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A critical review of EIA follow-up in South Africa: A case study for Gauteng Province

Environmental Sciences Research Report (GEOL7007A)

Submitted in partial fulfilment of academic requirements for the Master of Science Degree (CW/RR) in the School of Animal, Plant and Environmental Sciences

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04 October 2021

Declaration

I declare that this Research Report is my own work, unaided work. It is being submitted for the Master of Science Degree at the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University



(Signature of candidate)

_4th_____day of_October_____2021_____in_Midrand_____

Abstract

Environmental Impact Assessment (EIA) is internationally recognised as a tool for environmental management. When an EIA is done and likely environmental impacts have been identified, recommendations for mitigation against them are made. EIA follow-up (evaluation, monitoring, and communication) to confirm whether these proposed mitigation measures and recommendations are put into practice and whether they have the desired mitigating effect is often not done. While EIA has been legally established in South Africa for the past two decades, there has not been much consideration given to assess implementation of these mitigation measures. This study attempts to address this gap by assessing the extent of implementation of mitigation measures (level of compliance) on seven construction projects executed in different areas within Gauteng Province. Project compliance levels to authorisation conditions and Environmental Management Plan Reports (EMPrs) were used as a base for discussion and the extent to which mitigation measures have been implemented successfully. Perceptions of EIA follow-up participants/project stakeholders, including the Competent Authority, Client (Project Manager) and Environmental Compliance Officer) was also explored to determine their views towards and understanding of EIA follow-up. The findings show that mitigation measures are inadequately implemented and also revealed that EIA follow-up is a neglected element of the EIA process, with several constraints identified. In terms of perceptions over EIA follow-up, all project stakeholder participants acknowledged the value of EIA follow-up in ensuring that mitigating measures are put in place to reduce developmental impacts on the environment by implementing recommendations stipulated in Environmental Authorisations and EMPrs, however several concerns were raised regarding the practice, cost related to implementation of mitigation measures, inadequate resources in terms of technology and equipment, lack of support and enforcement from competent authorities, inadequate capacity development amongst project stakeholders, poor public participation during EIA process, lack of support from the government through weak regulatory framework, corruption and poor EMP quality. With this, the study has made recommendations that may help to improve EIA follow-up in the context of South Africa.

***Key words**: Environmental Impacts Assessment, EIA follow-up, Project stakeholder perceptions, Construction projects*

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Table of Contents

Declaration ..... **ii**
Abstract ..... **iii**
Acronyms and Abbreviations ..... **viii**
Chapter One: Introduction **1**
1.1 Rationale 2
1.2 Aim and Research Questions 3
1.3 Layout of the Research Report 3
Chapter Two: Literature Review **4**
2.1 Overview of EIA 4
2.2 EIA Process in South Africa 6
2.3 EIA follow-up 7
2.4 Stakeholders involved in EIA follow-up. 8
2.5 Importance of EIA follow-up 9
2.6 Project stakeholders' perceptions on EIA follow-up 11
2.6.1 Challenges and barriers to EIA follow-up 12
2.7 EIA follow-up in South Africa 13
2.8 EMP and Environmental Authorisation implementation in construction 15
Chapter Three: Research Methodology **17**
3.1 Case study approach 17
3.2 Case study selection 17
3.3 Data Collection 18
3.4 Data Analysis 21
3.5 Limitations of the study 22
Chapter Four: Results **23**
4.1 Implementation of Environmental Authorisation conditions 23
4.2 Project stakeholder's perceptions on EIA 25
4.2.1 Client (Project Manager - PM) 25
4.2.2 Competent Authority 26
4.2.3 Environmental Compliance Officer 27
Chapter Five: Discussion and Conclusion **30**
5.1 Implementation of Environmental Authorised conditions 30
5.2 Project stakeholder's perceptions on EIA 32
5.3 Recommendations 38
5.4 Concluding remarks 39
References **41**

Appendix 1: Audit/compliance checklist_ Construction of a food warehouse 48
Appendix 2: Audit/compliance checklist_ Construction of low-cost housing..... 54
Appendix 3: Audit/compliance checklist_ Construction of a stormwater system 58
Appendix 4: Audit/compliance checklist_ Construction of a filling station..... 62
Appendix 5: Audit/compliance checklist_ Construction of a road 67
Appendix 6: Audit/compliance checklist_ Construction of an outfall sewer 71
Appendix 8: Ethics clearance certificate 77
Appendix 9: Questionnaires 78

List of figures

Figure 1: EIA process flow chart (Ogola 2007) 5
Figure 2: EIA follow-up as link between EIA and project implementation (taken from Arts, Caldwell and Morrison-Saunders, 2001:177) 10
Figure 3: Average project compliance (with min/max) over the 3-month audit period 24

List of Tables

Table 1: Compliance scoring methodology 20
Table 2: Record of interviews conducted onsite 21
Table 3: Monthly compliance of all sites 23

Acronyms and Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent authority
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, Act 73 of 1989
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMPr	Environmental Management Program
EMS	Environmental Management System
EPA	Environment Protection Agency
GN	General Notice
ISO	International Standard Organisation
IEM	Integrated Environmental Management
LN	Listing Notice
NC	Non-Compliance
SMME	Small, Medium and Micro Enterprises
NGO	Non-Governmental Organisation
NEMA	National Environmental Management Act, act 107 of 1998
NEPA	National Environment Policy Act, No. 107 of 1969
PPP	Public Participation Process
PM	Project Manager
ROD	Record of decision
RSA	Republic of South Africa

S&EIA	Scoping and Environmental Impact Assessment
UNEP	United Nations Environmental Programme
WULA	Water Use Licence Application

Chapter One: Introduction

Industrialisation to achieve economic development has resulted in global environmental degradation (Ahuti, 2015). While the industrial revolution has brought with it some positive change, there is no question that it has resulted in significant damage to the environment (Ahuti, 2015). Depletion of natural resources and increasing pollution levels have been mostly detrimental to the world's environment (Oskamp, 2000). The United States' National Environmental Policy of 1970 (NEPA) was promulgated as a response to an increased growth in the human population, technology, and economic development. Environmental evaluation procedures (formal and informal) were then developed and implemented throughout the world to this effect (Sowman *et al*. 1995). One of these procedures is the Environmental Impact Assessment (EIA), which was initially introduced as an instrument for managing the environment under NEPA, addressing environmental issues that were growing at a fast rate (Sadler, 2004).

Arts *et al*. (2001) defined an EIA as a "formal process that provides valuable information concerning the potential environmental consequences of a proposed development". Its primary goal is to achieve sustainable development, environmental protection and management (Glasson and Therivel, 2013). Since inception in the early 1970's, the EIA's mandate has expanded continuously, with its application varying amongst countries. EIAs have been extensively used as a tool for decision-making, however they have put much emphasis on events leading to acquiring environmental permits, neglecting monitoring and auditing of impacts. Stages before EIA decision has received so much attention internationally whilst the post EIA decision has gained minimal recognition (Gwimbi and Nhamo, 2016). This has compromised the success of EIA towards its goal for sustainable development (Ahammed and Nixon, 2006). Without follow-up, the EIA process would simply become a paper exercise without real environmental benefits (Abebe *et al.* 2007).

It is widely known that EIAs are far from being perfect with several problems associated with their procedural steps, from baseline studies to follow-up activities. In an international study conducted by Sadler (2004) on the effectiveness of EIAs, follow-up activities were found to be either non-existent or attained poor performance. Wood (2013) assessed the status of follow-up activities in developed countries and

discovered that none of them met his evaluation criteria fully. Studies conducted by Sandham *et al*. (2013) in eight European countries revealed that only Greece had measures in place to strengthen their EIA follow-up. EIA follow-up has therefore been identified internationally to be the weakest link in the EIA process (Jalava, Haakana, and Kuitunen, 2015). EIA follow-up facilitates protection of the environment during execution of developmental projects (Glasson and Therivel, 2013).

According to Glazewski (2000), EIA for large projects were done since 1970s in South Africa. While EIA has been legally established in South Africa for the past two decades, there has not been much consideration given to assess implementation of these mitigation measures. Preparation of EIA reports/ statements as well as satisfactory institutional arrangements do not guarantee protection of the environment. Instead, it is the authentic application of mitigation measures during execution of projects that can ensure sustainable development (Cashmore *et al*. 2004). Effective implementation occurs when mitigation measures are implemented and continuously monitored for effectiveness (Wood, 1995). According to Momtaz and Kabir (2018), environmental management activities such as monitoring of impacts after approval of a project are often a weak and a discretionary component of the EIA process. In most cases, the EIA process is concluded upon receipt of a developmental permit/ licence, without some form of follow up (Jones and Fischer, 2016).

1.1 Rationale

The importance of EIA follow-up has been acknowledged in literature (see Glasson *et al.* 2012). Deficiency in EIA follow-up has been identified to be an international problem, compromising the efficacy of EIAs as an instrument for sustainable development (Gwimbi and Nhamo, 2016). While EIA has been legally established in South Africa for the past two decades, minimal attention has been given to the assessment of implemented mitigation measures. With the ultimate goal of conducting an EIA in mind, it is important to note that this will only be possible upon implementation of effective mitigation measures.

In South Africa, poor environmental performance could be due to the absence of EIA follow-up practices. According to Glasson *et al*. (2012), follow-up usually assists in promoting environmental management throughout the stages of a project. EIA follow-

up also enables learning from experience and produces information that may be utilised in future. By evaluating the extent of implementation of mitigation measures on projects and exploring perceptions associated with EIA follow-up, this research will contribute towards the body of knowledge on EIA follow-up in South Africa.

1.2 Aim and Research Questions

With a clear trend of poor follow-up in other countries, this study aimed to assess the extent of EIA follow-up activities at seven authorised/ approved projects in Gauteng and subsequently identify opportunities to improve the practice.

This research sought to answer the following questions:

- To what extent have project proponents implemented Environmental Authorisation conditions?
- What are project stakeholders' perceptions on EIA follow-up?
- How can implementation of authorised conditions be improved on authorised/ approved projects?

1.3 Layout of the Research Report

The research report is divided into five chapters. Chapter one introduces the research topic and provides a brief introduction and background on EIAs, EIA follow-up and rationale of the study. It also outlines the aim and research questions the study seeks to answer. Literature review follows in Chapter two, providing some perspective on EIA process, EIA follow-up, regulatory framework for EIA and its contribution to environmental sustainability of projects. Chapter three outline the research methods adopted for the study. Results are presented in Chapter four, while the discussion and conclusion are outlined in Chapter five. The research report ends with concluding remarks and recommendations on how to improve EIA follow-up practice, followed by a reference list and appendices. Tables and figures are numbered in continuous form throughout the research report.

Chapter Two: Literature Review

2.1 Overview of EIA

An environmental impact assessment can be defined as “a planning or decision-making tool that allows the various impacts of a proposed project and its alternatives to be assessed prior to any decisions about its feasibility being taken” (Ortolano & Shepherd 1995). Glasson and Therivel (2013, p. 3) define it as “a systematic process that examines the environmental consequences of development actions in advance”. EIA is being practiced internationally and plays an important role in environmental management (Morrison-Saunders and Fischer, 2006). Global industrial development in the 1960’s led to major environmental impacts facilitating introduction of legislation to control the impacts (Noble, 2006). This ultimately gave birth to the establishment of the National Environmental Policy Act (NEPA) in 1969, in the United States of America (USA) in January 1970 (Noble, 2006). Since then, EIA has been practiced by several countries, promoting environmental sustainability (Sadler 2004). Ogola (2007) reiterates that, while the EIA process varies from one country to the other, it involves a common set of steps concluding in a written environmental impact report that is submitted for decision making by a competent authority. Figure 1 illustrates a generalised EIA process flow chart (taken from Ogola, 2007). In individual EIA systems however, various stages of the process are not compulsory, and its administration can differ significantly. Despite being specific to different countries, there is general standardisation in the way they are applied throughout the world.

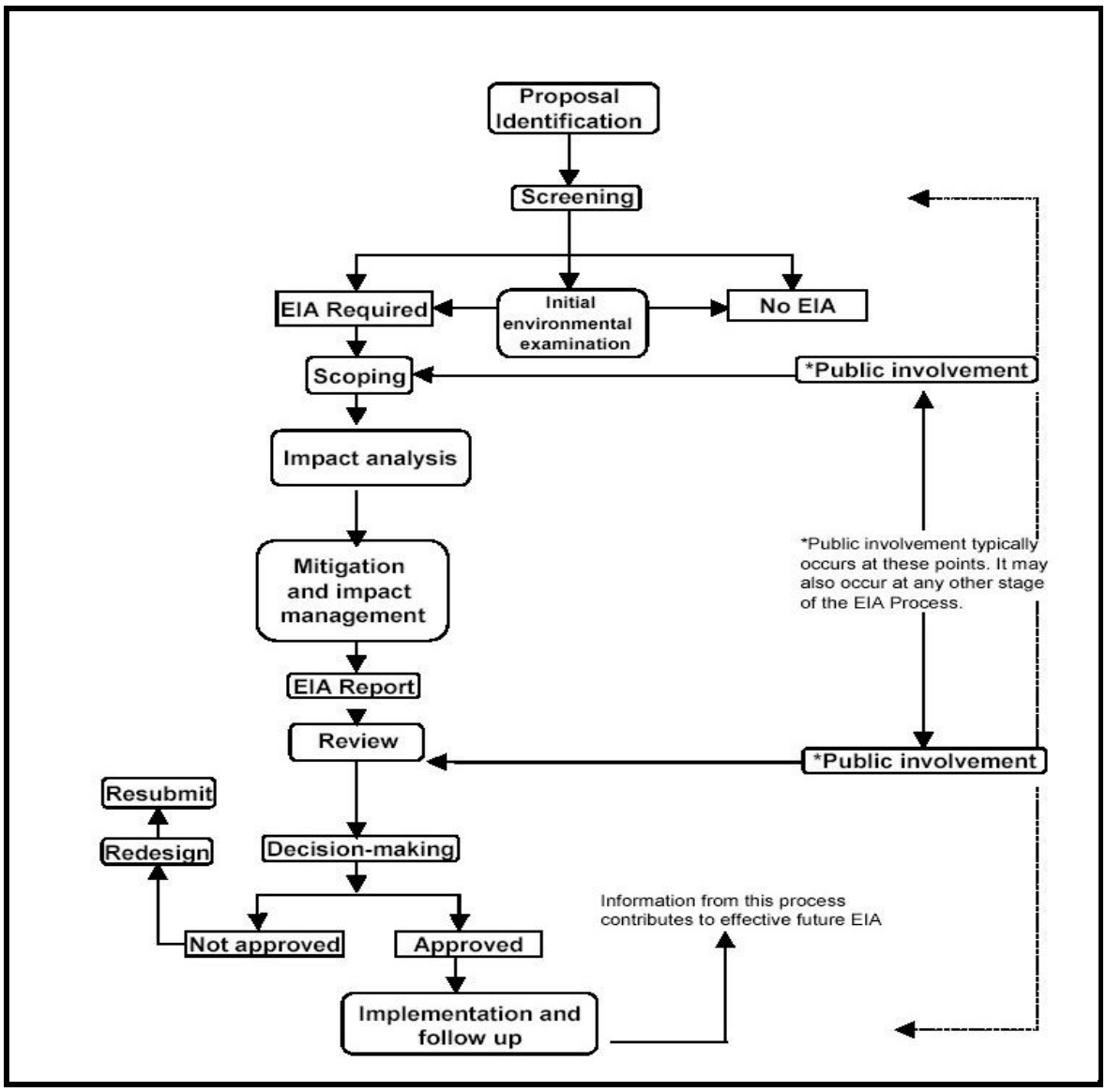


Figure 1: EIA process flow chart (Ogola 2007)

Screening is undertaken during the planning phase of a project. During screening, the need and level of assessment (full EIA or Basic Assessment) is determined (UNEP, 2002). During this stage acquisition of important information that is important for decision making is done (Department of Environmental Affairs, 2018). When the level of assessment is established, scoping will determine alternatives to be investigated further during the actual impact assessment (UNEP 2002). Scoping plays an important role in focussing resources where needed. The impact assessment stage predicts the likely positive and negative environmental impacts (UNEP 2002). Proposed mitigation measures are then consolidated in an environmental management plan (EMP) to avoid or minimise negative environmental impacts and to enhance positive ones

(UNEP 2002). The EMP is project specific and provides a framework/ guideline for monitoring and managing the environment from inception to decommissioning of a project (Weaver, 2003; Rizzolo, 2006 and Saiccor, 2008). After evaluating the likely impacts, mitigation measures and alternatives, an Environmental Impact Assessment Report (EIAR) with all findings is compiled (Weaver 2003). Compiled reports are then submitted to relevant competent authorities for review and decision-making (UNEP, 2003). This process usually result in an authorisation, licence or permit. While review is primarily the responsibility of competent authorities, the public and/or independent specialists can also review the reports (Weaver, 2003).

During inception of developmental projects, conditions specified in the authorisation document and EMPr should be implemented and continuously monitored (Weaver, 2003). In spite of its importance, South Africa's EIA process often neglects this stage (Kruger and Sandham, 2018). According to Section 24 of the Constitution of South Africa EIA ensures that "everyone is guaranteed a right to an environment that is not harmful to their health or wellbeing and that the environment is protected for the benefit of the present and future generations".

2.2 EIA Process in South Africa

In the 1970's, EIA (mostly for large projects) were practiced on a voluntary basis. Official administrative systems were non-existent in spite of enabling clauses to process EIAs in the Environmental Conservation Act, 73 of 1989. EIA practice only became legal in 1997 as part of the Environmental Conservation Act, 1989 (Act 73 of 1989) (ECA). After the Apartheid era in 1994, South Africa experienced several changes in government systems, decision making processes and law reform processes (Leiman, 2014). This resulted in the EIA Regulations under the ECA (No. 73 of 1989) being substituted by EIA Regulations that were promulgated in terms of chapter 5 of the National Environmental Management Act (NEMA) No 107 of 1998. In July 2006, NEMA was amended and the 1997 EIA regulations were repealed (Kruger and Sandham, 2018). Upon review of EIA effectiveness in South Africa after ten years at a conference an agreement was reached to come up with an Environmental Impact Assessment and Management Strategy. This resulted in amendments to the 2006 EIA regulations and introduction of new regulations in August 2010 (DEA, 2015). In December 2014, new EIA regulations were introduced, subsequently substituting the

2010 EIA regulations (DEA, 2015). Furthermore, EIA regulations of 2014 were amended in April 2017 with implementation at provincial and national levels (DEA, 2015). EIA follow-up however, is neglected in the 1997 EIA regulations promulgated under the ECA (No. 73 of 1989). The NEMA, No. 107 of 1998 partially provides for EIA follow-up through “investigation and formulation of arrangements for the monitoring and management of environmental impacts” (Section 24(7) (f). A deficiency in EIA follow-up has resulted in a regressive step towards management of the environment in South Africa (Hill, 2000). Within NEMA, the EIA Regulations determine activities that should be subjected to an EIA process as well as reports to be submitted for decision making (DEAT, 2006). These regulations are published in the Government Gazette in the form of General Notices (GN). Activities listed in GN R983 and GN R985 require that a Basic Assessment (BA) be undertaken, whilst those in GN R984 require that a Scoping and Environmental Impact Assessment Report and an Environmental Management Plan (EMP) be compiled. Commencement of these listed activities without authorisation from competent authorities is illegal and constitutes an offence, that is liable to imprisonment, a fine, or both. (Kruger and Sandham, 2018). The EIA process for South Africa is comparable to the generic EIA process, with a few unique aspects (Youthed, 2009).

2.3 EIA follow-up

The term 'EIA follow-up' refers to various activities that include “monitoring, auditing, ex-post evaluation, post-decision analysis and post-decision management” (Morrison-Saunders *et al.* 2014). EIA follow-up focuses on activities after a decision has been made and also provides feedback to EIA processes. Marshall, Arts and Morrison-Saunders (2005, p. 176) define EIA follow-up as “the monitoring and evaluation of the impacts of a project or plan (that has been subject to EIA) for management of, and communication about, the environmental performance of that project or plan”. According to Marshall (2005), the application of follow-up as integral part of the EIA process is now mandatory in ensuring environmental protection. Successful development on the other hand is now regarded in terms of its contribution to sustainable development, environmental performance, acceptance by stakeholders, and the size of the environmental impacts over its life cycle (Glasson *et al*. 2012) Follow-up activities are generally recognised to be crucial in confirming compliance

with legislative requirements, precision in impact predictions and verifying performance of proposed mitigation measures (Abebe *et al*. 2008).

Arts *et al.* (2001) and Morrison-Saunders and Arts (2004b) proposed that EIA follow-up consists of four key activities:

- "Monitoring - refers to baseline data collection, impact monitoring, compliance monitoring as well as state of the environment monitoring.
- Evaluation/Auditing - entails appraisal of monitoring results against established benchmarks. It involves the periodical objective examination of monitoring observations by comparing them with pre-defined criteria.
- Management - refers to the making of decisions and adopting of appropriate measures in response to issues arising from monitoring and evaluation activities.
- Communication - refers to informing the EIA follow-up stakeholders involved about the results of EIA follow-up in order to offer feedback on plan/project implementation and on the EIA process as a whole"

2.4 Stakeholders involved in EIA follow-up.

Morrison-Saunders *et al*. (2007) has identified three categories of stakeholders involved in EIA follow up: the proponent, the regulators, and the community. Follow-up carried out by proponents is also known as first party follow-up. Parastatals and private companies fall in this category. These are usually accountable for managing projects and expected to conduct most follow-up activities through voluntary, self-regulatory and other initiatives like Environmental Management System as they are responsible for project management (Noble & Storey, 2004 and Morrison-Saunders & Arts, 2004). EIA regulators are competent authorities and other government agencies in charge of implementing and administrating EIA systems. Regulators mainly focus on ensuring compliance to specified authorisation conditions and other applicable legal requirements by proponents (Sanchez and Morrison-Saunders, 2011). The community refers to individual independent persons or group of persons that are directly affected by a developmental project (Morrison-Saunders *et al*. 2007). Communities are very important in the EIA process since they are independent and have special knowledge of their local areas (Morrison-Saunders *et al*. 2007). This information will assist them in evaluating EIA process. Hunsberger *et al*. (2005) argue

that involving communities in follow-up might improve the quality of environmental assessment.

2.5 Importance of EIA follow-up

EIA's provide information regarding the environmental impacts of larger developments. Several studies over the past two decades have revealed benefits associated with EIA follow-up (Jones and Fischer 2016), however in practice this has proven to be a weak link in an EIA system/process (Chang *et al*. 2018). According to Glasson and Therivel (2013), EIA will not be effective without implementation of follow-up activities. Research has proven that implementation of EIA follow-up activities is being neglected globally. Concerns have been raised over the EIA process putting too much emphasis on the pre-decision level and ignoring post-decision activities (Arts *et al.* 2001). This has therefore resulted in EIAs failing to contribute significantly to sustainable development (Abebe *et al.* 2008). Resources utilised during pre-decision in the form of time, money and effort will be considered to be useless unless there is a way of evaluating the effectiveness of proposed mitigation measures. EIA follow-up therefore becomes a critical part of any EIA system in ensuring that EIAs work to protect the environment (Storey and Noble, 2004; Baker and Dobos, 2001).

By integrating all lessons learnt into the EIA process, follow-up allows project stakeholders to learn from experience (Morrison-Saunders and Arts, 2014). Without it there will be no mechanism for feedback, resulting in a static process without any room for improvement. EIA follow-up therefore allows project stakeholders to shift from their imaginary perception of a proposed project to actually appreciating practical situations during their implementation. Ultimately it is not about predicted impacts, but rather the tangible effects that must be clearly understood in order to protect the environment (Jordaan, 2010). Follow-up connects the pre- and post-decision stages of EIA, (Figure 2) consequently bridging the implementation gap (Arts et al. 2001). EIA stages before decision making are predictive, concentrating on an unknown future, however follow-up addresses such reservations and discrepancies. EIA follow-up should therefore be incorporated in all stages of the project life cycle (Arts et al. 2001).

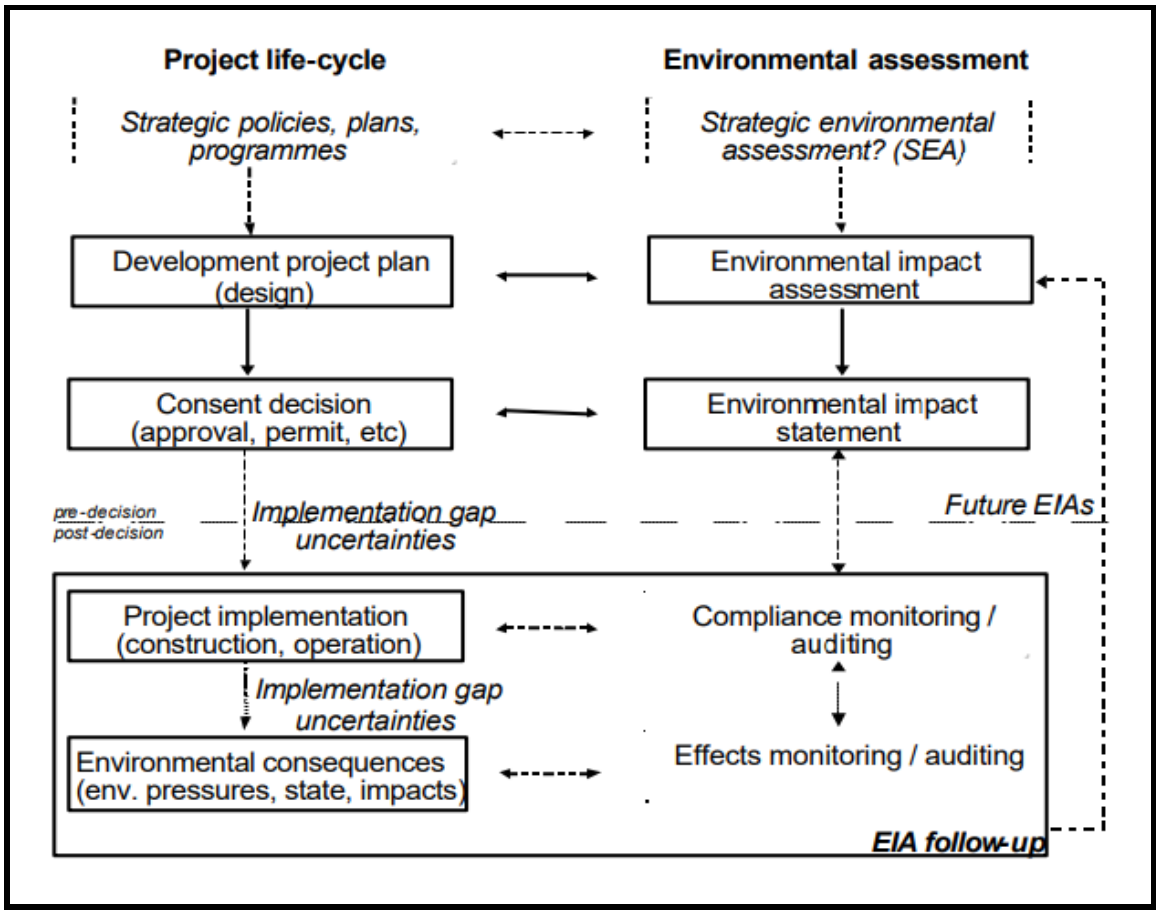


Figure 2: EIA follow-up as link between EIA and project implementation (taken from Arts, Caldwell and Morrison-Saunders, 2001:177)

2.6 Project stakeholders' perceptions on EIA follow-up

Perceptions on follow-up has been documented by a several authors such as Arts *et al*. (2001) and Hullet and Diab, (2002). According to Jones and Fischer (2016), stakeholders' perceptions on follow-up have an influence on its implementation and EIA process as a whole. In a study by Hullet and Diab (2002), EIA follow-up has been regarded as an enduring process of managing the environment with the aim of attaining sustainable development. The results of the study further established that the majority (67%) of participants perceived EIA follow-up to be implementation of EMPr requirements and EA conditions throughout the stages of a project. Over and above implementation of EA and EMPr conditions, EIA follow-up evaluates precision of projected impacts and EIA as a whole. One major reproach however on EIA follow-up is that its strengths are emphasised in concept but not decoded into practice (Arts, 2001).

Public participation through stakeholder engagement should be an integral part of EIA follow-up to promote sustainability of developmental projects (Arts *et al*. 2000). These interested and affected parties can participate in follow-up through formalised or voluntary partnerships (Scott *et al*. 2000). Local forums within communities can absorb EIA follow-up requirements into their existing structures, thus reducing pressure placed on regulatory authorities. Public participation facilitates transparency and participation in decision making, allowing local knowledge to be shared.

In a study by Hullet and Diab (2002), perceptions in terms of who is responsible for EIA follow-up activities and its application thereof, revealed two categories of people, i.e., regulatory bodies and consultants. Regulatory bodies/ competent authorities were believed to have the relevant authority to enforce compliance and penalties, whilst none believed consultants can take up this role. Interview participants however supported the notion for consultants to take up the key role in EIA follow-up. With this, sentiments towards adoption of a voluntary approach through incorporation of follow-up into prevailing environmental management frameworks such as EMS were suggested, with benefits that include reduced financial/ operational costs, facilitates compliance with stipulated legal requirements, management of environmental risks etc. Inception of follow-up activities was also an area of concern, with 80% of the respondents advocating for it to start soon after granting of a decision by competent authorities. A relatively smaller group (20%) of participants nevertheless, believed it is

rewarding to consider follow-up activities in the pre-EIA phase, and collect baseline information that would be useful later in EIA follow-up. Preston *et al*. 1992 on the other hand thought it is of utmost importance to conduct EIA follow-up in decommissioning and rehabilitation stages of developmental projects. Despite different perceptions identified in literature, all acknowledged the importance of EIA follow-up, resulting in several companies promoting environmental management and going beyond legal requirements (Jones and Fischer, 2016).

2.6.1 Challenges and barriers to EIA follow-up

The practice of EIA follow-up is limited, and its full potential has not yet been exploited (Aud *et al*. 2006). Limited information during the EIA process led to various uncertainties, warranting the need for an EIA follow-up. If not resolved, these reservations can produce inaccurate information, negatively impacting on the practice and its goals (Ahammed and Nixon, 2006). Such reservations include inaccurate prediction of environmental impacts as well as limited scientific knowledge (Arts, 2001). Communication of these uncertainties amongst project stakeholders can improve the practice. (Aud *et al*. 2006). Shortfalls in EIRs facilitate for EIA follow-up to be done. These include ambiguous impact predictions and extrapolation of information without baseline monitoring (Morrison-Saunders and Arts, 2004). In a study by Morrison-Saunders and Arts (2004), he reported that training and capacity building is required in the field of environmental management. Environmental training increases awareness, changes people's attitudes and behaviour towards sustainable development (Windapo and Goulding, 2015). Studies conducted by Windapo and Goulding (2015); Dominguez *et al*. (2016), revealed that lack of knowledge on environmental management and legislation may hinder effective environmental management in infrastructural projects. The importance of environmental management needs to be emphasised to facilitate the protection of the environment throughout the project cycle.

Deficiencies in legislative requirements related to EIA follow-up has partly contributed to minimal guidance on the practice. According to Hill (2000), weak regulatory framework on EIA follow-up has resulted in a regressive step for managing the environmental in South Africa. The lack or absence of legislation has led to projects

environmental non-compliance (Jones and Fischer, 2016). Governments should therefore take a lead in provision of financial resources for capacity building and reviewing their legal framework that will promote implementation of EMS ISO 14001 within the construction industry (Dominguez *et al*, 2016).

EIA follow-up requires resources (money, personnel and time,) from developers as well as and regulatory authorities (Ahammed and Nixon, 2006). Continuity/personnel changes may disturb follow-up programs and hinder learning from experience. Lack of adequate financial resources for the implementation of EA conditions and EMPr requirements due to poor budgeting has also been highlighted in literature by Betey and Essel (2013) and has resulted in the sacrifice of environmental management for the sake of profits (Zhang *et al*. 2015). Lack of technology was also identified as a hindrance to the implementation of environmental mitigation measures on construction sites (Schmidt and Osebold 2017). Lastly, corruption and lack of ECO independence have been reported as being a hindrance and weakness to the success of EIA practice in South Africa (Rathi 2017). Until benefits of these requirements are recognised, they will continuously hinder progress in follow-up (Kidd, 2008).

2.7 EIA follow-up in South Africa

Rapid global economic development in the 1970's resulted in a gradual awakening of environmental consciousness (Chang *et al*. 2018). Numerous laws governing environmental management were promulgated in several countries to mitigate negative impacts arising from development projects. The notion of EIA follow-up was then gradually given birth (Morrison-Saunders and Arts, 2005). In South Africa environmental protection and control were initially specified in the Environment Conservation Act 73 of 1989, however this piece of legislation did not cover the concept of EIA follow-up. Developers that attained environmental authorisation were not obliged to do monitoring of their projects. Compliance monitoring/auditing that was conducted was voluntary and through best practice (Freemantle, 2008). A series of institutional arrangements after Apartheid led to the birth of Integrated Environmental Management Procedures, however these were not legally binding, leaving follow-up to be done voluntarily (Hulett and Diab, 2002). With the promulgation of the National Environmental Management Act, 107 of 1998, there was limited consideration of EIA

follow-up. Section 24 (4b) (v) of NEMA (Act 107 of 1998) calls for an “Investigation and formulation of arrangements for the monitoring and management of consequences or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation”. Section 28 (1) of Chapter 7 (Compliance, Enforcement and Protection) of the same Act also requires that “Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment” (Republic of South Africa, 1998). Section 24Q of NEMA also requires that “every holder of an environmental authorisation conduct monitoring and performance assessment of the approved environmental management programme as may be prescribed” (Republic of South Africa, 1998). All these requirements of the NEMA imply that project developers have an obligation of care for the environment through implementation of follow-up activities. EIA regulations have improved substantially by embracing follow-up mechanisms in EIA since 1989, however the Economic Commission for Africa (2015) still maintains that South Africa does not have systems in place, either at national or provincial level to evaluate EIA practice.

According to Youthed (2009), follow-up is done if the project is of large-scale and poses significant impact on the environment. In a study conducted in Eastern Cape, it was noted that follow-up resulted in a positive effect towards management of the environment (Youthed, 2009). Predicted impacts in a study by Freemantle (2008) in Free State Province were accurately predicted, resulting in successful implementation of mitigation measures. Overall, several studies highlighted challenges that affected the EIA process in South Africa and include inadequate financial resources, stakeholder engagement, lack of environmental legislation and policies, lack of support from the government, inadequacies in environmental law, inefficient administrative structures and inexperienced environmental assessment practitioners (Saidi, 2010).

2.8 EMP and Environmental Authorisation implementation in construction

Construction is widely recognised to be a significant source of environmental degradation in the developing world (Maund *et al*., 2018). The sector is resource dependent and has an oversized ecological footprint (Maund *et al*., 2018). Integrating environmental issues in infrastructural development through the EIA process ensures environmental sustainability of a project (Dixon, 2010). The majority of property developers however are motivated by short term cost benefits and perceive environmental concerns to be a soft issue (Ofori *et al.* (2002). Effectiveness of EIA mainly depends on implementation of effective mitigation measures to evade adverse environmental conditions (Momtaz and Kabir, 2018). In actual projects, there is a general perception that conditions of environmental authorisations and / or project EMPr are rarely implemented but remain as prescriptions in government approvals (Dias and Sánchez, 2001). According to Morrison-Saunders and Arts (2014), implementation of proposed mitigation measures should be audited, monitored and reported. Empirical evidence collected from several case studies indicated compliance with prescribed environmental terms and conditions to a large extent (Storey and Jones, 2003).

Objectives for environmental management in construction have been implemented through EMPs, government policies, environmental management systems (EMS) and incentives (Zhang *et al*. 2015). EMPSs provide guidelines on project impacts management throughout its lifecycle, i.e., from commissioning to decommissioning, thus becoming a link between EIA and EMS (Baby, 2011; Glasson and Therivel, 2012). Projects EMPs should not be treated as a foreign, but integral to daily project management onsite (DEAT, 2004). In South Africa, EMPs are implemented in various ways through stakeholder engagement, monitoring, auditing, awareness training, reviewing and amending the EMP, document creation and record keeping (Lochner, 2005). Environmental awareness training can be done through induction of all new employees and ensures they are familiar with their obligations in EMP implementation (Baby, 2011). Awareness training can also be extended to local communities through stakeholders' engagement, improving their knowledge as well as project environmental compliance (Project Management Institute, 2003). Monitoring and auditing on the other hand evaluate implementation of EMPs and seek to improve projects environmental performance through gap analysis at scheduled intervals,

(Project Management Institute, 2003). Uttam *et al*. (2012) has argued that construction projects' environmental performance is negatively affected by their complex nature and need for coordination among stakeholders

Chapter Three: Research Methodology

This chapter discusses the study's research design and a synopsis of the strengths and weaknesses associated with various methods utilised in this study. A presentation of sampling techniques, site selection, data collection and data analysis will follow and lastly, the limitations encountered in this study.

3.1 Case study approach

This research adopted a case study approach. Yin (2009) defined it as a technique for examining a current activity by contextually investigating events or conditions and their relationships. A case study approach gives the researcher an opportunity to comprehend matters at hand since it is an inductive approach to research (Yin, 2009). Adoption of this approach was justified by several advantages cited by Yin (2009). One of the advantages is that it encompasses extensive sources of information as well as quantitative and qualitative data gathering and analysis. According to Barbour (2008), case studies are flexible and give researchers room to explore when conducting research. A case study approach is a proactive method of obtaining implicit and unambiguous information from the subjects (Cele 2016). Zainal (2009) considers it to be a strong research method predominantly in situations where holistic and comprehensive investigation is required. On the other hand, a case study approach is considered to be weak since it does not encompass experimental control, dependability and internal legitimacy (Merriam, 2009). This research adopted a case study approach to assess the follow-up process and also determine implementation of the practice at seven authorised/ approved projects.

3.2 Case study selection

The sample for this research comprised of seven authorised/ approved projects in their construction stage to evaluate the implementation of follow-up activities. All seven projects were selected through purposive sampling and all were selected from Gauteng Province. Gauteng is the smallest of South Africa's provinces situated in the highveld with several construction projects currently running. The projects selected were deemed suitable as they had one or more of the following attributes:

- The project would have attained authorisation from Gauteng Department of Agriculture and Rural Development (GDARD) or the Department of Environment, Forestry and Fisheries (DEFF) as their competent authority;

- Environmental Authorisation would have been granted after a project was subjected to a Scoping and full EIA process or a Basic Assessment;
- Authorised/ approved projects had their EIA reports compiled by different consulting companies or Environmental Assessment Practitioners;
- Selected projects were administered by different companies;
- All projects had to be infrastructure projects such as roads, streets, highways, bridges, water supply, power generation and transmission, telecommunications, housing, waste management or wastewater management.

Based on these criteria, the following projects below were identified for further study. Specific projects were those in the vicinity of the researcher and selected on the basis of trust as most construction companies were not willing to open up for externals.

1. Construction of a food warehouse
2. Construction of low-cost housing
3. Construction of a stormwater system
4. Construction of a filling station
5. Construction of a road
6. Construction of an outfall sewers
7. Construction of sidewalks

3.3 Data Collection

A mixed methods research approach was adopted which integrated both quantitative and qualitative data. Both quantitative and qualitative research have weaknesses, however adoption of a mixed methods approach provides strengths that offset weaknesses presented by these individually (Kumar, 2018). Mixed method research approach is a creative form of rdenisesearch, that does not limit or constrain the researcher in answering research questions (Johnson and Onwuegbuzi, 2004).

Two types of data were collected and analysed for this research, i.e., primary and secondary data. Primary data were collected through independent monthly audits and interviews, whilst secondary data were derived from project specific documents such as Environmental Management Plans (EMPr), Environmental Compliance Audit

reports and Environmental Authorisation conditions. An audit/ compliance checklist was used to generate quantitative data while the interviews provided qualitative data.

3.3.1 Independent Monthly Audits

Fieldwork for this study was undertaken between August 2019 and October 2019. Access to all selected sites was achieved through liaison with Environmental Compliance Officers (ECO's). In liaison with ECOs, contractors were approached, and permission was sought to conduct independent monthly audits for research purposes. Once permission was granted, access letters were signed by contractors, giving clarity that information obtained from independent audits would only be used for research purposes.

Upon gaining access to the sites, an audit/ compliance checklist was compiled to score audit findings against criteria listed in the Environmental Authorisation and Environmental Management Plan per site. Site observations were also done to evaluate the progress made in implementing the Environmental Management Plan and Environmental Authorisation requirements. EA conditions and EMPr requirements for each project were copied and pasted into one audit/ compliance checklist. These conditions and/ or requirements varied per project and have been attached to this research report (refer to appendix 1 to 7). Findings from the audits were presented to indicate full compliance, partial compliance and non-compliance with the audit criteria (Table 1). Compliance was graded and colour coded on a scale of 0 – 5 depending on the extent to which the contractor implemented EA conditions or EMPr requirements. A condition or requirement with a score of 1, represented with 20% completion implied that a contractor only met 20% of the required steps for each mitigation requirement. Similarly, 40%/60%/ 80% completion referred to a contractor only met 40%/60%/80% of the required steps for each mitigation requirement. With some EA conditions or EMPr requirements not applicable during the time of the audit, the number of conditions applicable to the current state of the development were determined and multiplied by five (with 5 being the highest score achievable per mandatory measure) to determine the highest possible score for each project. The actual conformance was then determined by adding up all individual scores highlighted in the conformance score column of appendices 1 to 7. Monthly compliance levels for each project were

then calculated as a percentage (e.g., [(18/30) x 100] to give an overall percentage of 60%.

Table 1: Compliance scoring methodology

Compliance Scores	Description	
0	Task not achieved	Non-compliant - urgent attention is needed for aspects to comply with the legislation and commitment made in the EA and EMPr
1	Task 20% Complete	
2	Task 40% Complete	
3	Task 60% Complete	Partially compliant - good progress for compliance but more can be done to achieve 100 percent
4	Task 80% Complete	
5	Fully compliant with approved EMP and/ or EA	
N/A	Not applicable at this stage	

3.3.2 Interviews

Interviews involve questioning a typical sample of a population in person for research analysis (Wilkinson, 2004). Literature has identified various forms of interviews: structured, unstructured, and semi-structured (Corbin and Strauss, 2014). This study applied semi-structured interviews, permitting the researcher to be flexible and stray from the set questions (Appendix 9). These interviews were conducted to establish project stakeholders' perceptions on EIA follow-up.

Ethics approval was applied for and granted by the University's Human (non-medical) Ethics Committee before engaging people in interviews (Ethics Clearance Number HA1907). Interviews were conducted in person with the following project stakeholders: Competent Authority, Client (Project Manager) and Environmental Compliance Officers (ECO). One individual from the respective competent authority and client were selected for interviews (Table 2).

Table 2: Record of interviews conducted onsite

Site number	Competent Authority	Client (Project Manager)	ECO
1. Construction of a food warehouse	√		√
2.Construction of low-cost housing	√		√
3. Construction of a stormwater system		√	√
4. Construction of a filling station	√		√
5. Construction of a road		√	√
6. Construction of an outfall sewer	√	√	√
7. Construction of sidewalks		√	√

3.4 Data Analysis

Data gathered during independent monthly audits were analysed through descriptive statistics in tabulations and graphs using Microsoft Excel. According to Singh (2007), descriptive statistics are used to explain, summarise, and describe a given set of data. Monthly and mean compliance scores from each respective project were analysed quantitatively. With the mean being a measure of central tendency, it was obtained by adding values of all monthly observations and then dividing the total with the number of observations (Punch, 2013).

Data from interviews were analysed using the thematic content analysis approach with the aim of searching for themes occurring across the data set. This thematic content analysis consists of four main processes that requires a researcher to familiarise themselves with the data, code the data, search for themes and recognise relationships (Saunders and Lewis, 2012). Interviews were initially recorded and transcribed to facilitate thematic content analysis. This was then followed by reading through all interview transcripts to familiarise myself with the data, applied codes to

excerpts, grouped codes according to themes, and then made interpretations that led to the research findings.

3.5 Limitations of the study

Gaining access to all seven sites was a difficult task as contractors were not always willing to have their projects utilised for research purposes. There was restricted access to some information due to some contractors' privacy policies. Access to other documents like compliance audit reports since inception of the project was limited due to confidentially clauses. Respondents at sites 3, 4 and 6 were willing to provide audit reports, however some reports were missing. This was mainly due to mismanagement of information by the contractor's Environmental Compliance Officers on site. The issue of photographic evidence was common in all sites due to stringent company policies and protocols. All these limitations had a negative impact on the results of the study as the researcher could not relate to previous audit findings as well as provide photographic evidence for all sites under study. The researcher emphasised the sole purpose of the study, which was for research purposes only, however some project stakeholders were not willing to openly discuss some issues pertaining to their projects. Contractor's ECO's specifically had biased responses regarding compliance issues at their respective sites. Most of their answers suggested that all was well.

Chapter Four: Results

4.1 Implementation of Environmental Authorisation conditions

Findings of this study showed that none of the projects was found to be fully compliant (100%) against EA and EMPr conditions in any particular month of data collection (Table 3), all seven projects, however, were partially compliant, falling within the 50-99% range. Generally, the findings show that the extent of implementation of environmental authorisation conditions was inadequate. Compliance levels for each project showed a positive trend throughout the three months, meaning there was improvement from one month to another. This shows that even though all projects were partially compliant, contractors put some effort into ensuring their compliance levels to EA conditions and EMPr requirements improved from the previous month.

Table 3: Monthly compliance of all sites

Project details	Month	Compliance level (%)
Construction of a food warehouse	1	78.2%
	2	85.0%
	3	88.4%
Construction of low-cost housing	1	67.9%
	2	71.2%
	3	74.2%
Construction of a storm water system	1	81.9%
	2	84.5%
	3	90.0%
Construction of a filling station	1	89.0%
	2	89.0%
	3	92.2%
Construction of a road	1	94.4%
	2	95.6%
	3	98.1%
Construction of an outfall sewer	1	87.8%
	2	88.2%
	3	91.7%
Construction of sidewalks	1	90.7%
	2	93.0%
	3	96.3%

Of all projects, road construction had the highest average score of 96%, followed by construction of sidewalks with 93% compliance. Construction of the filling station was third in rank with 90% compliance. The rest of the projects had a compliance less than 90%, with low-cost housing project being the least compliant with a compliant percentage of 71% (see Figure 3 below).

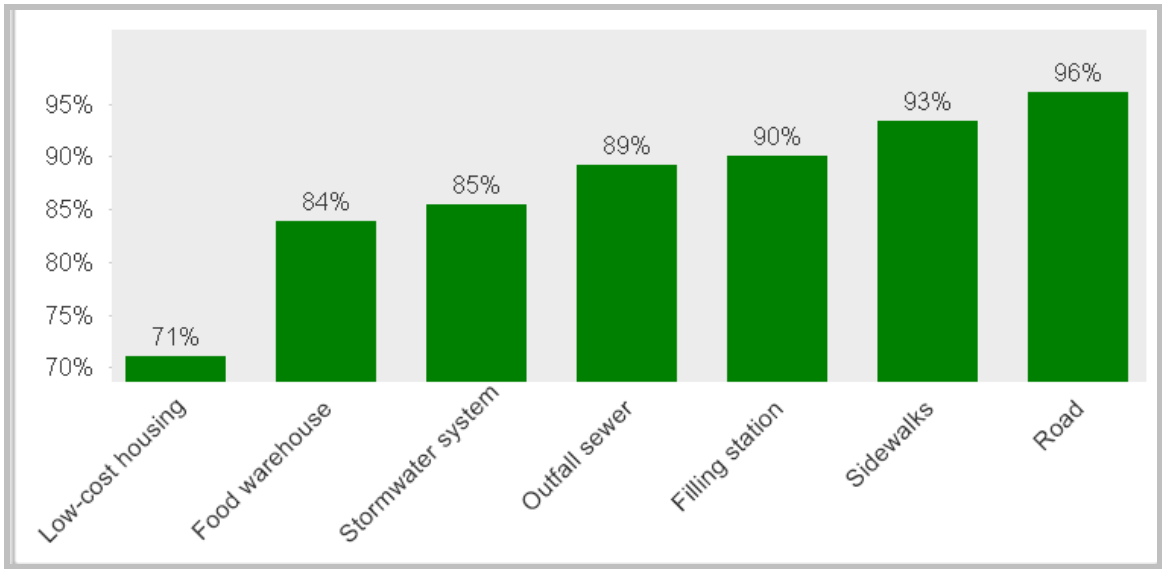


Figure 3: Average project compliance (with min/max) over the 3-month audit period

The food warehouse project's, repeated non-compliance was in the area of waste management and noise monitoring. The recommended mitigation measure required proponents to collect and dispose of all solid waste generated according to the National Environmental Management Waste Act, 2008 (Act 59 of 2008) and keep records of such, however no records were kept, and waste was left to accumulate and spilling from the skips. This issue was not given any attention and continued throughout the 3 months the project was audited. Also, with the project located behind OR Tambo, the ECO failed to monitor noise levels from the construction site alluding to its proximity to the noise from the airport. The construction of low-cost housing proposed mitigation measures that were not implemented throughout the three months included ample rehabilitation of all disturbed areas, conducting internal environmental audits, provision of adequate PPE and storage of fuel in bunded areas. The vast piece of land that was earmarked for construction had a lot of trees and the main challenge faced was unauthorised removal of trees in some sections. There was a need for planting more seedlings for rehabilitation purposes, however most of them failed due

to poor monitoring. Besides recurring complaints of dust, noise and vibrations from the communities they operated from, projects for construction of a filling station, a road and sidewalks performed relatively better than the other projects. Stakeholder engagement, however, was noted to be a missing element amongst these projects. The out-sewer project experienced problems in water quality monitoring, incident management and ECO independence, In terms of incident management, the contractor poorly managed hazardous substances onsite. Oil leaks were observed around the construction site, stationery mobile equipment and generators were not provided with drip trays to hold any possible leaks. The contractor's Environmental Officer however did not have any incident reports for all these. The main issue of concern on the stormwater project was unavailability and implementation of stormwater method statement and management plan.

4.2 Project stakeholder's perceptions on EIA

The purpose of the second objective was to explore the project stakeholders' perceptions on EIA follow-up. This objective was achieved through analysis of data from the interviews that were conducted. Project stakeholders that participated in this study included the client (PM), competent authorities and the ECO.

4.2.1 Client (Project Manager - PM)

Four out of seven (4 out of 7) Project Managers participated in the interviews. All the interview participants (4 out of 4) highlighted a common role in EIA follow-up, i.e., ensuring that the contractor complies with environmental requirements, monitoring construction activities to ensure all environmental impacts are managed and that the project is implemented in a sustainable way. In terms of costs associated with conducting EIA follow-up, 2 out of 4 stated that conducting environmental monitoring and auditing for compliance is costly, especially when it comes to purchasing of services, equipment and materials for environmental compliance, including training services, equipment for emergency preparedness and response. PMs agreed that, while EIA follow-up indeed can be costly, failure to carry out such audits can have negative consequences on the environment and result in even higher costs. Interview data show that none of the participants had concerns with compliance, save for a few

instances where contractors could not provide for certain requirements specified in the EA and EMPr.

4.2.2 Competent Authority

Four out of seven (4 out of 7) Competent Authority representatives participated in the interviews. All participants (4 out of 4) understood their role and value of EIA follow-up toward protection of the environment, some statements included:

> *"The Department of Environment, Forestry and Fisheries (DEFF) is mandated to ensure protection of the environment for the benefit of present and future generations. The Department also provides leadership in environmental management, conservation and protection towards sustainability for the benefit of South Africans and the global community", (DEFF competent authority representative, 19/11/19).*
>
> *and,*
>
> *"The Gauteng Department of Agriculture and Rural Development (GDARD) is responsible for environmental protection and nature conservation within Gauteng Province. It ensures an environment that supports human well−being through conservation of the environment and pollution control", (GDARD competent authority representative, 25/11/19).*

Similarly, competent authorities seem to have adopted the same tools and methods for monitoring project environmental compliance, these included site visits, inspections and audits, utilising the project's EMPr and conditions stipulated in EA to monitor compliance, Constitution of RSA (108 of 1996), National Water Act, 1998 (Act No. 36 of 1998), NEMA (107 of 1998), Water Use Entitlements and conditions attached thereto. Based on their individual experiences, all interviewees were in agreement on whether proponents complied with the EIA/ EMPr approved conditions. All participants highlighted that compliance is not always 100%, there are usually one or two nonconformances, but proponents usually have a steady trend of improvement. In such circumstances the department will ultimately use its powers through the enforcement section to ensure compliance. Interviewees had mixed opinions on challenges associated with EIA follow-up in South Africa. Half of them (2 out of 4) were of the view that there are inadequate resources for EIA follow-up, i.e.,

technology and equipment especially in relation to management of waste and pollution and personnel to conduct inspections. One of the representatives however, cited other reasons such as a weak regulatory framework related to EIA follow-up, lack of political will and corruption, inadequate capacity development to enable officers to adequately deal with biodiversity crime scenes. Another representative brought up an issue of corruption amongst some competent authorities' officials through inappropriate acquisition of environmental authorisation, permits and licenses, overlooking non-complying contractors upon receipt of bribery.

4.2.3 Environmental Compliance Officer

There was a 100% (7 out of 7) response rate from the ECO's. All participants were able to articulate their role in EIA follow-up; some statements included:

> *"My responsibility as an ECO on this site is to monitor all activities and ensure that all contractors comply with the requirements of the conditions as stipulated in any environmental authorisation as well as the requirements as outlined in the Environmental Management Programme. I also attend all technical and progress meetings that are conducted on a monthly basis and report on the project's environmental performance", (ECO for site 2, 21/10/19).*
>
> *and,*
>
> *"My duties are as follows:*
> - *Ensuring implementation of the project Environmental Authorisation, Environmental Management Program and Water Use General Authorisation by the contractor.*
> - *Conduct on-site environmental audits and the prepare reports on environmental compliance.*
> - *Prepare training material and conduct environmental inductions for all new employees and contractors.*
> - *Prepare weekly and monthly reports for circulation to various authorities.*
> - *Attend and report back findings at monthly site progress meetings*
> - *Write project environmental Close-out Reports", (ECO for site 6, 30/10/19).*

According to ECOs, there are several barriers to EIA follow-up in Gauteng, these include insufficient formulation of governmental environmental policy that in turn affects the legal framework; deficient national systems for environmental auditing, monitoring and reporting; lack of adequate resources to conduct environmental audits, i.e. qualified environmental auditors and other technical experts; lack of support from

the government in ensuring environmental protection; ineffective penalties on parties that contravene against the protection of the environment; ECOs' lack of independence and employment of Safety Practitioners as Environmental practitioners as they are not very conversant with environmental requirements. These Safety Officers will end up not covering environmental aspects adequately during inspections.

In terms of unforeseen issues or impacts arising from the projects, not all predicted impacts were applicable. Site 3 (construction of a stormwater system) for example received excess rainfall that was not anticipated, this resulted in flooding of excavations/ open trenches. The principal contractor however managed to control the situation by installing a drainage system. The excess rainfall also resulted in transportation of litter from surrounding areas and got deposited in open trenches at our site. Gabions were created immediately to trap all the litter/waste. The vast piece land that was earmarked for construction of low-cost housing at site 2 had a lot of trees. The main challenge faced was unauthorised removal of trees in some sections. More trees were replanted for rehabilitation purposes, however most of them failed due to poor monitoring. Clearance of the land for construction purposes resulted in the loss of agricultural potential of the area. Site 7 (construction of sidewalks) received a lot of complaints on dust from the surrounding community. These issues came up after breaking down of the water bowser/ tanker that was not replaced. Traffic management during peak hours was also not predicted for the sidewalk construction project, high traffic congestion was experienced during peak hours since the construction site was close to a school and an office complex. One of the employees was bitten by a snake during site establishment, and this risk was not identified in the EIA process, probably because of the fact that the project occurred in a built-up area. Site 4 (Construction of a filling station) experienced delays as works were disrupted by general community members and SMME's several times who wanted jobs and get appointed for certain tasks. Noise monitoring that was predicted for site 1 (construction of a food warehouse) could not be done as the site was located close to OR Tambo International airport, which was always noisy due to aircraft taking off and landing.

Based on their individual experiences, ECOs raised various challenges they experienced in EIA follow-up at their respective sites. The majority of them (5 out of 7) were of the view that they lacked commitment from competent authorities:

"*Officials from Department of Environmental Affairs need to visit the site regularly to enforce compliance and encourage sustainable development, however they never came. Their absence resulted in the contractor not taking me seriously, and not putting much effort in ensuring compliance with environmental regulations and standards", (ECO for site 1, 26/09/19).*

and

"As an ECO, for my work to be fruitful and ensure environmental protection throughout the project, the contractor and the Department should support me fully. Without their support I felt that I was fighting a losing battle. Most of the non-conformances I identified that required money especially were not attended to", (ECO for site 7, 04/09/19).

Two out of seven (2 out of 7) of ECO's, however cited other reasons such lack of awareness in EIA follow-up, the client, construction manager and other subcontractors, did not really appreciate or understand what EIA follow-up is about. All of them put more effort on their duties and little attention on environmental performance of the project; inaccurate prediction of impacts resulted in having to apply for amendments and interaction with the community;

"The issue of dealing with the immediate community was a major challenge in this project. We simply did not have a good working relation with them regarding project development and environmental protection. Regardless of our efforts to talk and create awareness among them, they wanted all their disturbed areas to be rehabilitated immediately", (ECO for site 4, 10/09/19).

Chapter Five: Discussion and Conclusion

In this study I set out to evaluate the extent of implementation of seven construction projects within Gauteng authorised under a set of environmental conditions. The study also sought to understand project stakeholders' perceptions of EIA follow-up. This chapter discusses the findings of the study related to relevant literature to address the research questions. Findings of this study have therefore been used to draw conclusions and provide recommendations for future studies or projects.

5.1 Implementation of Environmental Authorised conditions

The status of implementation of authorisation conditions for all seven projects are shown in Table 3. Throughout the three consecutive months of auditing, no project was found to be fully compliant (100%) with its stipulated environmental conditions, instead they all fell within the 50-99% range. This is in line with findings by Wood (2003) who confirmed that not all mitigation measures identified will be implemented during project execution in developing countries. Hammer (2005) further emphasised that EIA has been adopted as a way of attaining developmental permit or licence rather than a tool for accomplishing comprehensive environmental management, possibly leading to some mitigation measures not being implemented. However, all seven projects in this study showed a positive trend, suggesting that contractors did put some effort into ensuring their compliance levels improve from month to month and, given enough time, more resources, skills and training, compliance may improve significantly.

It was noted that each project had its own specific conditions that contractors failed to comply with. In the case of the food warehouse, non-compliance related to its waste management and lack of improvement over the 3-month audit implied lack of commitment from the contractor's management personnel. This is consistent with studies by Owola and Booth (2016) and Schmidt and Osebold (2017) who reported that lack of commitment by construction site management lead to poor environmental practice. Another concern associated with construction of the food warehouse was monitoring of noise levels. With the project located behind OR Tambo, the ECO felt it was futile to monitor noise levels from the construction site due to its proximity to the

noisy airport. Failure to monitor noise due to these circumstances could be contributed to a poor EMP which was not site specific and lacked detail on how to manage the impact. Poor EMP quality is a hindrance to implementation of EMPs on construction projects (Jalava et al., 2015; Rathi, 2017). Manifestation of unpredicted impacts also implied poor EMP quality as the project EMP was not detailed enough. For example, the EMP did not discuss excessive heat production within the warehouse during construction, exposing workers to high temperatures.

The construction of low-cost housing project attained the lowest average score of 71.10% mainly due to inadequate rehabilitation of all disturbed areas, failure to conduct internal environmental audits, inadequate provision of personal protective equipment and storage of fuel. The NEMA (Act 107 of 1998) EIA regulations compel all developers to ensure that all required environmental conditions (EA and EMPr) are implemented and that they conduct self-monitoring through internal audits. In spite of these regulations, the contractor for low-cost housing did not have any record of such audits. In terms of provision of adequate PPE, employees working on the roof were not provided with safety harnesses and this was a serious safety concern. An enquiry with the ECO revealed that the contractor had financial constraints which resulted in inadequate implementation of some mitigation measures that had high financial demands, e.g., construction of bunding for their fuel storage. Failure to implement the proposed mitigation measures suggested poor enforcement from competent authorities and other independent external auditors. This coincides with findings by Ahammed and Nixon (2006) who argued that successful EIA follow-up leading to implementation of mitigation measures requires substantial resources, i.e., finances, personnel and time, without them implementation will be compromised.

Contractors for the filling station, road and sidewalks projects put some effort to ensure compliance to their stipulated environmental requirements. This is consistent with empirical evidence that was collected from several case studies were compliance with prescribed environmental conditions was observed to a large extent (Storey and Jones, 2003). There was no record of environmental awareness with representatives of the communities whatsoever. According to the Project Management Institute, (2003), awareness training in local communities improve people's knowledge as well as the project's environmental compliance**.** Construction of the out-sewer project

presented challenges in water quality monitoring and incident management. Upon enquiry, it was discovered that the contractor's Environmental Officer did not have any technical experience related to monitoring of water quality. The project also did not have an appointed independent ECO who could have assisted in this regard. With that being said, the contractor therefore chose not to implement this requirement. This finding is supported by Ahammed and Nixon (2006) who reported that EIA follow-up requires adequate resources (money, qualified and experienced personnel and time), else it leads to the sacrifice of the environment for the sake of profits. It was noted that financial dependence of Contractor's Environmental Officers had a negative influence on the implementation of EA and EMPr requiremts. This lack of ECO independence has been identified on being a hindrance to the success of EIA practice in South Africa (Rathi, 2017 and Wessels, 2013).

The project for the stormwater system had a condition that required the contractor to implement a stormwater method statement and management plan to prevent pollution as well as runoff. These documents however were missing in the contractor's environmental file. Similar findings were reported by Dias and Sanchez (2001) who noted that some conditions of environmental authorisations and/or project EMPr are rarely implemented but remain as prescriptions in government approval licenses.

5.2 Project stakeholder's perceptions on EIA

The second research question sought to explore the project stakeholders' perceptions on EIA follow-up. According to Lochner (2005), the number of role players per project depends on its type and size. Literature has identified role players involved in EIA follow-up as competent authorities, contractors and clients (Polonen, Hokkanen and Jalava 2011). By allowing project stakeholders to express their views on EIA follow-up, the practice is strengthened, subsequently improving future practice, knowledge and enabling learning from experience in the process (Polonen, Hokkanen and Jalava 2011). In terms of their role and responsibilities, all project stakeholder participants identified a common responsibility: to ensure preservation of the environment and avoid adverse impacts during execution of the project. They all acknowledged the value of EIA follow-up in mitigating construction impacts on the environment by following recommendations stipulated in EA and EMPr. This is similar to a study

conducted by Hulett and Diab (2002) in South Africa were participants agreed that EIA follow-up ensures implementation of conditions set by regulatory authorities. From the Client's viewpoint, follow-up activities will ensure that the project is implemented in a sustainable way, taking into consideration all stipulated environmental requirements and conditions from inception to close out. Competent authorities on the other hand are directed to ensure sustainable use, management and restoration of the natural resources as well as allay threats for sustainable development. This is done through developing and implementation of relevant national and related legislations. ECO's understood EIA follow-up as a way of monitoring construction activities and ensuring that all contractors comply with conditions stipulated in the EA as well as the requirements outlined in the EMPr.

All project stakeholders who participated in the interviews demonstrated a general understanding of what EIA follow-up entails, however several concerns were raised regarding the practice. This is also consistent with workshop presentations provided by Morrison-Saunders *et al.* 2001 during IAIA'01 conference in Colombia were all stakes involved acknowledged the importance of EIA follow-up in management of the environment and minimising adverse effects on local communities and ecosystems. Costs related to implementation of mitigation measures was cited as one of the challenges faced by proponents. Interviewees emphasised that procurement of services for auditing as well as implementation of the EMPr requirements are expensive, alluding to the fact that the majority of environmental consultancies charge high rates for site visits. This lack of adequate financial resources for the implementation of EA conditions and EMPr requirements due to poor budgeting has also been highlighted in literature by Betey and Essel (2013) and has resulted in the sacrifice of environmental management for the sake of profits (Zhang *et al*. 2015). Project stakeholders therefore emphasised the need for contractors to ensure that they provide more accurate budget requirements, especially during the tendering process, to address the challenge of cost constraints.

Limited resources in terms of technology and equipment were also identified as a challenge towards EIA follow-up, especially in relation to management of waste, pollution, and to undertake quick compliance verifications and personnel to conduct inspections/audits. Consistent with the present findings, Kidd (2008) reported that EIA follow-up demands substantial resources for the developer and regulatory authorities.

Schmidt and Osebold (2017) stated that lack of technology is a hindrance to the implementation of environmental mitigation measures on construction sites. ECOs from sites 1 and 7 raised concerns regarding the nonexistence of support and enforcement from the DEFF and GDARD. Environmental compliance and enforcement officers available were not able to follow up on all active projects to deal with arising problems, enforce legislation, follow up on penalties or offences due to staff shortages, impacting negatively on the overall protection of the environment during project execution. According to Morrison-Saunders and Arts (2004), regulatory bodies should ensure compliance with approved environmental conditions and subsequently improve EIA follow-up practice. This lack of resources was identified by Kidd (2008) as a challenge to the EIA follow-up procedure, affecting its effectiveness and sustainable development, and the subsequent lack of enforcement has therefore resulted in non-compliance by several construction projects. This phenomenon is common in countries such as Tanzania which is still struggling with institutional arrangements for their EIA administration processes (Sosovele, 2011). Their environmental department therefore depends on audit reports submitted by ECOs. In South Africa, shortage of staff within competent authority institutions has been attributed to general understaffing, lack of skills and poor retention of human resources (Sandham and Pretorius, 2008; Retief *et al*., 2011). Project stakeholders therefore suggested that competent authorities employ more officers so that they will be able to conduct regular compliance audits/ inspections.

Inadequate capacity development amongst project stakeholders was identified as a barrier to EIA follow-up. Environmental training increases awareness, changes people's attitudes and behaviour towards sustainable development (Windapo and Goulding, 2015). Although most of the project stakeholders had an appreciation of what EIA follow-up entails, they were ignorant of how some mitigation measures stipulated in their EMPr should be implemented, as they are not specialists/ experts in environmental management. This therefore hindered effective environmental management throughout project execution. Consistent with these findings are studies by Windapo and Goulding (2015) and Dominguez *et al*. (2016) who reported that lack of knowledge in environmental management and legislation may hinder effective environmental management in construction projects. ECOs specifically suggested that environmental awareness training be done before commencement of every

construction activity for both general labourers and construction management personnel. The importance of environmental management needs to be emphasised to facilitate its protection throughout the project cycle. This need for integration of environmental awareness in environmental management has also been emphasised in previous studies (Griffith and Bhutto, 2008).

Project stakeholders faced various challenges within the communities they were working in, attributing this to poor public participation during the EIA process. If communities are not consulted during the pre-EIA stage and not conversant with the project objectives, they may not cooperate during the post EIA stage, disrupting the implementation of environmental requirements (Betey and Essel, 2013). Site 4, for example, experienced delays as activities were disrupted by community members and SMMEs who wanted jobs and also get appointed for certain tasks. The site's ECO and Construction Manager barely managed a good working relationship with the community regarding project development and environmental protection. Irrespective of their efforts to improve communication and create awareness among them, community members did not cooperate, demanding for all their disturbed areas to be rehabilitated immediately. These findings are similar to those presented by Betey and Essel (2013), who reported that poor public participation has been identified as barrier to the EIA process in South Africa. Disturbing and stopping construction projects has a cost implication for contractors in the form of penalties from their project partners and contractors. Celik and Budayan (2016) emphasised the need to quantify and estimate all social impacts arising from construction projects and include them in the budget. Community disruptions are usually due to poverty and unemployment (Tshiki, 2015). To avoid such problems, there is a need for a holistic approach where all project stakeholders involved in EIA follow-up cooperate and work together to ensure the overall protection of the environment. This stakeholder engagement will ultimately improve stakeholders' environmental knowledge and attitudes (Sanchez and Mitchell, 2017).

Interviewees from the competent authorities raised a concern over lack of support from the government through weak regulatory frameworks related to EIA follow-up and inadequate national systems for environmental auditing, monitoring, and reporting. They also suggested that the South African government support them through an effective legal service that will enable them to deliver on their mandate, provide

cooperative governance and administrative support to the office, reinforce and enhance the environmental regulatory framework related to EIA compliance and provoke the section of the law on penalties, ensuring these are implemented timeously against those who do not comply. These suggestions are similar to those highlighted by Dominguez *et al*., (2016) in China and Hong Kong where it was suggested that the government should always take a lead in provision of financial resources for capacity building and reviewing their legal framework that will promote implementation of EMS ISO 14001 within the construction industry.

Corruption amongst some competent authorities was identified to have an undesirable effect on the success of EIA follow-up as it compromises the effective implementation of EA conditions, EMPr requirements and enforcement of compliance on construction projects. ECO's lack of independence may result in them performing their duties in an unethical manner by choosing not to report contractors' environmental non-compliance. Rathi (2017) reported on corruption and lack of ECO independence on being a hindrance and weakness to the success of EIA practice in South Africa. To curb such problems in future projects, interviewees suggested for engagement of environmental officials that are experienced and fully registered with the professional body (EAPASA).

Inaccurate prediction of impacts affected the quality of EMPs and their implementation. Project stakeholders felt that the EMP's generic/vague nature and lack of detail hindered its effective implementation. Several impacts for site 1 for example were inaccurately predicted, resulting in applying for amendments in order for the contractor to comply. The EMP for site 2 was too generic and did not cover all mitigation measures that would ensure environmental protection. Detailed EIA reports promote the protection of the environment (Poon and Lam, 2013). The majority of EMPs emphasised impacts linked to the natural environment, neglecting socio-economic impacts. In other cases, anticipated impacts did not occur, instead new impacts appeared. This is similar to studies conducted by Kruger and Sandham (2018), who highlighted the challenge of omitting socio-economic impacts in EIA reports. To improve the quality of EMPs, interviewees suggested that designers incorporate environmental issues during the design stage, ensure EMPs are project / site specific and written in a simple language that can easily be understood by all and ensure EIA

reports are compiled by professionally registered and experienced environmental professionals only.

Interviewees' results indicated that competent authorities within Gauteng adopted the same tools and methods for monitoring project compliance with EA conditions and / or project EMPrs. These included site visits, inspections, and audits, and use of pieces of environmental legislation such as the Constitution of RSA (108 of 1996), National Water Act, 1998 (Act No. 36 of 1998), NEMA (107 of 1998) etc. Continuous monitoring of the environment ensures implementation of mitigation measures. According to Marshall *et al*. (2005) these tools and methods need to be flexible and site specific (fit for purpose).

Finally, the study acknowledged that proposed mitigation measures were not implemented equally for some aspects where more effectively implemented than others, an example risks related to fire. This was probably due to contractor's acknowledgement of how fire can have a negative impact on both their finances (insurance) in terms of property loss as well as the environment. With this, contractors were therefore forced to effectively put in place measures against fire risks. For South Africa to accomplish the main objective for EIA, then all proposed mitigation measures should be implemented. This is in line with a study by Harmer (2005) who established that mitigation measures are useless, until they are implemented.

Findings of this study show that there is an alignment between projects environmental compliance and project stakeholders' perceptions on EIA follow-up. Barriers/ weaknesses identified had a direct influence on the implementation of EA conditions as well as EMPr requirements. Regardless of all this, it is important to note however that contractors demonstrated commitment in protecting the environmental while implementing the projects.

5.3 Recommendations

Following the findings of this study, several recommendations have been proposed on how to improve implementation of mitigation measures on authorized / approved projects. These recommendations will benefit policy makers, academia, and the industry at large.

- Regulatory authorities need effective legal support, that will enable them to deliver on their mandate
- Enhance the regulatory framework related to environment so that EIA follow-up carries more weight in the EIA process.
- Recognising ECO's as legal practitioners and creating a set of criteria for their appointment.
- Provide cooperative governance and administrative support to regulatory authorities.
- There is a need for the South African government to avail adequate technical and financial resources that will promote and enforce compliance with environmental legislation through compliance audits.
- Roll out environmental awareness training with EIA follow-up stakeholders before construction activities resume on site through workshops and regular site meetings. Environmental education should also be mandatory for built environment professionals at tertiary education level to facilitate their understanding better.
- Sections of the law on penalties must be provoked and implemented timeously against those who do not comply to stipulated environmental requirements.
- Top management commitment is required to ensure success of a project's environmental performance. This can be achieved through provision of resources and finances to cater for environmental protection.
- Promote effective participation and communication among EIA follow-up stakeholders (communities, regulatory authorities, proponents, contractors and ECO's) as it improves the environmental performance of the project. ECOs for example will be taken more seriously when they issue fines or penalties due to non-compliance. Mutual cooperation among these project stakeholders will ensure sustainability of projects.

- Competent authorities should ensure that only qualified and experienced Environmental Assessment Practitioners (EAPS) are appointed to do EIAs and develop EMPs. This will allow for effective identification, assessment, and mitigation of the project's environmental impacts. Due diligence must also be applied to ensure that EMPr submitted by EAP's are project/ site specific and also detailed.
- There is need for proponents to manage a balance between production and management of the environment to ensure the overall sustainability of the project.
- Follow-up to include EAPS so that they have an opportunity to assess their own suggested mitigation measures and improve future EMPS.

5.4 Concluding remarks

While development has advanced and created wealth for economies, it has negatively impacted on the environment we rely on. A coordinated approach is therefore required to solve these environmental issues. South Africa has made use of EIA for the past two decades to achieve environmental sustainability of projects**.** It is important to note however that the value of EIA mainly depends on implementing effective mitigation measures that will prevent substantial environmental degradation. Various tools such as environmental management systems, environmental monitoring and follow-up have been used to achieve this. There is a widespread perception, however that effective mitigation measures are hardly implemented in actual projects but continue to be recommendations or prescriptions in environmental authorisations.

The study aimed at assessing the extent of implementation of authorisation conditions (mitigation measures) for seven projects within Gauteng province and explored perceptions of EIA follow-up participants / project stakeholders to determine their views and understanding towards EIA follow-up. Overall, it can be concluded that authorised conditions (mitigation measures) on all seven projects were inadequately implemented. Upon auditing, compliance levels for each project, however showed a positive trend throughout the three months, indicating improvement from one month to another. Proponents were able to control, rehabilitate, mitigate, and also put on preventative measures under the guidance of their ECO's. Through interviews, project

stakeholders had an opportunity to air their views on EIA follow-up, highlighting constraints and proposing recommendations on how implementation of these authorised conditions can be improved in future.

Lessons learned from this study provide several conclusions that can be valuable to other countries since EIA is practiced throughout the world:

- Successful impact control can only occur if a project's environmental impacts are effectively identified, assessed, and mitigated.
- Continuous environmental awareness training throughout the project lifecycle is vital for environmental management.
- It is important to work with communities within which the project is located, as they have the power to make or break project's success through their participation.
- Monthly progress meetings provide a suitable opportunity for project stakeholders to communicate, ensuring implementation of corrective actions.
- Success in a project's environmental performance is a function of collaboration between all EIA follow-up stakeholders.
- Efficient EIA follow-up does not necessarily include extreme costs.
- Credibility of external auditors is important in ensuring the successful implementation of mitigation measures.
- Compliance to legislated environmental conditions have several benefits such as reduction in costs associated with waste, recycling and consumption and insurance cover.
- Environmental monitoring, auditing, and communication of results with EIA follow-up stakeholders promoted continuous learning on projects environmental management.

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Appendix 1: Audit/compliance checklist_ Construction of a food warehouse

No.	Condition/ Mitigation Measures	Responsibility	Conformance Score	Comments
1.	The authorised activities to be limited within the property indicated in the EA			
2.	Any changes to, or deviation from, the project description set out in the EA (dated 25/07/2011)			
3.	The development to commenced within two (2) years from the date issue of the EA.			
4.	The Department of Water and Sanitation (DWS) (previously known as Department of Water Affairs), must be informed of any environmental and pollution incidents relating to the proposed activities within twenty-four (24) hours of such incidents occurring.			
5.	Thirty (30) days written notice to be given to GDARD prior to commencement with the construction phase.			
6.	All invasive and alien plant species to be identified and removed from site prior to commencement of construction activities			
7.	Gauteng Department of Transport and Roads (GDTR) and the Department of Labour (DoL) to be informed of the development prior to commencement. Proof to be in the file.			
8.	An approved Storm Water Management (Approved by Ekurhuleni Metropolitan) must be submitted to the GDARD, 30 days prior to the commencements of the activities.			
9.	An effective storm water drainage system separating clean storm water from dirty storm water must be installed to reduce surface water contaminations. Mixing of concrete and chemicals on bermed area on an impermeable surface.			
10.	Dust suppression measures implemented.			
11.	Complying to the Gauteng Noise Control Regulations, 1999			
12.	No stockpile material placed within any drainage lines on site.			
13.	Fuel and chemicals to be stored within SANS complaint bunded areas.			
14.	Suitable signage to warn the public about hazards must be erected on site.			
15.	Employees to wear relevant PPE.			
16.	Access roads to construction site to be designed to carry 1 in 20-year flood events.			
17.	All waste (including building rubbles) generated during construction must be disposed of in permitted land fill.			
18.	Surrounding residents to be notified in advance of construction schedule especially if blasting is to be undertaken.			
19.	Contaminated soil to be removed to a suitable waste disposal facility and the site must be rehabilitated to the satisfaction of GDARD and DWS. On-site remediation and re-use of contaminated soil must be investigated prior to disposal.			
20.	An ECO must be appointed to monitor the developer's compliance with all the conditions of the Environmental Authorisation			
21.	Copy of the Environmental Authorisation must be kept on site at all times			
22.	Where any of the holders contact details change, including the name of the responsible person, the physical or postal address and/ or telephone details, the holder must apply for			

	amendment of the EA as soon as the new details become known to the holder			
23.	Organogram of the contractor's Management Structure			
24.	EMPr Induction undertaken and signed attendance register kept in the file			
25.	Organogram of the contractor's Management Structure			
26.	EMPr Induction undertaken and signed attendance register kept in the file			
27.	Environmental provisions in method statements. Method statements for the following activities must be submitted to the ECO and Engineer for approval before construction commences • Solid waste management • Crew camps and construction lay down areas; • Workshop and maintenance/clearing of plant; Cement and concrete batching; • Chemical breaking; • Dust control • Hydrocarbon and emergency spills procedures; • Diesel tanks and refuelling procedures • Handling and storage of oils and chemicals; • Sourcing, excavating, transporting and dumping of fill and spoilt material; • Topsoil Management; • Fire; • Demarcation method statement to be used for sensitive areas; and Rehabilitation of crew and other disturbed areas.			
28.	A copy of the Environmental Management Programme (EMPr) to be available on site.			
29..	The Contractor must ensure that all the personnel on site, sub-contractors and their teams, suppliers, etc are familiar with and understand the specifications contained in the EMPr.			
30.	A complaint registers to be compiled and maintained.			
31.	Environmental emergency procedure - Accidental exposure of employees to hazardous substances.			
32.	Environmental emergency procedure - Accidental veld or forest fires.			
33..	Environmental emergency procedure - Accidental spillage of hazardous substances.			
34	A copy of the Environmental Management Programme (EMPr) to be available on site.			
35.	The Contractor must ensure that all the personnel on site, sub-contractors and their teams, suppliers, etc are familiar with and understand the specifications contained in the EMPr.			
36..	A complaint registers to be compiled and maintained.			
37.	Environmental emergency procedure - Accidental exposure of employees to hazardous substances.			
38.	Environmental emergency procedure - Accidental veld or forest fires.			
39..	Environmental emergency procedure - Accidental spillage of hazardous substances.			
40.	Environmental site layout plan.			
41.	Environmental Incident Record updated and maintained (A record must be kept of all spills and the corrective action taken)			
42.	Monthly ECO Audits conducted, and copies of			

	reports must be kept on site			
43.	Ripping must be done to a depth of 250mm in two directions at right angles. Topsoil must be placed in the same soil zone from which it has been stripped.			
44.	Stockpiled topsoil <2m in height			
45.	No compaction of stockpiled topsoil.			
46..	Weed-free topsoil stockpile(s)			
47.	Soil not to be stockpiled on drainage lines.			
49.	Dust suppression is necessary for stockpiles older than a month - with either water or a biodegradable chemical binding agent.			
50..	Do not use equipment displaying oil and fuel leaks.			
51.	Rehabilitating eroded areas in such a way that the erosion potential is minimized after construction has been completed			
52.	All disturbed areas that will require rehabilitation must be mulched to encourage vegetation re-growth. Mulch used must be free from alien seed.			
53.	No plant, workforce or any construction related activities may be allowed onto the topsoil stockpiles.			
54..	Topsoil stockpiles must be clearly demarcated as no-go areas			
55.	No driving off from the marked roads is permitted and designated parking areas must be identified and demarcated with applicable signage.			
56.	Removal of contaminated soils.			
57.	Ensure drip trays are placed under stagnant vehicles / machinery and under all vehicles that stand for more than 24 hours. Ensure that all drip trays are emptied.			
58.	Only existing access roads to be used.			
59..	Cover soil loads in transit / ensure no material can fall from transportation trucks.			
60..	Surrounding areas not to be used as toilet facilities			
61.	Vehicles to be serviced at suitable areas			
62.	Spill kits must be available on site and in all vehicles, that transport hydrocarbons for dispensing to other vehicles on the construction site.			
63.	All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site (this includes contaminated soils, and drenched spill kit material).			
64..	All maintenance and washing of vehicles and equipment must take place in the workshop area that is equipped with a bund wall and grease trap oil separator.			
65.	Have measures been taken to divert stormwater flow from works area?			
66.	Sedimentation control measures at watercourse crossings / steep slopes towards water bodies?			
67.	Control of pollution entering watercourses			
68.	Appropriate management of storm water runoff from site using berms and other suitable structures as required to ensure flow velocities are reduced			
69.	No-go areas e.g. areas of high water table must be demarcated with fencing/warning tape and signs before any construction activities commence.			
70.	Any work or access near or in a permanent drainage system may have implications in terms of the National Water Act, 1998 (Act No. 36 of 1998), and therefore may well require application for a water use license.			
71.	In the event of pollution caused as a result of construction activities, the contractor, according to Section 20 of the National Water Act, 1998 (Act No. 36 of 1998) is responsible for all costs incurred.			
72.	Ensure that excessive quantities of sand, silt and siltladen water do not enter the storm water system (e.g. erection of silt traps, or drainage retention areas to prevent silt and sand entering drainage areas).			

73	Approval must be obtained from DWS for any activities that require authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998)			
74	No vehicular access is allowed in permanently wet areas.			
75	Construction vehicles to travel at low speeds to minimize dust.			
76	Inform nearby interested and Affected Parties of noisy after-hours work			
77	No site fires allowed or waste to be burnt.			
78	Main access roads and site camps must be surfaced with a temporary surface such as gravel to assist with dust suppression			
79	All vehicles transporting material that can be blown off (e.g. soil, rubble etc) must be covered with a tarpaulin, and speed limits of 20 km/h must be adhered to.			
80	Regular monitoring of dust fallout must be carried out and the records kept on site. Baseline dust measures must be sampled and approved by the ER and ECO prior to the commencement of construction activities.			
81	Noise levels during construction must therefore be kept within 7dB of the baseline data.			
82	Regular monitoring of noise levels must be conducted during construction and the records kept on site.			
83	The use of silent compressors is a specific requirement			
84	Designated restricted eating areas for eating during normal working hours.			
85	Prevent casual access to construction site.			
86	Camp followers/informal traders must not be allowed to congregate on pavements or outside the construction site. However, at the contractor's discretion facilities can be made available within the designated eating area.			
87	Work restricted to 07h00 - 17h00 on weekdays.			
88	Compensation for damage to property			
89	All machinery maintained to reduce noise level			
90	Maintenance of photographic record of damages			
91	Inform SAPS of any crimes on site.			
92	Contractor's employees to be clearly identifiable.			
93	No unemployed labour seekers to gather on site			
94	General compliance with Occupational Health and Safety Act (Act No. 85 of 1993)			
95	Are chemical toilet facilities provided 1 for every 15 employees?			
96	Vehicular movement beyond the site boundaries must not occur during peak hour traffic, i.e. between 06.30-8.00am and 16.0018.00pm.			
97	Access by construction vehicles shall be through the Airport Custom Controlled Area (ACCA) gates and not through the Bonaero Drive adjacent to Bonaero Park residential area.			
98	Emergency procedures to be in place prior to commencing work.			
99	Emergency telephone numbers list to be updated and all numbers and names to be posted at relevant locations throughout the construction site.			
100	Limitation of damage to visual impressions of the area.			
101	Construction material to be stored neatly			
102	Adequate housekeeping practices			
103	Landscaping must enhance the aesthetic appeal of the development			
104	Rubble and litter must be removed every two weeks or more often as the need arises and be disposed of at a registered landfill.			

105	Large trees bordering the Bonaero Park residence area should be retained as far as practicable.			
106	Avoid graveyards / relocation of unavoidable graves.			
107	Work ceased when buried artefacts discovered and the ECO must be notified within 24 hours.			
108	Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an archaeologist.			
109	Project manager informed of findings.			
110	Fences erected to protect archaeological sites.			
111	No employee access to identified archaeological and cultural sites.			
112	Have any Red Data plant species been removed, relocated, destroyed or disturbed in any way without authorization from the relevant authority?			
113	Alien or invader plants to be removed from construction footprint.			
114	Trees on the boundary of Bonaero Park residential area should be preserved as far as practicable.			
115	Trees which will not be cleared for construction purposes, must be clearly demarcated and not be defaced, removed, painted for benchmarks or otherwise damaged, even for survey purposes.			
116	Employees must be trained on how to deal with fauna species and to whom to report the sighting. In the case of a problem animal e.g. a large snake a specialist must be called in to safely relocate the animal.			
117	Recording of incidents regarding disturbance of animals.			
118	Bird nesting sites not to be disturbed			
119	Notification of interruptions of service due to construction.			
120	Complaints of damage to infrastructure recorded.			
121	Proper storage facilities for site requirements.			
122	Fuel storage tanks must be on an impervious surface that is bunded and able to contain at least 110% of the volume of the tanks.			
123	'No Smoking', 'No Naked Lights' and 'Danger' signage to be displayed at the hazardous chemicals substances (HCS) Storage area and containers must be clearly marked to indicate contents as well as safety requirements			
124	Bulk fuel storage areas should be covered during the rainy season			
125	Material Safety Data Sheets (MSDS) to be available for all hazardous substances on site.			
126	Adequate precautions regarding traffic control.			
127	Fire prevention measures.			
128	Periodic checking of open excavations.			
129	Appropriate notification signage erected warning of hazards pertaining to construction site and presence of construction machinery and vehicles.			
130	Perimeter fencing erected and maintained			
131	Equipment and stores locked up.			
140	Are ablution facilities service once a week?			
145	Toilet paper dispenses must be provided in all toilets.			
146	No toilets allowed in sensitive areas.			
147	Toilets out on site must be secured to the ground and have sufficient locking mechanism operational at all times.			
148	Have existing services such as sewer pipes been identified? Way leaves kept on site?			
149	No wood is to be collected, chopped or felled for fires from private or public property.			
150	The camp and construction site to be cleaned up on a daily basis.			

160	The mixing of cement must only be done at specifically selected sites on mortar board or similar structures to contain run-off			
161	All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a licensed facility.			
162	Bins must be clearly marked for the type of waste they contain and must be covered A skip, with a cover, must be used to contain refuse from camp site bins, rubble and other construction material.			
163	Suitable storage of hazardous waste.			
164	General waste disposal to be done at a registered waste disposal site. Certificates of safe disposal to be retained in file on site.			
165	Chemical waste disposal to be done at a registered waste disposal site. Certificates of safe disposal to be retained in file on site.			
166	Indigenous trees and grasses replanted along verges an on median.			
167	Borrow pits reshaped to even surfaces and closed off.			
168	Indigenous vegetation mix used in rehabilitation.			
169	Irrigation to be carefully applied until adequate vegetation cover.			
170	Scarify areas compacted by vehicle movements.			
172	Compliance with Environmental Specifications for revegetation and rehabilitation.			
173	Eradication of exotic species in construction footprint.			
				Compliance Level
No. of Items Scored				
Highest Possible Conformance Score				
Actual Conformance Score				

Appendix 2: Audit/compliance checklist_ Construction of low-cost housing

No.	Condition/ Mitigation Measures	Responsibility	Conformance Score	Comments
1.	A copy of the EMP authorization must be kept at the camp site where activity will be carried on. The authorization must be produced to any authorized official of the Department who request to see it and must be made available for inspection by any employee or agent of the holder of the authorization who works or undertakes work at the premises.			
2.	Where all of the applicants contact details change, include the name of the responsible person, the physical or postal address and/ or telephonic details, the applicant must notify the Department as soon as the details become known to the applicant.			
3.	The site must be cleared of all waste prior to any construction related activities			
4.	Waste must be disposed of at a registered waste disposal facility			
5.	The removal, damage or disturbance of any flora outside the construction area is not permitted			
6.	Vegetation on the site may be removed but care must be taken to confine removal of vegetation during construction activities to within the boundaries of the development area.			
7.	Topsoil that is removed must be stockpiled for re-use in subsequent landscaping activities.			
8.	Ensure that the topsoil is stockpiled separately from the subsoil and construction materials.			
9.	The contractor shall ensure that no remnants of stockpiles have been left in positions or states that may be eroded during and after construction.			
10.	If archaeological or heritage sites are exposed during construction work, work must be halted and it should immediately be reported to a museum, preferably one at which an archaeologist is available, so investigation and evaluation of the findings can be made.			
11.	Old burial grounds (if found) will be reported to the ECO who will advise the contractor as to the mode of action, which will include informing either the South African Police Service (SAPS) and/or the South African Heritage Resources Agency (SAHRA).			
12.	Substrate that is not suitable for plant growth should not be used for infilling of excavations unless used at a suitable depth e.g., deeper than 2 m.			
13.	Removal of all construction rubble from the site, including substances that cannot be used for infilling of excavations must be undertaken.			
14.	Steep and unstable slopes must have stabilizing measures put in place to prevent collapse of the slopes or soil erosion. Slope stabilization and soil erosion prevention measures include the placement of silt fences, staked grass sods and rows of sawdust filled onion bags.			
15.	The campsite should be fenced off for the purpose of temporary office staff accommodation, storage facilities and ablutions during the construction period.			
16.	The contractor's camp, offices, ablutions and storage facilities shall be located within the site boundaries			
17.	The mesh size of the fence should be small enough to act as a filter net for litter as well as a demarcation of the site.			

18.	The contractor shall provide water and/or washing facilities at the construction camp for the site staff.			
19.	All contractor vehicles will be parked in a location where an oil trap will be installed to prevent soil pollution.			
20.	The contractor shall be responsible for the establishment of a refuse control and removal system that prevents the spread of refuse within and beyond the construction site			
21.	The contractor shall ensure that all refuse is disposed of by him and his sub-contractors' employees in refuse bins which he shall supply and arrange to be emptied on a daily basis.			
22.	Waste shall be separated into recyclable and non-recyclable waste			
23.	Refuse bins shall be watertight, wind-proof and scavenger proof and shall be appropriately placed throughout the site			
24.	Refuse must also be protected from rain, which may cause pollutants to leach out.			
25.	Refuse may not be burnt or buried on or near the site.			
26.	A minimum of two chemical toilets shall be provided per 15 persons.			
27.	Toilets provided by the contractor must be easily accessible. All toilets will be located within the contractor's camp			
28.	The toilets shall be of a neat construction and shall be provided with doors and locks and shall be secured to prevent them from falling over.			
29..	The contractor shall ensure that fuels and chemicals (e.g. drums of fuel, grease, oil, brake fluid, hydraulic fluid) are stored flat and handled carefully so as to prevent spillage.			
30.	The contractor must ensure that workers do not smoke or take part in any activity that may result in sparks in the vicinity of fuels and other flammable substances to prevent ignition			
31.	Refuelling of vehicles shall only take place at a predetermined area, where adequate measures are in place to prevent spillage or pollution.			
32.	Drip trays must be put in relevant locations (inlets, outlets, points of leakage, etc) so as to prevent such spillage or leakage during transfer.			
33..	Drip trays shall be cleaned regularly and shall not be allowed to overflow. Substances, which cannot be reused, must be disposed of according to the relevant waste disposal procedure			
34	A record must be kept of all spills and the corrective action taken.			
35.	Site vehicles are only permitted within the demarcate construction camp, as required, to complete their specific task.			
36..	All construction vehicles should be in a good working order to reduce possible noise pollution.			
37.	On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation on site.			
38.	Servicing and maintenance of vehicles on-site shall be avoided as far as possible.			
39..	Working hours for all operations shall be limited to between 08h00 and 17h00 during weekdays (Monday to Friday) and between 08h00 and 13h00 on Saturdays.			
40.	No work may take place on a Sunday or Public Holidays.			
41.	During operation (completion of the development) care should be taken not to let sewage leaks (and to a lesser degree water leaks) continue for more than one or two hours (reasonable time for detection and implementation of a "clean-up plan").			

42.	Runoff containing high sediment loads is not to be released directly into natural or municipal drainage systems or nearby hydrological features			
43.	Builders' rubble and other debris must be confined to the building site and may not be stored/discarded on open space, outside the development area.			
44.	The contractor must take appropriate and reasonable measures to minimise the generation of dust as a result of his/her works, operations and activities.			
45.	The contractor is responsible for educating the employees to report any excessively dusty conditions to the contractor or responsible representative			
46..	During building operations all reasonable precautions must be taken to minimise noise generated on site, especially when working in areas, or on activities, that may impact on neighboring landowners and users.			
47.	Construction vehicles must be in good working order such that they do not create a noise nuisance.			
49.	As the site is in close proximity to residential areas, the operational schedule must be strictly adhered to.			
50..	Concrete may only be mixed on mortar boards, and not directly on the ground,			
51.	The visible remains of concrete, either solid, or from washings, must be physically removed immediately and disposed of as waste (washing of visible signs onto the soil surface is not acceptable).			
52.	The contractor must ensure that there is an emergency procedure in place to deal with accidents and incidents (e.g. spills) arising from hazardous substances.			
53.	The contractor must ensure that all personnel on site are properly trained concerning the proper use, handling and disposal of hazardous substances.			
54..	Any blasting required on site may only occur during official working hours. Blasting should only be undertaken Where fully necessary.			
55.	In the event that excessive blasting is required the contractor must ensure that potential claims from neighbouring residential properties in respect of damages to houses (cracked walls, etc.) are valid.			
56.	The contractor must distribute a list of dates (and times) during which blasting will occur on site as well as place notices in appropriate areas.			
57.	Blasting activities may only occur under controlled conditions, whereby safety precautions are adhered to, and only authorised personnel may take part in these activities.			
58.	The contractor must inform all workers of dates and times when blasting will take place and the necessary safety steps must be taken to prevent any injuries.			
59..	A storm water management plan for the operational phase of the development must be in place			
60..	Fuel tanks must be stored in an area that will not lead to pollution of any sensitive areas should there be an accidental spill.			
61.	A suitable area must be cleared surrounding the site selected for the tanks to ensure that accidents are minimised.			
62.	It must however be ensured that clearing the area does not result in bare soil being exposed to the elements.			
63.	In the event of spillage or a leak of fuel, the respondent should attempt to isolate the flow of the leak or spill. This may involve closing a safety valve or plugging a hole that has been formed. All people and traffic must be kept away from the spill area. All possible sources of ignition must be removed from the area. The spill must be immediately reported to the ECO.			

64..	Procedures for site cleanup and remediation must be developed in consultation with GDARD, the ECO as well as any other necessary services required (such as remediation companies).			
65.	The contractor shall keep the necessary materials and equipment on site to deal with spills of the materials present, should they occur.			
66.	After construction, any area cleared or disturbed (as a result of the activity) within and outside the boundaries of the construction site shall be rehabilitated to a state as agreed by and according to the specifications of a landscape architect and the ECO.			
67.	All construction equipment and excess aggregate, gravel, stone, concrete, bricks, temporary fencing and the like shall be removed from the site upon completion of the work.			
68.	Topsoil that is disturbed or removed during construction and excavation must be replaced, preferably using topsoil stockpiled prior to excavation activities, or with topsoil sourced from elsewhere.			
69.	It is recommended that indigenous plants be used in the landscaping of the site.			
70.	Plants that are proclaimed as problem plants or noxious weeds are to be excluded from the landscaping plan and these should be removed immediately, should they occur on site.			
71.	The contractor must take all reasonable measures to ensure that fires are not started as a result of construction activities on site, and shall also ensure that their operations comply with the Occupational Health and Safety Act (Act No. 85 of 1993). No large open fires are permitted on site.			
72.	The contractor is to ensure that he/she has the contact details of the nearest fire station in case of an emergency.			
				Compliance Level
No. of Items Scored				
Highest Possible Conformance Score				
Actual Conformance Score				

Appendix 3: Audit/compliance checklist_ Construction of a stormwater system

No.	Condition/ Mitigation Measures	Responsibility	Conformance Score	Comments
1.	The authorised activities to be limited within the property indicated in the EA (falling within the jurisdiction of the City of Tshwane Metropolitan Municipality)			
2.	A Specialist (Ecologist) must be appointed to compile a Rehabilitation Plan that must be implemented immediately after construction to prevent erosion and siltation.			
3.	The approved Environmental Management Programme (EMPr) submitted as part of the application must be implemented.			
4.	Any changes to, or deviation from, the project description set out in the EA (dated 10/04/2014) must be approved, in writing by the Department before such changes or deviations may be affected.			
5.	The activity must commence within a period of five (5) years from the date of issue of this EA (10/04/14)			
6.	A copy of this authorisation must be kept at the property where the activity will be undertaken.			
7.	Where any of the holders contact details change, including the name of the responsible person, the physical or postal address, the applicant must notify the Department as soon as the new details become known to the applicant in order for the Department to advise if an application for amendment of EA will be required or not.			
8.	The holder of the EA must notify the Department (GDARD) within 24 hours if conditions under 3.1 are not adhered to.			
9.	The holder of the EA must notify the Department (GDARD) within seven (7) working days if all other conditions of the EA are not adhered to.			
10.	The Contractor shall ensure that all staff members, sub-contractors and suppliers understand and adhere to the EMP.			
11.	The Contractor shall ensure that all sub-contractors and suppliers are contractually bound to adhere to the EMP and Environmental Code of Conduct.			
12.	The Contractor shall ensure appointment of an Environmental Officer for day-to-day implementation of all environmental matters onsite.			
13.	The Environmental Officer shall ensure that all staff members are adequately trained and aware of the EMP and its Environmental Code of Conduct.			
14.	The Environment Officer shall conduct environmental inspections fortnightly			
15.	All senior and supervisory staff members shall familiarise themselves with the contents of the EMP			
16.	A representative of all sub-contractors shall be provided with a copy of the EMP.			
17.	A representative of the sub-contractor will be required to sign the Environmental Code of Conduct to give assurance that they understand the EMP and that they undertake to comply with conditions therein			
18.	ECO shall conduct monthly compliance audits on the construction site.			
19.	A report detailing non-compliances must be compiled and sent to the Client (City of Tshwane), Project Managers (Asande Projects Consulting & Engineering) as well as the competent authority (GDARD). The report will contain a copy of the Environmental Auditing Checklist.			

20.	The Contractor's Environmental Officer shall maintain an Environmental Incidents Register.			
21.	Complaints received regarding activities on the construction site pertaining to the environment should be recorded in a designated environmental complaint register, and the response noted with the date and action taken. This record must be submitted with the monthly report.			
22.	The Contractor's Environmental Officer shall be responsible for putting in place an Environmental Awareness Training Programme for all staff members. The training programme has to be approved by the ECO.			
23.	Before commencing with any work, all staff members shall be briefed about the Environmental Code of Conduct and sign the Environmental Training register as proof of their training.			
24.	The Contractor/s shall be handed copies of all relevant documentation regarding the project and before any work commences, ensure that they familiarise themselves with the environmental issues concerning the site.			
25.	Compliance with this EMP must be audited monthly during the construction phase and once immediately following completion of construction. This must be followed up with annual audits for a period of two years during the operational phase			
26.	Any amendments to the EMP are to be indicated in the form of addendums. The amended EMP shall be submitted to GDARD for approval prior to implementation.			
27.	The preferred area for the site office should be flat along the route. Steep areas and watercourses should be avoided as soil erosion could increase			
28.	The contractor should provide ECO with detail of layout of site facilities within two weeks of moving to the site, i.e. chemical toilets, the demarcation of areas for stockpiling of materials, storage of hazardous materials and the provision of containers. The offices shall be fenced.			
29..	Ensure that relevant environmental management specifications as per the EMP are incorporated in the Contract documentation.			
30.	Appoint an Environmental Officer that must monitor the contractor's compliance with the EMP. Contractor Environmental Officer appointment should be in place			
31.	Avoid concentration of stormwater without appropriate protection against soil erosion. This will be achieved by designing stormwater arrangements to satisfaction of local authority			
32.	No illegal borrowing of material will be allowed. Identify suitable borrow pit (if applicable) to obtain soil. Confirm with the Department of Mineral & Energy's ("DME") for the approval of borrow pits where appropriate			
33..	Surface water drainage areas are to be demarcated as sensitive areas			
34	Minimise potential adverse impact of stormwater damage. Stormwater to be managed in accordance with the engineer's designs			
35.	Ensure employment of local labourers where possible.			
36..	Contractor to ensure that noise levels are kept within acceptable limits.			
37.	The contractor should adhere to Health and Safety considerations to avoid incidents during construction phase			
38.	No dumping will be allowed. Suitable landfill sites for waste disposal and			

39..	spoiled building material to be indicated by Council			
40.	Employees should be provided with portable chemical toilets during construction. No temporary chemical toilets will be allowed within the flood line of any drainage line			
41.	Ensure minimal loss of indigenous flora and fauna by maintaining a fence/barrier around relevant areas during construction period and making sure workers and machinery remain within construction area			
42.	All weeds or invader plant species must be removed from site and disposed off at a registered dumping site Clearance of weeds must be done by hand before seeding.			
43.	No animals may be snared, captured or otherwise harmed, unless declared as a pest.			
44.	Red data species to be protected until specialist advice is obtained on how to rehabilitate them. There is need for saving of specimens where possible.			
45.	Adequate toilets to be supplied for construction crew. Siting of these chemical toilets should be done in consultation with the Site Engineer			
46..	Use of veld for this purpose shall not be allowed.			
47.	Precautionary measures shall be taken by the contractor to limit the possibility of oil and other toxic liquids from entering the soil or stormwater system. The containers for these substances are to be stored on impermeable ground.			
49.	All hazardous materials, i.e. bitumen binders will be stored in an appointed area that is fenced and has restricted entry. No spoiling of bituminous products on site, over embarkments, in burrow pits or any burning. No spillage of bituminous products shall be allowed on site.			
50..	All fuel tanks will be stored in an appointed area. Leakage will be avoided.			
51.	Oil, grease and cleaning materials from maintenance of vehicles shall be collected in a sump and sent back to supplier.			
52.	Streams, rivers or dams must be protected against spillages of pollutants. In the event of a spillage, prompt action must be taken to clear the affected area.			
53.	Construction related traffic to and from site to be minimised. No access to private properties will be allowed.			
54..	No maintenance or repair of vehicles will be allowed on site			
55.	Should any archaeological artefacts be discovered on the site during the construction process SAHRA and a qualified archaeologist should be informed for investigations and recommendations			
56.	Carry out compaction of foundations to the satisfaction of local authority and applicant's engineers as recommended were necessary			
57.	Erect signs and/or danger tape around the exposed excavations to warn the public of the inherent danger.			
58.	The topsoil (+-300mm) of any excavation shall be removed and stockpiled separately from underlying material in an appointment area. Topsoil must not be stockpiled for extensive period (> 3 months			
59..	Blasting of rock where necessary should be done in compliance with applicable regulations during normal working hours only			
60..	Appropriate erosion control structures must be put in place where soil may be prone to erosion.			
61.	Limit the impact of dust by using water tankers on a daily basis when dust is likely to be a problem			
62.	No disturbance to neighbouring properties. Times of construction to be restricted to permitted hours in terms of			

	local noise regulations and noise to minimised where possible			
63.	Limit impact of construction traffic on local traffic. Design access and provide control to minimize impact			
64..	Provide local employment opportunities			
65.	Solid waste is to be stored in an appointment area for collection and disposal. Disposal of waste will be in a DWAF licensed landfill, no waste may be burnt onsite. The site is to be kept free of litter.			
66.	All stockpiled material shall be controlled and removed on completion of construction. The site shall be re-instated/ rehabilitated to its original condition. The area chosen for stockpiling shall have no naturally occurring indigenous trees and shrubs present that may be damaged during operation.			
67.	Vehicles should utilise existing roads to avoid compaction of soil and material left in heaps. Excess excavated material must not be left in heaps in the veld. This material must be disposed of at a licensed facility.			
68.	Contain soils and materials within defined areas and prevent contamination of stormwater runoff			
69.	Concrete mixing to be carried out away from sensitive areas and on impermeable surfaces			
70.	If an artefact onsite is uncovered, work in the immediate vicinity must be stopped immediately and an archaeological consultant must be contacted. Work may only resume once clearance is given in writing by the archaeologist.			
71.	Graves, if any are found, are to be relocated or protected in accordance with legislated procedures moved If a grave onsite is uncovered, work in the immediate vicinity must be stopped and an undertaker should be contacted.			
72.	All areas disturbed during construction shall be reinstated to a state that approximates or betters the state that they were in before construction. All construction and camp areas cleared of equipment and temporary facilities.			
73.	The grass cover surrounding the construction site is to be left as intact as possible or restored to its original condition.			
74.	Borrow pits should be rehabilitated, fenced and safe			
75.	The proposed storm water outlet structures should be designed environmentally sensitive and ensure visual acceptability. Regular maintenance of system should be in place to reduce chances of siltation and flooding.			
				Compliance Level
No. of Items Scored				
Highest Possible Conformance Score				
Actual Conformance Score				

Appendix 4: Audit/compliance checklist_ Construction of a filling station

No.	Condition/ Mitigation Measures	Responsibility	Conformance Score	Comments
1.	The authorised activities must only be carried within the application area specified in the Environmental Authorisation.			
2.	The holder of this authorisation (hereafter referred to as the holder) is responsible for ensuring compliance with the conditions of this authorisation, and recommendations made in the Environmental Impact Assessment Report (EIR) and Environmental Management Programme Report (EMPR) dated 03rd of May 2017.			
3.	Any changes to, or deviations from, and amendments to the proposed activities, conditions of this authorisation, and recommendations in the S&EIR and EMPR must be approved, in writing, by the Department before such changes or deviations are effected. The Department reserves the right to request the submission of information deemed necessary to assess and evaluate the significance and impacts such changes, deviations and amendments before such changes, deviations and amendments are authorised or not. Any changes, deviations and amendments may be subject to provisions of Chapter 5 of the EIA Regulations, 2014 pertaining to the amendments of the authorisation and EMPR.			
4.	This authorisation does not absolve the holder from complying with any other statutory obligations that may be applicable to the proposed activities.			
5.	The holder of this authorisation must apply for an amendment of this authorisation in the case of a change of ownership of transfer of rights and/or obligations			
6.	The holder must, in writing, within fourteen days of the date of this amended authorisation, notify all registered interested and affected parties (I&APs) of the outcome of the application			
7.	The Environmental Management Programme (EMPR) submitted with the Environmental Impact Assessment Report (EIR) is hereby approved. It is hence mandatory for the holder to implement all recommendations and management measures stipulated in the Cluster 1 EMPR throughout all the phases of the proposed production activities within Cluster 1.			
8.	Any non-compliance with the EMPR constitutes non-compliance with this authorisation, and any non-compliance with this authorisation may result in its suspension and may render the holder guilty of offence in terms of section 49A of NEMA, and may, if convicted, liable for penalties contemplated in Section 49B(1) of NEMA.			
9.	Should there be changes in the operation and management of the authorised activities, the EMPR must be amended to accommodate those changes and submitted to the competent authority for approval before implementation takes place. The amendment(s) to the EMPR must be done in accordance with Regulations 36 and 37 of the EIA Regulations: 2014.			
10.	The holder of the authorisation must implement necessary measures to ensure that operators, contractors and subcontractors have full awareness of			

	the recommendations on the EMPR before commencing with any authorised activity.			
11.	The EMPR must be included in all contractual documentation entered thereto between the holder and contractor(s). Furthermore, a copy of the EMPR must be kept at the site office at all times.			
12.	The holder must before the commencement of the authorised activities, appoint an independent and experienced Environmental Control Officer (ECO) who will ensure that the conditions of this authorisation and provisions of the EMPR are implemented and adhered to.			
13.	The appointed ECO must, at drilling and construction stages (trenching and laying of pipelines and construction of the helium and CNG plant and associated infrastructure) submit monthly reports to the Petroleum Agency SA. Submission of quarterly environmental monitoring reports is also mandatory during production operations			
14.	The holder must submit an environmental audit report to the Petroleum Agency SA biannually (twice a year) carried out by an independent and qualified environmental practitioner in accordance with Appendix 7 of the EIA Regulations, 2014. At a minimum, the audit report must evaluate compliance with the conditions of this authorisation and provisions of the EMPR; identify and assess any new impacts and risks from undertaking the authorised activities; identify shortcomings in the EMPR; and identify if findings of the previous audit were addressed including opinion on the effectiveness of preventive and corrective actions implemented.			
15.	Where shortcomings in terms of Regulation 34(4) are identified, the holder must submit recommendations to amend the EMPR in order to rectify any shortcomings that may have been identified in the audit report contemplated in 5.4.8 above.			
16.	The holder of this authorisation must keep all records relating to monitoring and auditing and make them available for inspection to any relevant and competent authority in respect of this development.			
17.	If the final positions of the new wells and compressor site(s) as described in the EIR are altered, the new and final positions must be placed within the assessed Cluster 1 area, and must (where practically possible) avoid environmentally sensitive areas, including areas of historical/ cultural/ heritage significance.			
18.	Drilling fluids and muds must strictly be water-based and biodegradable. In this regard, the holder is required to submit Material Safety Data Sheets for drilling fluids to the Petroleum Agency SA at least 60 days before drilling operations commence.			
19.	Any excavations exceeding a depth of 3 meters, must be done under the supervision of an independent and qualified Palaeontologist.			
20.	The holder must obtain land use and access agreements prior to commencement of the proposed activities, and submit copies of such to the Petroleum Agency SA at least 30 days before the commencement of the authorised activities. Furthermore, in order to avoid conflict of interests with the current land-use activities, the applicant must consult on an ongoing basis with the affected surface landowners and keep them informed of the project development.			
21.	The holder must develop a grievance mechanism and claims procedure and share the content thereof with affected landowners before the authorised operations			

	commence. A copy of the grievance mechanism and claims procedure, including proof of communication with affected landowners must be submitted to the Petroleum Agency SA at least 30 days before the commencement of the authorised activities.			
22.	The holder must undertake an asset and infrastructure baseline study, in consultation with all affected landowners, before the authorised activities commence, and submit the report in question to the Petroleum Agency SA at least 30 days before authorised activities commence.			
23.	The holder must convene a special meeting with landowners and communities before operations commence to ensure that they understand the technical and safety aspects of the proposed operations. Periodic feedback meetings with affected landowners and relevant regulatory authorities on the progress of operations, compliance status and to address stakeholders' issues concerning the project must take place.			
24.	The holder must develop a traffic safety plan especially for the turn- offs from the R30 in consultation with the relevant Roads Authority in order to ensure that the safety of road users is not compromised.			
25.	Appropriate notification signs, warning the communities about the hazards around sites including the presence of heavy vehicles, must be erected at construction and operational sites.			
26.	Wastewater produced during drilling operations and gas processing operations must be stored in above ground storage containers or tanks, and must be tested and, where necessary, treated before disposal at an appropriate or licensed disposal facility.			
27.	An integrated waste management approach based on waste minimization must be implemented and must incorporate waste avoidance, reduction, recycling, treatment, re-use and disposal where appropriate. The holder must therefore develop an integrated waste management plan for implementation during operations. The said must be submitted to the Petroleum Agency SA at least 60 days before authorised activities commence.			
28.	The storage of hydrocarbons and/or chemicals and any operating equipment with hydrocarbons and/chemicals must have bund walls with adequate capacity to contain maximum volume that is stored or contained.			
29..	The holder must develop a storm water management plan for the combined helium and CNG plant, and must submit such to the Petroleum Agency SA at least 60 days before the operation of the plant commences.			
30.	Potentially occurring protected plant species such as *Merwilla plumbea* and *Crinum bulbispermum* and protected tree species such as *Acacia erioloba* must not be removed or disturbed unless necessary permission is granted by the relevant departments i.e. Department of Environmental Affairs and Department of Agriculture, Fisheries and Forestry.			
31.	The holder must develop and implement sound groundwater monitoring programme(s) that will ensure that potential impacts of gas production on ground water levels and quantity are prevented and/or managed. The programme to be developed must be submitted to the Agency at least 60 days before authorised activities commence.			
32.	The integrity of the pipelines is crucial in preventing gas leakage or explosions. The holder must develop			

	inspection mechanisms for the proposed production pipelines and submit such to the Petroleum Agency SA at least 30 days before production operations (gas extraction and transportation to the production plant) commence.			
33..	Emergency incidents must be addressed and reported to the Petroleum Agency SA in accordance with section 30 of NEMA. In addition, the holder is required to notify the Petroleum Agency SA within 24 hours of the occurrence of an emergency incident.			
34	The holder must develop emergency preparedness and response plans for responding to potential emergency incidents and submit such to the Petroleum Agency SA, at least 60 days before commencement of the authorised activities.			
35.	All recommended mitigation measures included in the EIR dated 03rd of May 2017 are deemed to be the conditions of the EA and must therefore be adhered to.			
36..	A copy of the authorisation and the EMPR must be kept onsite to ensure appropriate implementation of the mitigation measures.			
37.	The Department shall not be responsible for any damages or losses suffered by the holder in an instance where the operation is temporarily stopped for reasons of non-compliance with the conditions as set out herein.			
38.	Any drill sites or infrastructure routes that are located inside medium, high or very high sensitive sites on the sensitivity/constraint map require a site specific EMP. The EMP must address the sensitive aspects on site. Site specific EMP must be compiled by an EAP and must, where applicable, include input from professional (Pr.Sc.Nat) ecologists, cultural heritage specialists. All recommendations of the site specific EMP will be considered an extension of the requirements of this EMPR.			
39..	All pipelines and facilities will be designed and constructed in accordance with best practices and international gas standards.			
40.	The identified drill site should, where possible, not infringe on the landowners' surface activities. Irrigation pivot points should remain unaffected by infrastructure and must be deviated around or buried to allow for continued pivot irrigation operation.			
41.	A hazardous installation risk assessment must be conducted prior to construction.			
42.	Once prospective drilling sites are identified, an Environmental Assessment Practitioner (EAP) or Ecologist (registered Professional Natural Scientist) must undertake a site-specific assessment to assess the site for any potential site-specific environmental sensitivities prior to commencement			
43.	Communication to stakeholders about the nature and extent of economic opportunities should be undertaken. No unrealistic expectations should be created and the recruitment policy giving preference to local labour should be communicated from the beginning of the project. The local area of influence should be agreed with stakeholders early on in the process.			
44.	A heritage specialist should be appointed prior to commencing with the site establishment to identify any potential impacts on heritage features. Necessary legal processes need to be complied with.			
45.	A phase 1 HIA must be completed for all new drill sites and pipeline routes.			
46..	Landowners must be consulted, and all reasonable requests complied with. A written landowner agreement			

	should be negotiated and concluded prior to commencement. Should this not be possible, a record should be kept of reasonable negotiations with the landowners			
47.	Topsoil should be removed from areas that are to be cleared and stockpiled separately for later use during rehabilitation. Topsoil should be stockpiled for the minimal amount of time and should not exceed 1.5m in height, or have a slope steeper than 1:2. Stockpiles should ideally not stand for longer than a period of 12 months.			
49.	Preference for employment should be given to the local community. The recruitment policy must be communicated openly and made available to the public if requested.			
50..	Where possible, locate infrastructure in previously disturbed places and/or habitats with a lower sensitivity score. Rehabilitate disturbed areas as soon as possible. Control alien plants.			
51.	Ideally, no vehicle access tracks/roads should transect through watercourses. Access tracks/roads should be designed in such a way to minimise overlap with watercourses			
52.	Open trenches to be fenced or barricaded where necessary, and should be clearly demarcated. The time that any trench remains open should be limited. Access to areas with open fences should be controlled. There must be a protocol on how to rescue a stranded animal from a trench.			
53.	Progressive rehabilitation of disturbed land should be carried out to minimize the amount of time that bare soils are exposed to the erosive effects of rain and subsequent runoff. Traffic and movement over stabilised areas should be controlled (minimised and kept to certain paths), and damage to stabilised areas should be repaired timeously and maintained. The total footprint area to be cleared for drilling should be kept to a minimum by demarcating the drilling areas and restricting removal of vegetation to these areas only.			
				Compliance Level
No. of Items Scored				
Highest Possible Conformance Score				
Actual Conformance Score				

Appendix 5: Audit/compliance checklist_ Construction of a road

No.	Condition/ Mitigation Measures	Responsibility	Conformance Score	Comments
1.	A copy of the EMP authorization must be kept at the camp site where activity will be carried on. The authorization must be produced to any authorized official of the Department who request to see it and must be made available for inspection by any employee or agent of the holder of the authorization who works or undertakes work at the premises.			
2.	Where all of the applicants contact details change, include the name of the responsible person, the physical or postal address and/ or telephonic details, the applicant must notify the Department as soon as the details become known to the applicant.			
3.	The site must be cleared of all waste prior to any construction related activities			
4.	Waste must be disposed of at a registered waste disposal facility			
5.	The removal, damage or disturbance of any flora outside the construction area is not permitted			
6.	Vegetation on the site may be removed but care must be taken to confine removal of vegetation during construction activities to within the boundaries of the development area.			
7.	Topsoil that is removed must be stockpiled for re-use in subsequent landscaping activities.			
8.	Ensure that the topsoil is stockpiled separately from the subsoil and construction materials.			
9.	The contractor shall ensure that no remnants of stockpiles have been left in positions or states that may be eroded during and after construction.			
10.	If archaeological or heritage sites are exposed during construction work, work must be halted and it should immediately be reported to a museum, preferably one at which an archaeologist is available, so investigation and evaluation of the findings can be made.			
11.	Old burial grounds (if found) will be reported to the ECO who will advise the contractor as to the mode of action, which will include informing either the South African Police Service (SAPS) and/or the South African Heritage Resources Agency (SAHRA).			
12.	Substrate that is not suitable for plant growth should not be used for infilling of excavations unless used at a suitable depth e.g., deeper than 2 m.			
13.	Removal of all construction rubble from the site, including substances that cannot be used for infilling of excavations must be undertaken.			
14.	Steep and unstable slopes must have stabilizing measures put in place to prevent collapse of the slopes or soil erosion. Slope stabilization and soil erosion prevention measures include the placement of silt fences, staked grass sods and rows of sawdust filled onion bags.			
15.	The campsite should be fenced off for the purpose of temporary office staff accommodation, storage facilities and ablutions during the construction period.			
16.	The contractor's camp, offices, ablutions and storage facilities shall be located within the site boundaries			
17.	The mesh size of the fence should be small enough to act as a filter net for litter as well as a demarcation of the site.			

18.	The contractor shall provide water and/or washing facilities at the construction camp for the site staff.			
19.	All contractor vehicles will be parked in a location where an oil trap will be installed to prevent soil pollution.			
20.	The contractor shall be responsible for the establishment of a refuse control and removal system that prevents the spread of refuse within and beyond the construction site			
21.	The contractor shall ensure that all refuse is disposed of by him and his sub-contractors' employees in refuse bins which he shall supply and arrange to be emptied on a daily basis.			
22.	Waste shall be separated into recyclable and non-recyclable waste			
23.	Refuse bins shall be watertight, wind-proof and scavenger proof and shall be appropriately placed throughout the site			
24.	Refuse must also be protected from rain, which may cause pollutants to leach out.			
25.	Refuse may not be burnt or buried on or near the site.			
26.	A minimum of two chemical toilets shall be provided per 15 persons.			
27.	Toilets provided by the contractor must be easily accessible. All toilets will be located within the contractor's camp			
28.	The toilets shall be of a neat construction and shall be provided with doors and locks and shall be secured to prevent them from falling over.			
29..	The contractor shall ensure that fuels and chemicals (e.g. drums of fuel, grease, oil, brake fluid, hydraulic fluid) are stored flat and handled carefully so as to prevent spillage.			
30.	The contractor must ensure that workers do not smoke or take part in any activity that may result in sparks in the vicinity of fuels and other flammable substances to prevent ignition			
31.	Refuelling of vehicles shall only take place at a predetermined area, where adequate measures are in place to prevent spillage or pollution.			
32.	Drip trays must be put in relevant locations (inlets, outlets, points of leakage, etc) so as to prevent such spillage or leakage during transfer.			
33..	Drip trays shall be cleaned regularly and shall not be allowed to overflow. Substances, which cannot be reused, must be disposed of according to the relevant waste disposal procedure			
34	A record must be kept of all spills and the corrective action taken.			
35.	Site vehicles are only permitted within the demarcate construction camp, as required, to complete their specific task.			
36..	All construction vehicles should be in a good working order to reduce possible noise pollution.			
37.	On-site vehicles must be limited to approved access routes and areas (including turning circles and parking) on the site so as to minimise excessive environmental disturbance to the soil and vegetation on site.			
38.	Servicing and maintenance of vehicles on-site shall be avoided as far as possible.			
39..	Working hours for all operations shall be limited to between 08h00 and 17h00 during weekdays (Monday to Friday) and between 08h00 and 13h00 on Saturdays.			
40.	No work may take place on a Sunday or Public Holidays.			

41.	During operation (completion of the development) care should be taken not to let sewage leaks (and to a lesser degree water leaks) continue for more than one or two hours (reasonable time for detection and implementation of a “clean-up plan”).			
42.	Runoff containing high sediment loads is not to be released directly into natural or municipal drainage systems or nearby hydrological features			
43.	Builders’ rubble and other debris must be confined to the building site and may not be stored/discarded on open space, outside the development area.			
44.	The contractor must take appropriate and reasonable measures to minimise the generation of dust as a result of his/her works, operations and activities.			
45.	The contractor is responsible for educating the employees to report any excessively dusty conditions to the contractor or responsible representative			
46..	During building operations all reasonable precautions must be taken to minimise noise generated on site, especially when working in areas, or on activities, that may impact on neighboring landowners and users.			
47.	Construction vehicles must be in good working order such that they do not create a noise nuisance.			
49.	As the site is in close proximity to residential areas, the operational schedule must be strictly adhered to.			
50..	Concrete may only be mixed on mortar boards, and not directly on the ground,			
51.	The visible remains of concrete, either solid, or from washings, must be physically removed immediately and disposed of as waste (washing of visible signs onto the soil surface is not acceptable).			
52.	The contractor must ensure that there is an emergency procedure in place to deal with accidents and incidents (e.g. spills) arising from hazardous substances.			
53.	The contractor must ensure that all personnel on site are properly trained concerning the proper use, handling and disposal of hazardous substances.			
54..	Any blasting required on site may only occur during official working hours. Blasting should only be undertaken Where fully necessary.			
55.	In the event that excessive blasting is required the contractor must ensure that potential claims from neighbouring residential properties in respect of damages to houses (cracked walls, etc.) are valid.			
56.	The contractor must distribute a list of dates (and times) during which blasting will occur on site as well as place notices in appropriate areas.			
57.	Blasting activities may only occur under controlled conditions, whereby safety precautions are adhered to, and only authorised personnel may take part in these activities.			
58.	The contractor must inform all workers of dates and times when blasting will take place and the necessary safety steps must be taken to prevent any injuries.			
59..	A storm water management plan for the operational phase of the development must be in place			
60..	Fuel tanks must be stored in an area that will not lead to pollution of any sensitive areas should there be an accidental spill.			
61.	A suitable area must be cleared surrounding the site selected for the tanks to ensure that accidents are minimised.			
62.	It must however be ensured that clearing the area does not result in bare soil being exposed to the elements.			

63.	In the event of spillage or a leak of fuel, the respondent should attempt to isolate the flow of the leak or spill. This may involve closing a safety valve or plugging a hole that has been formed. All people and traffic must be kept away from the spill area. All possible sources of ignition must be removed from the area. The spill must be immediately reported to the ECO.			
64..	Procedures for site cleanup and remediation must be developed in consultation with GDARD, the ECO as well as any other necessary services required (such as remediation companies).			
65.	The contractor shall keep the necessary materials and equipment on site to deal with spills of the materials present, should they occur.			
66.	After construction, any area cleared or disturbed (as a result of the activity) within and outside the boundaries of the construction site shall be rehabilitated to a state as agreed by and according to the specifications of a landscape architect and the ECO.			
67.	All construction equipment and excess aggregate, gravel, stone, concrete, bricks, temporary fencing and the like shall be removed from the site upon completion of the work.			
68.	Topsoil that is disturbed or removed during construction and excavation must be replaced, preferably using topsoil stockpiled prior to excavation activities, or with topsoil sourced from elsewhere.			
69.	It is recommended that indigenous plants be used in the landscaping of the site.			
70.	Plants that are proclaimed as problem plants or noxious weeds are to be excluded from the landscaping plan and these should be removed immediately, should they occur on site.			
71.	The contractor must take all reasonable measures to ensure that fires are not started as a result of construction activities on site, and shall also ensure that their operations comply with the Occupational Health and Safety Act (Act No. 85 of 1993). No large open fires are permitted on site.			
72.	The contractor is to ensure that he/she has the contact details of the nearest fire station in case of an emergency.			
				Compliance Level
No. of Items Scored				
Highest Possible Conformance Score				
Actual Conformance Score				

Appendix 6: Audit/compliance checklist_ Construction of an outfall sewer

No.	Condition/ Mitigation Measures	Responsibility	Conformance Score	Comments
1.	The activity is to take place within the property mentioned in the authorization. The scope of work shall remain the same as the mentioned in the EA. Any changes or deviations from the project description set out in this authorisation must be approved, in writing, by the Department before such changes takes place.			
2.	This activity must commence within a period of 5 years from the date of issue. EA authorized on the November 2015			
3.	The proposed pipeline must be realigned from the wetland area with 30m buffer zone in order to reduce the impacts on the wetland.			
4.	No construction should take place before authorisation from DWA has been received.			
5.	Contents of the EMP and all authorisations must be made known to all contractors, subcontractors, agents and other people working on site			
6.	14 days written notice must be given to the Department prior the commencement of the activity.			
7.	A copy of the Environmental Authorisation and DWA License should be kept onsite and be made available to any department officer that visits the site			
8.	No activity must take place within the 1:100 year flood line or delineated riparian habitat, whichever is the greatest, or within the 500m radius from the boundary of any wetland unless authorized by this license			
9.	No fundamental alterations of the work method statements, site plans and drawings are allowed, unless modification is requested and granted by the Regional Head in writing.			
10.	No site activities must occur beyond the proposal site location of the erosion and sedimentation controls and marked limits of disturbance.			
11.	Stormwater management practices must be constructed, operated and maintained in a sustainable manner throughout the project.			
12.	The pipe has to be raised over the riparian area, and or 1:100-year flood line and or delineated riparian area unless authorized in this license			
13.	Where the pipeline is closest to the wetland, the manholes should be sealed as far as possible to minimise spills from these manholes that may occur as a result of pipeline blockages			
15.	All manholes within the 1:100 year floodline or delineated riparian habitat, whichever is the greatest, must be capsulated in concrete to hold a pre-determined capacity to avoid spillage into the river.			
17.	The proposed pipeline must be constructed in such a way as to allow any spills from the pipeline to be quickly observed and repaired.			
18.	Elevated fuel storage tanks must be provided with impermeable floors and bund walls to prevent pollution during accidental spillages. The outflow of the bunded area must be supplied with an oil trap and prevent spillage from elevated fuel tanks during decanting.			
19.	The batching plant must be bonded to prevent stormwater entry and to contain dirty water			

20..	The licensee shall sample the water quality weekly during construction and monthly for the mentioned variables			
21.	The ecological state of the water resource must not be lowered by the proposed development. The Licensee must ensure that the quality of the water downstream water users does not decrease to lower than the limits as set out on Table 2 of the license			
22.	Construction, operation and maintenance activities must be scheduled to take place during the dry seasons when flows are lowest.			
23.	Dirty water pumped from the trenches and foundations must be released through a filter before being discharged back to the rivers or wetlands			
24.	Vehicles and other machinery must be serviced well above the 1:100 year flood line or outer edge of the riparian habitat whichever is greatest.			
25.	Oils and other potential pollutants must be disposed off at an appropriate licensed site, with the necessary agreement from the owner of such a site.			
26.	Any hazardous substances must be handled according to the relevant legislation relating to transport, storage and use of the substance			
27.	The licensee must ensure that the overall magnitude and frequency of flow in the watercourse does not decrease, other than for natural evaporative losses and authorized attenuation volumes			
28.	The pipeline may not impede natural drainage lines			
29.	Topsoil will be stripped and stockpiled during the excavation. Measures should be in place to control erosion.			
30.	Waste to be managed, suitable waste receptacles (e.g. bins, skips) to be provided at the construction camp			
31.	No fires allowed, no waste will be burnt onsite. Further designated areas must be provided, where smoking can occur in a controlled environment.			
32.	Dust must be reduced by wetting down dirt roads, bare areas and stockpiled soil			
33.	Signs to regulate the speed of traffic and/or direct traffic should be in place			
34.	No animals may be snared, captured or willfully damaged or destroyed, unless declared as a pest by the ECO			
35..	No painting or marking of natural features must be allowed			
36.	Construction material to be stored in a neat and safe manner, in designated areas			
37.	Noise levels to be kept to a minimum through the servicing of vehicles and use of silencers where applicable			
38.	Employment of local laboures will be written into the contract, and the contractor will be encouraged to use local labourers is possible			
39.	Sufficient toilets should be provided i.e. 1:20 and should be serviced once a week			
40.	During construction erosion berms should be installed to prevent gully formation, according to the slope			
41.	Trenches must be open for minimal length of time and must be backfilled with materials that will not alter substances flow significantly.			
42.	Pollution incidents shall be dealt with in accordance with the Act			
43.	The license must ensure that no waste is stored close to crossings			

44.	The license shall keep an incident report and complaints register, which must be made available to any external auditors and the Department			
45.	Drip trays should be used to avoid spillage on the ground			
46.	Once the installation of the pipe has been completed, all construction material e.g. excess plastic will be removed, and the banks of the stream in the position of the pipe trench will be stabilized and rehabilitated			
47.	The construction camp, plant and material stockpiles, must be located outside the extent of the watercourse and must be recovered and removed 1 month within a period of one month after construction phase.			
48.	Banks must be protected against erosion and vegetated to blend into the surrounding banks			
49.	Sufficient topsoil must be stripped and redistributed			
50.	All disturbed areas must be re-vegetated with indigenous plants.			
51.	All cement residues must be removed			
52.	All borrow pits, if any must be filled and rehabilitated			
53.	Areas where spillages of liquid waste occurred must be cleaned appropriately			
54.	The grass mix, shrubs and trees used for rehabilitation must be compatible with the indigenous species			
				Compliance Level
No. of Items Scored				
Highest Possible Conformance Score				
Actual Conformance Score				

Appendix 7: Audit/compliance checklist_ Construction of sidewalks

No.	Condition/ Mitigation Measures	Responsibility	Conformance Score	Comments
1.	The holder of the authorisation must notify every registered interested and affected party, in writing and within 14 (fourteen) calendar days of the date of the environmental authorisation, of the decision to authorise the activity			
2.	The Environmental Management Programme (EMPr), submitted as part of the Application for EA was approved. This EMPr must be implemented and adhered to			
3.	The holder of the environmental authorization must, for the period during which the environmental authorisation and EMPr remain valid, ensure that project compliance with the conditions of the environmental authorisation and the EMPr are audited, and that audit reports are submitted to the Director: Compliance Monitoring of the Department.			
4.	The holder of the authorisation must, in addition, submit an environmental audit reports to the Department within 30 days of completion of the construction phase (i.e., within 30 days of site handover) and a final environmental audit report within 30 days of completion of rehabilitation activities.			
5.	The environmental audit reports must be compiled in accordance with appendix 7 of the EIA Regulations, 2014 and must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions as well as the requirements of the approved EMPr.			
6.	Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.			
7.	A written notification of commencement must be given to the Department no later than fourteen (14) days prior to the commencement of the Activity. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence, as well as a reference number.			
8.	The extent of the construction works must be limited to the development footprint and the designated buffer area.			
9.	Areas to be cleared need to be clearly marked and clearing of vegetation must only take place within these demarcated areas.			
10.	A qualified biodiversity specialist must be appointed and tasked to: Identify any features which require permit applications prior to their removal or destruction. All permits must be obtained prior to the feature being removed or destroyed.			
11.	A qualified biodiversity specialist must be appointed and tasked to: Identify and rescue indigenous vegetation to be replanted during rehabilitation phase.			
12.	Topsoil stockpiles must be protected against wind, erosion and seeds, i.e., by use of shade cloth/netting. Topsoil stockpiles should not exceed 2 meters in height and all exposed earth should be rehabilitated promptly with suitable vegetation to stabilize soil. In addition, sloped areas must be			

	temporarily stabilized during construction using geotextiles.			
13.	The storm water management system must be implemented during construction. In addition, hydrology management measures detailed in the existing EMPr, as per the Environmental Authorisation requirements must be implemented.			
15.	All aspects and mitigation measures identified in the Environmental Management Programme must be strictly adhered to.			
17.	An integrated waste management approach must be implemented that is based on waste minimization and must incorporate reduction, recycling and re-use and disposal where appropriate. Any solid waste shall be disposed of at a landfill licensed in terms of section 20 (b) of the National Environmental Management Waste Act, 2008 (Act 59 of 2008).			
18.	Control documentation on file up to date versions Proof of daily site inspections conducted by Contractor Environmental Officer, weekly site inspections, audits, etc.			
19.	Records (e.g. waste disposal, septic tanks, chemical toilet slips, incident reports, corrective action register, etc.) on file			
20..	All documentation signed off correctly			
21.	Site configuration corresponds with approved plan			
22.	Site fencing and demarcation facilities remain intact			
23.	Sewage and effluent infrastructure intact			
24.	Work areas properly demarcated and safeguarded			
25.	Is there an integrated waste management system in place whereby aspects such as waste separation, waste reduction, re-use and recycling as well as disposal is incorporated?			
26.	Waste stored in separate labelled containers			
27.	Waste equipment still in good condition			
28.	Waste properly disposed & records available. All rubbish and rubble removed to a recognized waste facility.			
29.	Certificates of disposal must be obtained for any waste that is disposed of.			
30.	Properly stored, inventory kept and relevant MSDS available			
31.	Spill response material equipment on site and in order			
32.	Spills recorded, reported and properly cleaned			
33.	Conducted by dedicated staff in dedicated areas			
34.	Areas properly protected from contamination			
35..	Spill response equipment on site and properly used			
36.	Spills reported, recorded and properly cleaned			
37.	The extent of construction works must be limited to the development footprint and the designated buffer area			
38.	Place signs and/or danger tape around exposed excavations to warn the public of the inherent dangers. This is with particular reference to excavations exceeding 1-1.5m in depth.			
39.	Excavated material to be placed in a designated place outside of the construction area			
40.	Ablution facilities are intact			
41.	No sewage spillages have occurred			
42.	Facilities are regularly serviced			
43.	Document proof of servicing and/or disposal available			
44.	Dust suppression equipment in working condition and readily available			

45.	Vehicle speed limits on unpaved roads of 40km/h adhered to			
46.	Water used for dust suppression taken from approved sources on site			
47.	Dust incidents reported, recorded and corrective action implemented			
48.	Temporary drainage infrastructure and equipment intact			
49.	Regular checks and maintenance conducted on drainage infrastructure			
50.	Stagnant water cleared where necessary			
51.	Incidents of stormwater contamination reported, recorded and corrective action implemented.			
52.	Protective infrastructure and equipment intact			
53.	Protective equipment (drip trays, spill absorbents, etc.) available on site			
54.	Protective equipment correctly used			
55.	Accidental spills reported, recorded and immediately cleaned – contaminated soil properly disposed			
56.	Noise generating equipment list updated and available on site			
57.	Noise generating equipment/plant in good working order			
58.	Noise incidents reported, recorded and addressed			
59.	Fire prevention equipment in good working condition – regularly serviced – fire breaks intact			
60.	Fires made in specially constructed facilities/equipment			
61.	Fire emergency contact numbers available on site			
62.	Fire incidents reported, documented and addressed			
63.	Water taken from approved points on site			
64.	Water adequately supplied to working areas			
65.	Water use monitored			
66.	Contamination of water reported, recorded & addressed			
67.	Rehabilitation method statement provided for rehabilitation work			
68.	Rehabilitation conducted in accordance with method statement			
69.	Rehabilitated areas monitored (while contractor is on site)			
70..	Encroachment of construction activities onto rehabilitated/ sensitive areas reported and recorded			
71.	All staff have received induction training			
72.	Records of training kept – up to date			
73.	Specific follow-up training (e.g., after oil spills) provided – proof supplied by Contractor			
73.	Staff have good general understanding of Specifications			
74..	Designate areas for personnel to eat during breaks within the site boundary.			
75.	Is the CEMP made an integral part of the contract with subcontractors?			
76.	Copies of EA and EMP on file.			
77.	Approved Spill Response Method Statement in place.			
78.	Complaint's register being maintained by EO.			
79.	Is there an audit findings register on file and is it up to date?			
				Compliance Level
No. of Items Scored				
Highest Possible Conformance Score				
Actual Conformance Score				

Appendix 8: Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

SCHOOL OF ANIMAL, PLANT AND ENVIRONMENTAL SCIENCES ETHICS COMMITTEE CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: HA1907**
PROJECT TITLE	A critical review of EIA follow-up in South Africa: A case study for Gauteng Province.
INVESTIGATOR	Faith Chigwanhire
SCHOOL/DEPARTMENT OF INVESTIGATOR	Animal, Plant and Environmental Sciences
DATE CONSIDERED	19 July 2019
DECISION OF THE COMMITTEE	Approved unconditionally
EXPIRY DATE	Date of submission of the project report
ISSUE DATE OF CERTIFICATE 19 July 2019	**CHAIRPERSON** _____ (Dr Shalini Dukhan)

cc: Supervisor/s : Dr Ute Schwalbold

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School ethics committee.

I fully understand the conditions under which I am are authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

_____ 30, 07, 19

Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix 9: Questionnaires

Interview questions – Competent Authority

Q1.	As the competent regulatory authority for the project, what is your role towards management of the environment?
A.	
Q2.	Which tools do you use to monitor projects environmental compliance?
A	
Q3.	In your own opinion, do contractors comply with stipulated EA conditions or EMPr requirements?
A	
Q4.	What do you think are the main challenges associated with EIA follow-up process in South Africa?
A	
Q5.	What recommendations would you suggest for South Africa to improve their EIA follow-up practice.
A	

Interview questions – Client (Project Manager)

Q1.	What are you responsible for as the Client in environmental management of the project?
A.	
Q2.	Does environmental monitoring and auditing for compliance pose a high financial implication on you?
A	
Q3.	Are you content with environmental monitoring and auditing done for this project?
A	
Q4.	Have you appointed an independent Environmental Officer for this project?
A	
Q5.	Did you face any challenges with regards to compliance throughout the monitoring and auditing process?
A	

Interview questions – Environmental Compliance Officer (ECO)

Q1.	What are you responsible for as an appointed Environmental Control Officer (ECO)?
A.	
Q2.	What weaknesses have you identified in environmental monitoring and auditing within South Africa?
A	
Q3.	Are there any unpredicted impacts that you have identified so far? Explain.
A	
Q4.	What challenges have you experienced in EIA follow-up so far?
A	
Q5.	Can you elaborate on lessons learnt during the environmental monitoring and auditing process?
A	