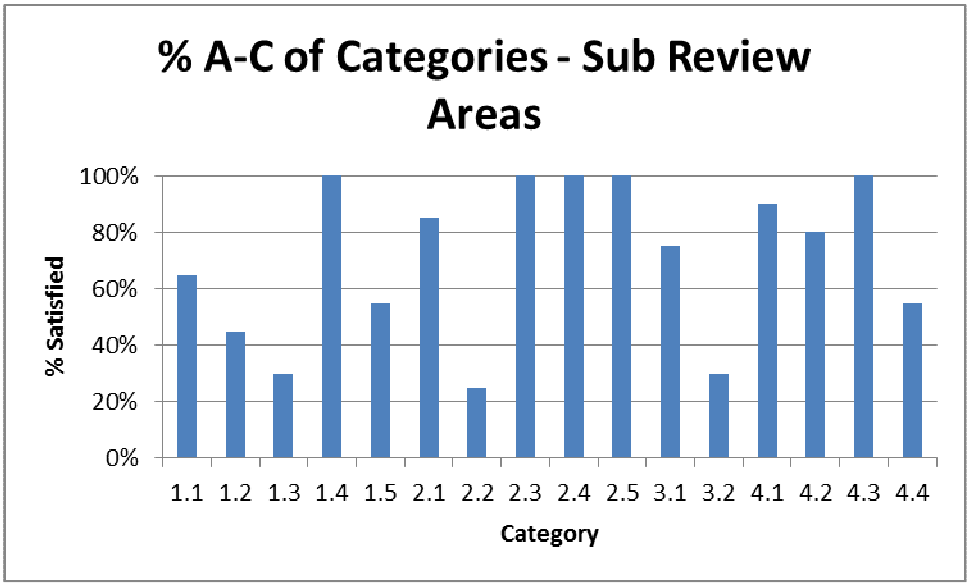

Figure 11 Graph to showing the percentage scores for A-C (satisfactory scores) of categories within the review areas

All three these categories are important for an EIA and specifically an EIA on a filling station development. Therefore, only one of the sample EIA's scored above C, with the rest of the EIA's either scoring a C (satisfactory) or D (unsatisfactory).

4.3 Minimum Legal Requirements for EIA Reports

For an EIA to be legally compliant it needs to at least score above C for the legal sub-categories. The overall scores of all the EIA's on the legally motivated sub-categories are depicted in Table 9 and Figure 12.

Table 9 Sub- category scores for all EIA's evaluated depicted against the legally motivated sub-categories

EIA Regulations (2006 and 2010)	Corresponding sub-category in adapted review package	Percentage for A-C for legally motivated sub category
details of – (i) the (EAP) who compiled the report; and (ii) the expertise of the EAP to carry out an environmental impact assessment;	1.1.1	**60%**
a detailed description of the proposed activity;	1.1.3	93%
a description of the property on which the activity is to be undertaken and the location of the activity on the property;	1.1.3	93%;
	1.1.4	100%
a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;	1.4.1	100%
	1.4.2	87%
	1.4.3	100%
details of the public participation process conducted in terms of sub-regulation (1);	2.3.1	100%
a description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;	1.1.8	100%
an indication of the methodology used in determining the significance of potential environmental impacts;	2.1.4	100%
a description and comparative assessment of all alternatives identified during the environmental impact assessment process;	3.1.1	93%
	3.1.2	81%
a summary of the findings and recommendations of any specialist report or report on a specialised process;	2.3.2	100%
	2.4.1	**60%**
a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;	2.1.1	87%
	2.3.2	100%
	2.5.1	87%
	2.5.3	93%
	2.5.4	100%
	2.5.5	100%
an assessment of each identified potentially significant impact, including – (i) cumulative impacts;	2.1.1	87%

EIA Regulations (2006 and 2010)	Corresponding sub-category in adapted review package	Percentage for A-C for legally motivated sub category
(ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated;	2.1.2	93%
	2.2	**27%**
a description of any assumptions, uncertainties and gaps in knowledge;	2.4.1	**60%**
an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	4.3.2	80%
an environmental impact statement which contains – (i) a summary of the key findings of the environmental impact assessment; and (ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.	4.4.1	**53%**

**Purple cells are those sub-categories that scored 60% and below*

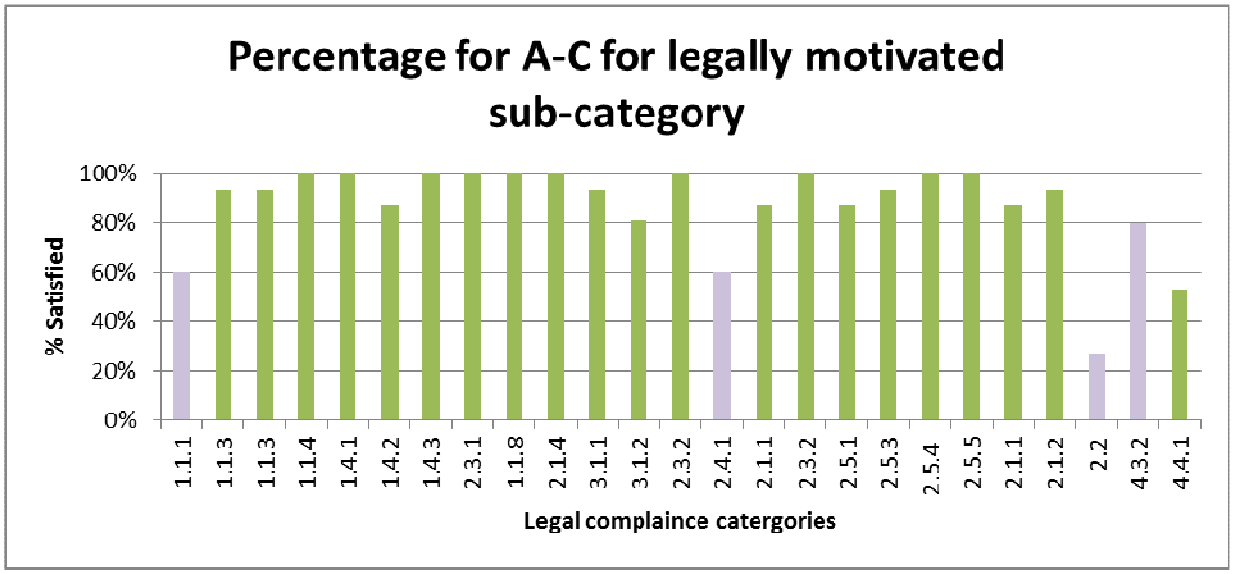

Figure 12 Graph to show the percentage scores for A-C (satisfactory scores) of legally motivated sub-categories

All sub-categories scoring 60% or below in the table above (also refer to Figure 12), were seen as unsatisfactory to comply with legal requirements. Most of the review sub-categories

and categories relating to the legislative requirements were addressed successfully with enough information to base a decision on. However, three review sub-categories and one category overall were not addressed sufficiently. These include the following areas:

- 1.1.1 – Information on the EAP and the applicant
- 2.4.1 - Assumptions, uncertainties and gaps in knowledge
- 4.4.1 – Technical summary
- 2.2 – Cumulative impacts

Review sub-category 1.1.1 however, did not fair badly due to the lack of EAP information but rather the Lee-Colley add-on of the information of the applicant. This will therefore not be discussed in further detail.

Discussing sub-category 2.4.1 (Assumptions, uncertainties and gaps in knowledge) in the EIA's obtained a 60% satisfactory score. Without knowing the limitations or gaps in knowledge the competent authority will be misled to believe that there are no omissions to information and that everything was covered satisfactorily. This is however never the case in EIA's as much of the planning is based on assumptions.

Sub-category 4.4.1 (Technical summary) of the reports either scored an A or scored an E or F. This means that the low satisfactory score is due to nearly half of the EIA's not even having a summary of the main impacts and findings.

Category 2.2 referring to cumulative impacts performed the worst in all of the EIA's. This review area scored 27% as satisfactory, leaving 73% as unsatisfactory. Describing the cumulative impact is a legal requirement as well as an important factor to discuss regarding a filling station development. The specific cumulative impacts to be included in the filling station EIA is the impact on other filling stations in the area. These include the impact on job losses as well as the economic viability of the other filling stations. These impacts where rarely mentioned and most of the time not even rated or mitigation proposed. Where they have been mentioned, they sometimes are not rated as a high impact, as the EIA's mention that the amount of losses to jobs will be absorbed in the new filling station. The economic impact and possible closure of existing filling stations have only been discussed in one of the EIA's reviewed. It could be argued that the feasibility of a filling station should be determined prior to even conducting an EIA. Should it lead to any negative impacts on other filling stations the planning should possibly be stopped prior to continuing into EIA. This will eliminate the need

to have EIA reports that try and convince the competent authority to approve yet another filling station.

Chapter 5: Discussion and Conclusion

This chapter demonstrates that the following overall research aim has been addressed:

- To critically analyse the quality of Environmental Impact Assessment Reports for proposed filling stations.

The chapter is divided into two sections. The first section highlights the main result in relation to the overall research aim. This is followed by section two where the main strengths and weaknesses of the EIA reports are summarised.

5.1 Main Conclusion

The evaluation of the fifteen EIA reports on the development of filling stations by means of the adapted Lee-Colley review package (Lee *et al*., 1999) suggests that there are a number of shortages in the content of the EIA reports. In the overall review, 60% of the EIA's scored C (can be considered satisfactory despite omissions and/or inadequacies). Only one or 7% of the evaluated EIA's scored a B (generally satisfactory and complete, only minor omissions and inadequacies). Of the EIA's evaluated, 33% scored a D symbol for the overall EIA (parts are well attempted but must, as a whole, be considered unsatisfactory because of omissions or inadequacies).

International EIA review showed a 67% or higher satisfactory score in developing countries. This EIA report review study showed filling station EIA's in South Africa at 67% satisfactory which correlates to the international findings.

Thus, the main conclusion reached in relation to the overall research aim is that the quality of the EIA reports for filling station developments, as reviewed by the adapted review package, is generally of a poor standard. This means that a decision to approve a new filling station is generally based on just adequate information to the competent authority. This is of great concern as filling stations in unmitigated situations can be not only detrimental to the biophysical environment but also to the social and economic environment. This will lead to unsustainable filling stations being approved.

5.2 Strengths and Weaknesses

Weaknesses were identified in each of the four major review areas. The weakness of the sub-categories were however the greatest in review areas 1, 2 and 3. The major omissions in the sub-categories included:

- 1.2 – Site description
- 2.2 – Cumulative impacts
- 3.2 - Commitment to mitigation measures

These major omissions lead to these three review areas having the poorest performance out of the four review areas.

The strengths in the EIA's were also identified by looking at the best performing review area which is review area 4 on the communication of results.
The issues that were addressed 100 % adequately in the EIA reports included:

- 1.4 Environment description
- 2.3 Identification of impacts
- 2.4 Scoping of impacts
- 2.5 Assessment of impact significance
- 4.3 Emphasis (impacts)

The results from the reviewed EIA's correspond mostly with the literature on the review of EIA reports. In past EIA quality reviews the EIA scores on the project description normally performed well, but the review area 3 on the mitigation and alternatives performed the worst (Kidd and Retief, 2008).

It should be noted that the review area with the least legal requirements (review area 4) had the highest score in the review areas, while review areas 1, 2 and 3 which have the largest amount of legal requirements was evaluated as less satisfactory. When the legal requirements are not being met effectively, it makes it difficult for the competent authority to make adequately informed decisions. A positive decision on these EIA's with inadequacies could lead to more unsustainable developments.

5.3 Recommendations

From this study it can be recommended that future EIA reports for Filing stations should take into account not only the biophysical area, but also include the social and economic environment. The EIA should especially take into account the cumulative impacts with regards to other Filling stations in the area.

The GDACEL guideline is still a good guide to what needs to be addressed in a Filling station EIA.

5.4 Future research possibilities

Due to time and budget constraints this study could not take into account both previous ECA application and reports under the 2010 regulations. Possible future research can also take into account the progress over different legislation and time span. This will include reports under ECA and NEMA reports after 2010 and how they fare against the criteria provided and also how they measure against the results from this study to see if there is a possible trend of improvement.

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APPENDIX A: CONDUCTING A REVIEW

The following has been compiled to assist reviewers to use the review criteria effectively.

In order to conduct a review the following steps need to be undertaken:

1. Read through the List of Review Topics (Appendix B) (Areas, Categories and Sub-categories) and familiarise oneself with them as well as the type of information required from the Environmental Impact Assessment report in order to assess its quality.
2. Briefly read through the environmental impact report noting the layout and the whereabouts of essential information.
3. Re-read the first review category (1.1) and its component sub-categories (1.1.1 - 1.1.10). Remember that the sub-categories refer to tasks, which must be undertaken in order that tasks described by the Category are performed fully and well.
4. Assess each of the sub-categories (1.1.1 - 1.1.10) referring closely to the environmental impact report. It is necessary to make notes. Remember that the information may be in a different place for each individual report.
5. Cautiously read the “List of Assessment Symbols”, explained on the first page before deciding on the symbol. The appropriate assessment symbol should be chosen based on the way the tasks relating to the review sub-category are performed in the environmental impact report. The symbol should be marked with an X or other appropriate symbol.
6. Decide which assessment symbol is appropriate for each sub-category and record it on the Collation Sheet. Avoid using split symbols (e.g. 'C/D') and be prepared to make use of the full range of assessment symbols 'A'-'F'. Record 'NA' where it is considered that the Review Topic is not applicable or irrelevant in the case of the particular environmental impact report under review. Note that a task should be assessed as having been satisfactorily handled (i.e. within the range 'A'-'C') if there is sufficient information of the appropriate quality provided in the environmental impact report on the Review Topic concerned to allow a decision maker to make an informed decision without having to seek further advice. It is the appropriateness and quality, and not the volume of information provided which is the relevant consideration.
7. Use the assessments of sub-categories 1.1.1 - 1.1.10 and any other information gained from the environmental impact report which you considered relevant. To assess

the review category 1.1 in the space next to Preliminary grade, under the appropriate symbol. Your evaluation of the relative importance of these Subcategories should also be taken into account.

8. Proceed to the next review category 1.2 and evaluate it in the same way as review category 1.1
9. Continue until all the review categories in the review area have also been assessed in the same manner.
10. Your evaluation of these review categories can now be used to assess the review area 1 in the same way in which they themselves were derived from the review sub-category assessments. For example, the assessment of review area 1 is to be based on the assessments of review categories 1.1 - 1.5. This assessment symbol is to be marked in the space next to “FINAL GRADE REVIEW AREA 1”. Again a simple averaging of the assessments of the component Sub-categories should not derive the assessment of the review category.
11. Assess review areas 2, 3 and 4 in the same manner as review area 1. When all review areas have been assessed the environmental impact report as a whole can be assigned an assessment symbol. The final assessment symbol is to be marked in the space next to “FINAL GRADE REVIEW FOR EIA” under the appropriate symbol.
12. The overall assessment should be supplemented with a brief synopsis (one or two paragraphs) of the environmental impact report's strengths and weaknesses, highlighting, in particular, any key deficiencies which would require correction to bring the report up to an overall satisfactory (“C” or above) standard.

APPENDIX B: REVIEW PACKAGE COLLATION SHEET

Sub-category		Generally well performed, no important tasks left incomplete	Generally satisfactory and complete, only minor omissions and inadequacies	Can be considered satisfactory despite omissions and/or inadequacies	Parts are well attempted but must, as a whole, be considered unsatisfactory because of omissions or inadequacies	Not satisfactory, significant omissions or inadequacies	Very unsatisfactory, important task(s) poorly done or not attempted	Not applicable. The review topic is not applicable or irrelevant in the context of this EA report
Review Area 1		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
1.1	**Description of the Development**							
1.1.1	The name of the applicant and address must be included. Information on the EAP must also be included							
1.1.2	The locality of the site and surrounding land uses of the area must be described, Including other filling stations and their radius from site (should be least 3 km in urban areas and 25 km in rural areas)							
1.1.3	A description of the extent of the operations must be given (e.g. the amount of diesel, petrol to be kept on site)							
1.1.4	There should be information regarding the proposed location on a map at an appropriate scale, showing boundaries of the proposed site, major existing infrastructure, adjacent land uses, and any important environmental features (e.g. rivers)							
1.1.5	Current land-use and zoning of the area							
1.1.6	A 1:50 000 map and street map and detailed site development plans							
1.1.7	The nature and quantities of raw materials needed during both the construction and operational phases should be							

	described							
1.1.8	A detailed motivation on the need and desirability of the proposed development							
1.1.9	Specific site design and recommendations for installation of underground tanks in relation to the receiving environment, including an indication as to how the following will be complied with: SABS 089, 1535 and 0131 relating to tank installation							
1.1.10	If the proposed filling station will include a car wash, the following must be taken into account: • Manual vs. automated systems • Water recycling practices • Quantity and quality of the effluent discharged into the sewer must be determined in consultation with the relevant local authority							
Total								
Preliminary Grade – Area 1.1								

Review Area 1		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
1.2	**Site Description**							
1.2.1	A description of the geology of the site with a description of soil types in terms of compatibility							
1.2.2	The location of wells and boreholes on the site and neighbouring properties with an indication of the level of reliance of the neighbouring properties on ground water resources							
1.2.3	The access to the site as well as the estimated amount of cars that will move in and out of the filling station must be determined							
1.2.4	A description of the transportation routes of tankers to the proposed development							
Total								
Preliminary Grade – Area 1.2								

Review Area 1		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
1.3	**Wastes & Emissions**							
1.3.1	Details (quantity, quality & method) of liquid and solid waste disposal from the premises							
1.3.2	Details of anticipated emission vapours, including VOCs and benzene concentrations							
Total								
Preliminary Grade – Area 1.3								

Review Area 1		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
1.4	**Environment Description**							
1.4.1	The environment, expected to be affected by the development, should be indicated with the aid of a suitable map of the area							
1.4.2	Biophysical description of the site including the physical (relevant physical features and characteristics, such as landscape features dynamics and patterns)							
1.4.3	Social characteristics (such as patterns of land use, resources use, present land uses and patterns of other							

	human disturbance)							
Total								
Preliminary Grade – Area 1.4								

Review Area 1		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
1.5	**Baseline Conditions**							
1.5.1	The depth of the water table should be provided with a baseline reference of the ground water quality of the site and surrounding areas							
Total								
Preliminary Grade – Area 1.5								

Summary of Preliminary Grades – Review Area 1		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
1.1	Description of the Development							
1.2	Site Description							
1.3	Wastes & Emissions							
1.4	Environment Description							
1.5	Baseline Conditions							
Final Grade – Review Area 1								

Review Area 2		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
2.1	**Definition of Potential Impacts**							
2.1.1	A description should be provided of the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the filling station							
2.1.2	The above types of effect should be investigated and described with particular regards to identifying effects on or affecting: human beings, flora and fauna, soil, water, air, climate, landscape, material assets, cultural heritage (including architectural							
2.1.3	Consideration should not be limited to events which will occur under perfect operation conditions. Where appropriate, impacts which might arise from non-standard operational conditions, due to accidents or natural disasters (floods, etc.), should also be described							
2.1.4	Impacts should be identified using a systematic methodology, such as project specific checklists, matrices, panels of experts. A brief description of the impact identification methods should be given as should the rationale for using them							
Total								
Preliminary Grade – Area 2.1								

Review Area 2		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
2.2	**Cumulative Impacts**							
2.2.1	Cumulative impacts should be included in the report. These may be caused by, for example, the dispersion of pollutants, infrastructural requirements of the project, traffic, effects on human health, socio-economic conditions, physical and cultural resources							
2.2.2	Assessment of the cumulative impacts must include the ability of the natural and social environment to assimilate							

	cumulative stresses placed on them							
2.2.3	Assessment of the cumulative impacts must include the likelihood of negative synergistic effects with regards to nearby filling stations							
2.2.4	Assessment of the cumulative impacts must include whether the proposed development has a significant impact on, or will be constrained by existing or future developments rights in the area							
2.2.5	Assessment of the cumulative impacts must include the feed flow and anticipated traffic volume and a feasibility study to prove this							
2.2.6	Assessment of the cumulative impacts must include the demand (necessity) and desirability of the proposed development (not feasibility); with an indication of the potential of the proposed filling station in terms of fulfilling the need of the targeted consumer							
2.2.7	Assessment of the cumulative impacts must include impact on the feasibility of existing filling stations							
Total								
Preliminary Grade – Area 2.2								

Review Area 2		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
2.3	**Identification of Impacts**							
2.3.1	Information relating to the actions taken to contact the general public and special interest groups to inform them of the proposed filling station and its implications should be provided							
2.3.2	Key impacts should be identified and selected for more intense investigation. This should have been done in consultation with the relevant authorities and stakeholders. Documentation should be provided to reflect the input from stakeholders and to indicate how their concerns will be addressed							
2.3.3	Impact areas not selected for thorough study should be identified and the reasons why they require a less detailed investigation should be given							
Total								
Preliminary Grade – Area 2.3								

Review Area 2		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
2.4	**Scoping**							
2.4.1	The data used to estimate the magnitude of the main impacts should be clearly described or their sources clearly identified. Any gaps in the required data should be indicated and the means used to deal with them in the assessment explained							
2.4.2	The parties that will be affected by the proposed activity or development must be identified, for example other filling stations and the effect it will have on their customer base							
2.4.3	The legitimate concerns from the I&AP's must be investigated, assessed and addressed in the report							
2.4.4	A record of all the views of and correspondence with interested and affected parties is to form an addendum to							

	the report							
2.4.5	Predictions of the magnitude of the impacts should be provided and where possible, expressed in measurable quantities with ranges and / or confidence limits as appropriate. Qualitative descriptions, where these are used, should be as fully defined as possible							
Total								
Preliminary Grade – Area 2.4								

Review Area 2		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
2.5	**Assessment of Impact Significance**							
2.5.1	Where mitigating measures are proposed, the significance of any impact remaining after mitigation should be described							
2.5.2	The choice of standards, assumptions and value systems used to assess significance should be justified and any contrary opinions should be summarised							
2.5.3	The significance of the impacts on the affected community and society in general, should be described; these descriptions may include the effects on public health or risk of life and the size of the affected community							
2.5.4	The significance of an impact should be assessed: account should be taken of the nature, duration, intensity, extent and probability of the impact in conjunction with national and local societal values							
2.5.5	A description of the proposed method of assessing the significance of the impacts should be given, thus the rating and ranking of impacts to attach values to impacts							
Total								
Preliminary Grade – Area 2.5								

Summary of Preliminary Grades – Review Area 2		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
2.1	Definition of Potential Impacts							
2.2	Cumulative Impacts							
2.3	Identification of Impacts							
2.4	Scoping							
2.5	Assessment of Impact Significance							
Final Grade – Review Area 2								

Review Area 3		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
3.1	**Alternatives**							
3.1.1	The method used to identify the alternatives must be clearly described, for example informal discussions with authorities, overlay maps that indicate different environmental and socio-economic factors, brainstorming or the Delphi technique or others							
3.1.2	A comparative assessment (benefits and disadvantages) of alternatives, specifically location, land-use and the no-go option							
Total								
Preliminary Grade – Area 3.1								

Review Area 3		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
3.2	**Commitment to Mitigation**							

3.2.1	There should be a clear record of the commitment of the applicant to the mitigation measures presented in the report. Details of how the mitigation measures will be implemented and function over the time span of which they are necessary should also be provided							
3.2.2	Monitoring programmes should be proposed to monitor the environmental impacts resulting from the filling station development and whether the actual impacts conform to the predictions within the report. Provision should be made to adjust mitigation							
3.2.3	Details of the decommissioning phase, including rehabilitation plans, measures for the financing thereof and proposal for end-use of the site							
Total								
Preliminary Grade – Area 3.2								

Summary of Preliminary Grades – Review Area 3		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
3.1	Alternatives							
3.2	Commitment to Mitigation							
Final Grade – Review Area 3								

Review Area 4		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
4.1	**Layout (Information)**							
4.1.1	There should be an introduction briefly describing the project, the aims of the environmental assessment and how those aims are to be achieved							
4.1.2	Information should be logically arranged in sections or chapters and the whereabouts of important data should be signalled in a table of contents or index							
4.1.3	Unless the chapters themselves are very short, there should be chapter summaries outlining the main findings of each phase of the investigation							
4.1.4	When data, conclusions or quality standards from external sources are introduced, the original source should be acknowledged at that point in the text. A full reference should also be included either with the acknowledgement, at the bottom of the page, or in a list of references							
Total								
Preliminary Grade – Area 4.1								

Review Area 4		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
4.2	**Presentation (Information)**							
4.2.1	Information should be presented so as to be comprehensible to the non-specialist. Tables, graphs and other devices should be used as appropriate. Unnecessarily technical or obscure language should be avoided							
4.2.2	Technical terms, acronyms and initials should be defined, either when first introduced into the text or in a glossary. Important data should be presented and discussed in the main text							
4.2.3	The EIA report should be presented as an integrated whole. Summaries of data presented in separately bound appendices should be introduced in the main body of the							

	text							
Total								
Preliminary Grade – Area 4.2								

Review Area 4		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
4.3	**Emphasis (Impacts)**							
4.3.1	Prominence and emphasis should be given to potentially severe adverse impacts as well as to potentially substantial favourable environmental impacts. The EIA report should avoid according space disproportionately to impacts which have been well investigated							
4.3.2	The EIA report should be unbiased; it should not lobby for any particular point of view. Adverse impacts should not be disguised by euphemisms or platitudes							
Total								
Preliminary Grade – Area 4.3								

Review Area 4		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
4.4	**Non-Technical Summary**							
4.4.1	There should be a non-technical summary of the main findings and conclusions of the study. Technical terms, lists of data and detailed explanations of scientific reasoning should be avoided							
4.4.2	The summary should cover all main issues discussed in the EIA report and contain at least a brief description of the project and the environment, an account of the main mitigation measures to be undertaken by the developer, and a description of any significant impact							
Total								
Preliminary Grade – Area 4.4								

Summary of Preliminary Grades – Review Area 4		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
4.1	Layout (Information)							
4.2	Presentation (Information)							
4.3	Emphasis (Impacts)							
4.4	Non-Technical Summary							
Final Grade – Review Area 4								

Summary of All Review Areas		**A**	**B**	**C**	**D**	**E**	**F**	**N/A**
1	Description							
2	Identification & Evaluation of Key Impacts							
3	Alternative & Mitigation							
4	Communication of Results							
Final Grade for EIA								

Comments on the overall EIA

Strengths and weaknesses

Legislative compliance