



Assessing the consideration of health impacts in Environmental Impact Assessment

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ABSTRACT

Rampant industrialisation, urbanisation and other activities pertaining to developmental actions have contributed to the deterioration of the environment. Environmental impact assessments (EIAs) are therefore now conducted worldwide to gather positive or negative information pertaining to proposed development projects. EIAs enable governments to make decisions on the basis of the potential impact of projects on the environment. However, previous studies that were conducted around the globe have shown that not much importance has been placed on issues of human health in EIAs.

The motive for conducting this study was to determine whether the above situation was also true in the South African context. Consequently, the objective of the study was to establish the amount of emphasis placed on health issues in EIA practices and the extent to which health impacts are considered in EIAs in South Africa. The research question that guided this study was: "To what extent are health impacts considered in South African EIA practice?" The Lee-Colley review package, which was adapted to predominately address health impacts, was utilised to conduct a thematic analysis of 23 EIA reports that were produced in several developmental sectors in South Africa, such as mining, power stations, road and rail, and buildings. The review areas were designed using the International Association of Impact Assessment (IAIA) international health guidelines.

The results suggest that developmental sectors incorporate health impacts differently within the EIA reports with mining and power station developmental projects taking the leading in considering health impacts in EIAs even though there were inadequacies which can be due to lack of standardised method of addressing health impacts. The overall assessment revealed that EIA reports incorporated health impacts to a lower extent. Focus of health impacts were mainly on how the projects degraded the air or water quality, or could increase the noise pollution. The direct and indirect effects of health determinants aspects of affected populations, health equity were omitted in the reports. It is essential to educate the environmental practitioners about the need to include health impacts in their EIAs, with an adherence to the IAIA international guidelines. There is a need to allocate a section in the reports to address all health impacts, irrespective of the type of development.

Keywords: Environmental Impact Assessment, Health Impact Assessment, Health, Health Impacts, Health Assessment

ABBREVIATIONS AND ACRONYMS

CCPP	Combined Cycle Power Plant
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EHIA	Environmental Health Impact Assessment
HA	Health Assessment
HI	Health Impact
HIA	Health Impact Assessment
IA	Impact Assessment
I & AP	Interested and Affected Parties
IAIA	International Association of Impact Assessment
KZN	KwaZulu-Natal
NEMA	National Environmental Management Act
NEPA	National Environmental Policy Act
RA 1-4	Review Area 1-4
SKASA	Square Kilometre Array South Africa
SUN EIA	Sun International Environmental Impact Assessment
WHO	World Health Organisation

KEY DEFINITIONS

Health: A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity (World Health Organisation, 2019).

Health hazard: An agent with the potential to cause ill health (e.g., bacteria, toxins, chemicals).

Health determinants: The range of personal, social, economic and environmental factors that determine the health status of individuals or populations (NIHCE, 2006).

Health risk: The extent to which the potential of a hazard may be realised

Screening: Identifying whether a project is subject to EIA and, if so, at what level

Scoping: Identification of issues and impacts that might come with the project

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CHAPTER 1 INTRODUCTION

This chapter begins with a description of the background to the topic and the problem statement. The research question is then presented and the significance of the study is explained. Finally, an overview is provided of the structure of the dissertation in order to assist the reader to navigate the content.

1.1 Background

Environmental Assessment (EA) is an environmental policy intervention utilised in many countries. EA is regarded as an approach to environmental integration in planning and policymaking (Cashmore and Richardson, 2013). It involves a system of knowledge production of how the environment might be affected by a development and a way of taking this knowledge into account in decision-making. As EA practices have developed, the understanding of the environment and development have broadened. Consequently, a range of frameworks, tools and practices have become part of the international field of practice. An EIA is a tool to conduct the EAs that is intended to achieve sustainability.

EA practice cannot be addressed without noting the megatrends that determine shifts in society or patterns of activity. The global trends require adaptation strategies in each country. Megatrends are described in terms of demographics, urbanisation, technology innovations, shifts of power, climate change and resource scarcity Retief *et al.* (2016). The world is said to be changing at a rapid pace Retief *et al.*, (2016). It is against this backdrop that EA is considered an appropriate and crucial guide to adequate planning.

According to Glasson *et al.* (2012) the EIA was developed in the USA in 1969. Glasson *et al.* (2012) explain that, in 1985, the European Community issued a directive containing the EIA requirements applicable to member states. The stipulations led to challenges, resulting in amendments in 1997, 2003 and 2009, which resulted, in turn, in immense improvement in EIA practice in Europe. Moreover, the majority of member governments noticed a huge improvement with regard to integrating sustainability policies and legislation after the first United Nations Conference on Environment and development: Earth Summit 1992, held in Rio de Janeiro (Morrison-Saunders & Retief, 2012). According to Glasson *et al.* (2012), EIA systems and their implementation differ from country to country. However, the spread of the concept and role of EIA

in countries' environmental protection programmes demonstrates its global validity as a practical planning tool.

In South Africa, EIAs were initially conducted on a voluntary basis, but were legislated in 1997 with the endorsement of the EIA regulations in the Environmental Conservation Act 73 of 1989. The National Environmental Management Act (NEMA) 107 of 1998 was issued to address the limitations of former Act. The NEMA has since been subjected to several revisions. According to Sandham *et al.* (2013), the EIA regulations were modified in 2006 in order to improve the effectiveness of EIAs. The NEMA also makes provision for the choice to conduct either a basic or full EIA. Kidd and Retief (2009) define the conditions for using a basic assessment as follows: a basic assessment should be conducted when the proposed activities are unlikely to have serious environmental impacts. A full assessment, according to Kidd and Retief (2009), involves scoping and the EIA process. It is conducted for complex activities and large-scale projects that might result in harm to the environment and human beings. A noticeable improvement has been seen in EIA practice; thousands of EIAs are done and approximately 1,000 practitioners are registered as members of the South African branch of the International Association of Impact Assessment (IAIA), according to Retief *et al.* (2007; 2011).

EIA is said to be a regulatory requirement in many countries. It provides a mechanism of addressing human health and wellbeing (Harris *et al.* 2009). EIA potentially covers positive and negative health impacts that might be directly or indirectly linked to the development. This gives opportunity for the following three aspects: identification of the health issues, interpreting health hazard and managing the health impact. Countries such as Australia have been recognised to be leading in including health impact within the EIA (Harris *et al.* 2009). Studies conducted in US, revealed that human health was neglected or assessed inadequately within the EIA (Sadler, 1996). In the UK studies revealed that there was a mention of human health in majority of EIA, with deficiencies of addressing the human health in depth and lack of chapters dedicated to health impacts. In Sweden, studies revealed lack of inclusion of health impacts. In most countries health is therefore, said not to be addressed explicitly but it is considered mostly indirectly through the physical environment (Harris *et al.* 2009).

Health is defined by the World Health Organisation (WHO, 2019) as a "state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity". The IAIA relates health to the genetic, biological, behavioural, circumstantial, social, cultural and physical environment in which we live. Furthermore, the IAIA stipulates the effects of health impacts as

the state of the environment, access to resources in order to meet our basic needs, risk and capacity to meet our basic needs, income, educational background and social networks. According to Harris-Roxas *et al.* (2012) environmental factors such as water, waste and air quality have an impact on human health, as well as social impacts, which are the main driving forces in defining health outcomes and health risks. Health has thus become an important aspect of EIAs internationally. According to Joffe and Mintell (2002) health has become a prominent focus in recent years in public debate, not only in relation to personal risk behaviour and medical care, but also due to a variety of policies. Morgan (2010) is of the view that although health impacts are normally required to be considered before major developments can occur, more explicit health determinants need to be incorporated in assessments, such as environmental, social, cultural, lifestyle, individual biology, capacity and the jurisdiction of public sector institutions.

Adequate integration of health impacts in EIA will improve the environment and protect the human health Harris *et al.* (2015). According to IAIA addressing health in EIA is part of a regulated process which carries weight with the competent authorities. With the EIA, the developer commits to mitigation and monitoring effects. Health in EIA may therefore provide certainty to how health effects are managed. According to Harris *et al.*(2015) if health impacts are not addressed they may lead to vector borne diseases, air, soil, water, noise pollution, equity, quality of life, transmission of communicable diseases, cancers, respiratory illness, mental health illness, injuries

1.2 Problem statement

The majority of developed countries have already incorporated the consideration of health impacts into their EIAs, although this component might not feature prominently in several countries. South Africa is a developing country and, as Miranda *et al.*, (2016) note, developments such as mining, road developments, infrastructure development can impact the economic conditions of individuals and their overall wellbeing. The emissions, pollutants and other substances emitted from development sites can negatively affect the community's health. Health can also be impacted by the availability of resources, which can be altered by human activities in the development context.

South Africa has a long history of EIAs, with a particular focus on environmental issues. When health issues are addressed they focus on the physical impacts that the developmental project would pose to the communities with a focus on the indirect environmental impacts such as air,

noise, soil and water pollution. The extent in which human health is considered in EIAs is still not known. This can be due to several issues such as lack of understanding the definition of health and knowledge on how to integrate human health in EIA and methods or approaches to use to address health impacts holistically.

1.3 Objectives

In light of the above, the ultimate aim of this study was to assess to what extent health impacts are considered in EIAs in South Africa. To achieve this aim, the first objective was to explain the existing role of EIAs in decision-making in South Africa and provide an outline of its framework. The second objective was to evaluate South African EIA practice in light of the international guidelines for addressing health issues in EIA frameworks and to thereby reveal how EIA practitioners involved in various developmental projects, such as building construction, road construction, mining, wind farms and power stations, conduct their health assessments.

1.4 Research question

In view of the problem statement, the primary research question was: “To what extent are health impacts considered in South African EIA practice?” In order to provide context for the answer the main research question, the following two sub-research questions needed to be answered first:

- What are the requirements for the consideration of health impacts within the South African EIA system?
- What are the international best practices requirements for incorporating health impacts in EIAs?

1.5 Structure of the dissertation

The following outline is provided to give the readers an overall idea of the topics that are dealt with in this dissertation.

Chapter 1 comprises the introduction, which deals with the background of the study, problem statement, objectives and research. The rationale for and scope of the research are also explained.

In **Chapter 2**, the methodology utilised for this study is detailed. This includes a description of the approach, data collection and analysis methods. The case studies selected for the research according to different sectors are also listed.

The **third chapter** contains the literature review.

In **Chapter 4**, the results that were obtained from a qualitative analysis of the data are discussed.

The last chapter, **chapter five**, is the conclusion of the study, in which the research questions are answered on the basis of the findings of the study and recommendations are made for improving the assessment of health impacts in EIA procedures in South Africa.

CHAPTER 2 METHODOLOGY

The research method refers to the measures used for collecting essential data, which could be analysed or interpreted in order to frame the answers for the research questions that would help to enhance the knowledge and skills related to the topic (Sutton & Austin, 2015). In this chapter a detailed description is provided of the research methods utilised in this study. The design of research, the type of data collected and how data will be analysed. Other factors are analysed in detail to gain the overview of the acquisition that is needed to further the analysis of the study.

2.1 Research design

A research design is considered to be crucial because it sets up the framework of the research. The primary importance of a research design is to ensure the reliability of the research results, balance the neutrality of the research, and achieve the validity of the research (Mueller *et al.*, 2015). The reliability focuses on the consistency of the measures and validity focuses on the accuracy of the method. The approach that was used for this research was the qualitative research method. The qualitative data used for this study was utilised to conduct a descriptive analysis of the study (simplypsychology.org, 2019).

2.2 Data collection

a) Literature articles were collected from science direct, pubmed and research gate to form the framework for the research including the main legislation documents addressing the environmental and health laws in South Africa. Some of the articles were collected from the IAIA health key citation series. Studies previously conducted, such as by Hilding-Rydevik *et al.* (2006) used literature review to form the basis of their research. Therefore for this study to answer the sub-questions of the research looking into experience and lesson learned from other countries literature review was used.

b) The current researcher collected 23 EIA reports ranging from those related to wind energy and telescope fields to mines and ash cement facilities, power stations, the construction/expansion of buildings, roads and railways facilities. The reports were randomly selected from the consultation companies and government websites to represent a wide scope of different developmental projects. The majority of the reports collected were generated by different EAPs from different companies.

Out of the 23 reports analysed only 3 reports were generated by the same EAPs. All EIAs collected were generated by EAPs ranging from the year 2007-2019. The different years of compilation of the EIAs allow a clear perspective on how EAPs have been incorporating health impacts within different developmental projects over the years. The EIA reports collected are represented in (**Table: 2-1**) according to the development sectors.

The reports were analysed using the Lee-Colley review package Lee *et al.*, 1999 (**Annexure 1**), which was adapted to accommodate revised review areas using the IAIA international best practice principles. Most studies conducted used risk assessment, interviews and questionnaires to evaluate the extend health impacts are incorporated in EIA (Hilding-Rydevik *et al.* (2006); Arquiga *et al.*, 1994) due to lack of standardised method to address health impacts in EIA. However gaps were noted from the studies such as effects of health, social and economic determinants, direct and indirect health impacts not adequately included in EIAs (Nobel & Bronson, 2005). Recommendations from such studies were taken into consideration for this study. The research opted to use a more holistic method, the Lee-Colley review package. This review package is able to gives a holistic performance of EIA on many factor including the quality of reports and it is adaptable to the scope of study one uses. Because it evaluates many factors the researcher thought it would be an adequate method to evaluate the extent in which health impacts are considered in EIA in South Africa.

Table 2-1: EIA reports collected

TYPE OF DEVELOPMENT	TITLE OF EIA
WIND POWER AND TELESCOPE EIAs	
1. Construction of Wind Power Facility (PHEZUKOMOYA)	<i>EIA report for the proposed 315 mw Phezukomoya wind energy facility and grid connection, Northern and Eastern Cape Provinces</i>
2. Construction of Wind Power (ESKOM)	<i>EIA report: proposed wind energy facility and associated infrastructure, Western Cape</i>
3. Construction of telescope array (SKASA)	<i>EIA report for proposed Karoo array telescope (Meerkat) project on the farm Losberg and at Mey's dam near Carnarvon in the Northern Cape</i>
MINES AND ASH CEMENT FACILITIES EIA	
4. Construction of Gold Mine (BVG)	<i>EIA and Environmental Management Plan Report: Project Environmental Authorisation for the Blyvoor Gold Mining Project near Carletonville, Gauteng</i>
5. Construction of Mine Project (Palmietkuilen)	<i>EIA for the proposed Palmietkuilen Mining Project, near Springs, Gauteng</i>

6. Construction of Chrome Mining (Lanxess)	<i>EIA and Environmental Management Programme Report for Lanxess Chrome Mine</i>
7. Construction of Ash Disposal Facility (Kendal)	<i>Final Environmental Impact report For Kendal Power Station – 30-Year Ash Disposal Facility</i>
8. Construction of Mine (Bloemendal)	<i>EIA report and environmental management programme: application for mining right for the proposed Bloemendal opencast coal mine, Gauteng province</i>
9. Construction of Mine (Dorstfontein)	<i>EIA for the Dorstfontein East Mine Extension of Pit 1 and Water Transportation Pipeline from Dorstfontein West to Dorstfontein East, Emalahleni Local Municipality, Mpumalanga</i>
10. Construction of Ash Facility (FAD6 Sasol)	<i>Application for the Fine Ash Dam (FAD) 6 Cement-Ash Mixing Plant for undermining stabilisation of Portions of the Brandspruit Mine under FAD 6 using a Cement/Ash Mixture</i>
11. Construction of Ash Facility (Matimba)	<i>EIA report for the proposed continuous ash disposal facility for the Matimba power station in Lephalale, Limpopo province</i>
ROAD, BUILDINGS AND RAILWAYS EIAs	
12. Construction of Railway Line (KZN Rail)	<i>EIA Report: The Proposed Upgrade and new Construction related to the Development of the Swaziland Rail Link</i>

	<i>Project, from Golela to Nsezi in KwaZulu-Natal (KZN)</i>
13. Construction of N17 Toll Road	<i>Final EIA for the proposed rehabilitation and upgrading of the N17 from Springs to Ermelo and proposed construction of new sections between Leandra and Leven Station at Trichardt and Bethal</i>
14. Construction of Road (K56)	<i>Final EIA report for the design and construction of Erling road between k46 and k56, and the k56 between the k46 and main road</i>
15. Construction of Building (Nomalanga KZN)	<i>EIA and Environmental Management Programme Report for the Proposed Expansion of the Nomalanga Estate, KZN Province</i>
16. Construction of Facilities (SUN FEIA)	<i>Final EIA and Environmental Management Programme Report: Proposed Expansion, Upgrade and Maintenance Projects within the Sun City Complex, North West Province</i>
POWER STATION EIA	
17. Construction of Power Lines (WITKOP)	<i>Final EIA for the proposed 400kV Maphutha-Witkop powerline within the jurisdiction of Sekhukhune and Capricorn District Municipalities, Limpopo Province</i>
18. Coal Power Station (KUSILE FINAL)	<i>Final EIA: proposed coal-fired power station and associated infrastructure in the Witbank area</i>

19. Coal Power Station (KUSILE BRAVO)	<i>EIA report : Bravo integration project- construction of 400KV line from Kusile Power Station to Lulamisa</i>
20. Coal Power Station (MEDUPI)	<i>Final EIA report for the proposed Medupi flue gas desulphurisation retrofit project</i>
21. Gas to Power Station (ATLANTIS)	<i>Scoping and EIA for the proposed Atlantis Gas-to-Power facility on Portion 1 and Portion 4 of Cape Farm 1183, Western Cape</i>
22. Combined Cycle Power Plant (CCPP RBAY)	<i>EIA report: Richards Bay combined cycle power plant project, KZN</i>
23. Relocation of Acacia and Pot Rex Gas Turbines	<i>EIA report: proposed decommissioning and relocation of three gas turbine units in Acacia power station and one gas turbine unit at Port Rex power station to the existing Ankerlig power station site, Western Cape</i>

2.2.1 Adaptation of the Lee-Colley package

The Lee and Colley package was developed in the UK in 1982. It is structured in four tiers, namely: overall score; four review areas; 17 review categories; and 52 review sub-categories. The Lee-Colley package (Lee and Colley, 1992) is regarded as an international standard. It is utilised in both developed and developing countries (Ibrahim, 1992; Rout, 1994; Mwalyosi and Hughes, 1998; Sandham *et al.*, 2005) to review the quality of EIA reports. The review package was developed to review specific aspects of reports, such as scientific accountability (Devuyst, 1994) and typographic quality (Gallagher and Jacobson, 1994). The Lee-Colley package is easily adaptable and provides a systematic structure to evaluation of reports. This was observed when Sandham *et al.* (2004) adapted the package to suit the South African EIA context.

The topics in the Lee-Colley package are hierarchically arranged under four review areas, which are as follows (Lee *et al.*, 1999:39):

- 1 *Description of the proposed development, environment and baseline conditions.*
- 2 *Identification and evaluation of key impacts.*
- 3 *Alternatives and mitigation of impacts.*
- 4 *Communication of results.*

The package was adapted by the current researcher to suit the review area, and the categories and sub-categories of the study. Some of the subcategories were omitted because they were not relevant to the evaluation of health impacts within the EIA reports. However, the basic structure remained the same:

Review area 1 (RA1): the description of the proposed development, environment and baseline conditions remained unchanged

Review area 2 (RA2) was adapted to accommodate the identification of health impacts. The categories and sub-categories were designed from the IAIA health impacts assessment international best practice principles, which are the guidelines needed when honing in on the health impacts within the EIAs.

Review area 3 (RA3) was adapted to address the alternatives and mitigation of health impacts, rather than focusing only on the environmental alternatives

Review area 4 (RA4) remained the same. However, some of the categories and sub-categories were eliminated. Only those relating to health impacts were retained.

- In order to assess and evaluate the EIA reports, the current assessor performed the following recommended steps sequentially (adapted from Lee *et al.*, 1999):
 1. The reviewer read the appendix on “Conducting a review” to ensure that she understood the review package and what it would entail.

2. She thoroughly read the review topics, as in the collation sheet, to familiarise herself with the review areas, categories and sub-categories, as well as the data that was required in the EIA for each of the review topics.
3. She then briefly scanned through the EIA report to familiarise herself with the layout and the arrangement of essential information.
4. The assessor thoroughly read the list of assessment symbols. The most relevant assessment symbol had to be chosen to reflect the way the tasks in the sub-categories were performed in the EIA report.
5. She thoroughly read the review criteria and its component sub-categories. The sub-categories were the actions that needed to be undertaken for the requirements to be met.
6. She then assessed each of the sub-categories in the EIA report. Noted that the information would not always be located in the same place in each of the EIAs.
7. She recorded the appropriate assessment symbol of the sub-category in the collation sheet. A task had to be seen as satisfactorily handled if sufficient information was provided in the report for a decision maker to make an informed decision without having to request further information. It was important that appropriate information was not connected to the amount of information, but rather to the appropriateness and quality of the information provided. When data on a specific topic was not explicitly provided but was explicit on other topics, the reviewer could decide to rate it as satisfactory. It should, however, be recorded in the summary of the review.
8. The reviewer used the assessment symbols of the sub-categories, and any other information in the EIA, report to assess review category 1.1. This category symbol could not just be an average, but had to take into account the importance of the information provided.
9. The reviewer then proceeded to the next review category (1.2) and evaluated it in the same way as was done for review category 1.
10. The reviewer continued until all the review categories in the review area had been assessed in the same manner.

11. The evaluation of these review categories could now be used to assess review area 1 in the same way in which they themselves were derived from the review sub-category assessments. For example, the assessment of review area 1 was based on the assessments of review categories 1.1–1.5. This assessment symbol was to be marked in the space next to “FINAL GRADE REVIEW AREA 1”. Again, a simple averaging of the assessments of the component sub-categories could not determine the assessment of the review category.
12. Review areas 2, 3 and 4 were then assessed in the same manner as review area 1. When all the review areas had been assessed, the environmental impact report as a whole could be assigned an assessment symbol. The final assessment symbol was marked in the space next to “FINAL GRADE REVIEW FOR EIA” under the appropriate symbol.
13. The overall assessment was supplemented with a brief summary (one or two paragraphs) on the strengths and weaknesses of the environmental impact report, highlighting, in particular, any key deficiencies that would require correction to bring the report up to an overall satisfactory standard (“C” or above).

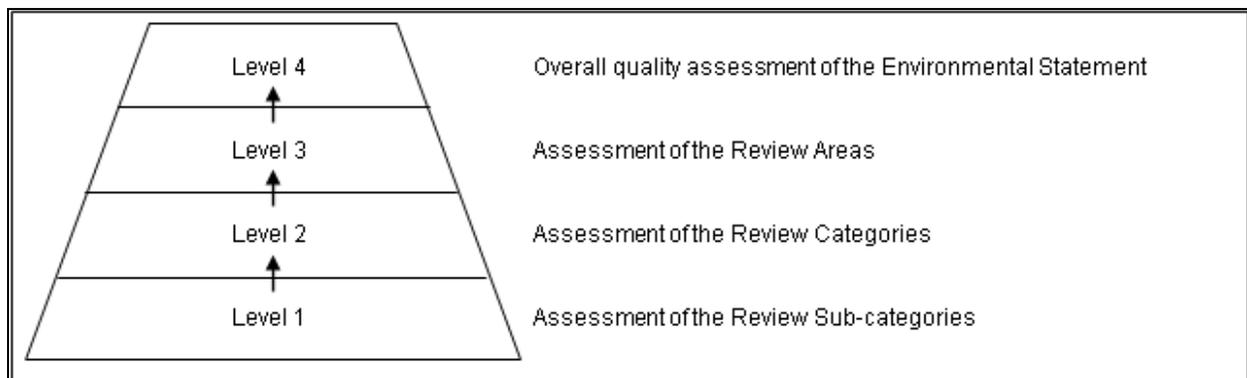


Figure 2-1: The Hierarchical/Pyramidal Structure of the Lee-Colley Review Package (Lee *et al.*, 1999)

2.3 Data analysis

A collation sheet was developed to assess the EIA reports. Symbols were used in the evaluation of the reports. The symbols were colour coded by the author, with green denoting “adequate”, yellow to orange “satisfactory”, and shades of red indicating “inadequate”. Below is the table of assessment symbols and their descriptions (**Table 2-2**)

Table 2-2: Assessment symbols of the Lee-Colley review criteria (Lee *et al.*, 1999)

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

2.4 Ethical considerations

In this study it was found that there were no ethical issues to be considered. An ethical clearance certificate without risk was issued to the researcher.

2.5 Methodological limitations

Every study is bound to face certain impediments in their procedure. Similarly, the investigator has also encountered some potential impediments in the process of conducting this study. These hindrances are summarised as follows:

2.5.1 Lack of resources

The major factor that hindered the progress of the work was the inadequacy of resources. There was a lack of sufficient support from the relevant institutions, and this slowed the progress of the study. Obtaining the necessary EIA reports for the study became difficult. The study was conducted with the available EIA reports collected.

Although this study was commenced after reviewing many journals, books and articles, a more extensive literature review could have given rise to more innovative ideas and approaches that could have been employed by the researcher to carry out the study in a more innovative way. Thus, further study of literature could have highlighted the ideas that the analyst might have missed out in this dissertation.

2.5.2 EIAs collected

The original intention was to analyse 25 EIAs. Twenty-six EIAs were initially collected for the purpose of the study. However, only 23 of the sample were found to be suitable for the study (3 wind power and telescope, 8 mine and ash cement reports, 5 roads, buildings and railways and 7 power station reports) Two of the EIAs collected were rejected due to the reports being drafts for which important pages were missing, which could have impacted the results. One EIA was found to have stipulated clearly that they did not address any health impacts, because the development would not be involve any human settlements on the proposed site. Therefore, three EIAs were not included in this study, leaving 23 EIAs to be analysed for the study.

CHAPTER 3 LITERATURE REVIEW

This chapter effectively sheds light on the core concept of EIA and its background in South Africa. The necessity for integrating health assessments into EIAs is also determined, considering its effectiveness and efficiency. Legislation and guidelines *apropos* EIA in relation to public health are also highlighted in the chapter. The purpose of this chapter is to answer the two sub-questions and develop a conceptual framework.

3.1 The Concept of EIA

An EIA is a technical tool that is used to identify, predict and analyse impacts on a physical environment, including the social and health aspects to achieve sustainable development (Glasson *et al.* 2012), Morrison-Saunders & Retief, 2012). This process makes it possible to successfully identify alternatives and measures for mitigating adverse environmental impacts on health. The EIA assessment tool serves as an advanced tool for assessing the potential impacts of developments on the environment. Among the various determinations, EIAs are intended to explore and propose mitigation strategies for compensating or finding remedies for adverse health effects (Kruger & Sandham, 2018). The EIA process is characterised by internationally-established elements, namely screening, scoping, mitigation, reviewing and licensing the contingency plans for proper implementation. These processes are detailed in the following subsection.

3.1.1 EIA processes

Screening

The step of screening involves determining the social and environmental aspects of a planned project and their relevance to key decisions. As such, it facilitates informed decision-making with clarity, facts and pre-determination of the consequences of the proposed actions. Furthermore, it influences project selection and project design. This increases the feasibility of conducting the actions related to the development.

Scoping

Scoping means establishing boundaries for EIAs and setting the basis for conducting analyses at every stage. It effectively describes alternatives for the project. As observed by De Witt *et al.*

(2019), it also involves consulting the public, who might suffer due to a certain health hazard, and identifying issues, in particular the cumulative effects of the risks or social impacts. Engaging people and reviewing is also involved, besides the determination of a baseline and detecting alternatives for mitigating the risk that persists.

Impact assessment and mitigation

This assessment is used for evaluating the environmental and socioeconomic aspects of the planned project and adopting measures to mitigate risks. Preventive measures and compensation mechanisms for unavoidable circumstances are also determined.

Impact management

Impact management is all about preparing plans that are required to implement measures for mitigating the health issues faced by people, technology failure or natural calamities through the environmental management plan (Linzalone *et al.* 2019).

The EIA report

The EIA report is a compilation of significant components, highlighting the social and environmental aspects of management monitoring plans with synthesised and comprehensive data that can effectively aid the decision-making process.

Review, licensing and monitoring

In light of the EIA report, concerned and delegated authorities are assigned with the responsibility of making any necessary amendments and they eventually execute the final checking process for quality maintenance.

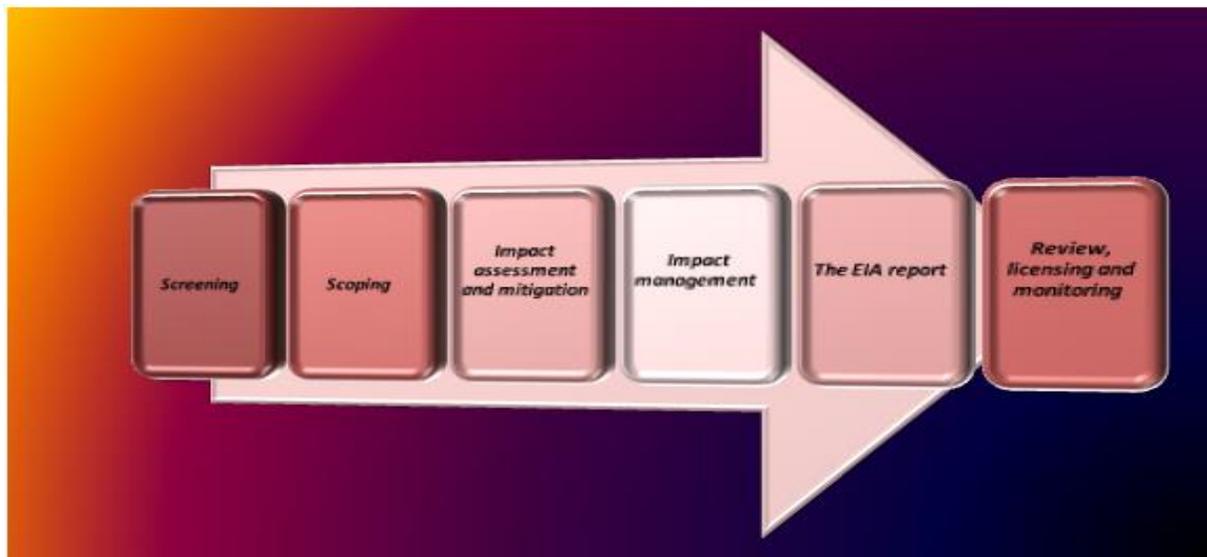


Figure 3-1: EIA steps

3.1.2 Background of EIA in South Africa

In keeping with the NEMA (Act No. 107 of 1998), an environmental impact management regime was introduced to stipulate an EIA process that integrates the social, economic and environmental factors. According to Cele (2016), the EIA is considered to be one of the key regulatory instruments in South Africa for managing environmental factors related to new developments and to mitigate the adverse effects of such developments on public health. The instrument serves as a guide to support and promote sustainable development. However, the meticulous participatory process and scientific investigation seem to be time-consuming and expensive. The one-size-fits-all application of the EIA process is also a weak point of the process. Nevertheless, the EIA process continues play major role in managing environmental impact in the country.

3.2 Necessity of integration of health assessment in the EIA

Environmental Impact Assessments in South Africa are carried out prior to new developments or activities. Among other effects, there are those that have to be faced by humans as well. As per certain health studies, clear guidance is provided for handling the assessment in order to ensure comprehensive investigation of any possible hazardous impact on life (Ko & Salkin, 2016). In order to determine whether environmental health is a part of the EIA decision-making process, it is necessary to integrate health assessments in a customised and systematic manner the figure below indicates the guidelines put forth by the Environmental Health Impact Assessment (EHIA) Guidelines published by the Department of Health in 2010 for integrating health concerns in EIAs.

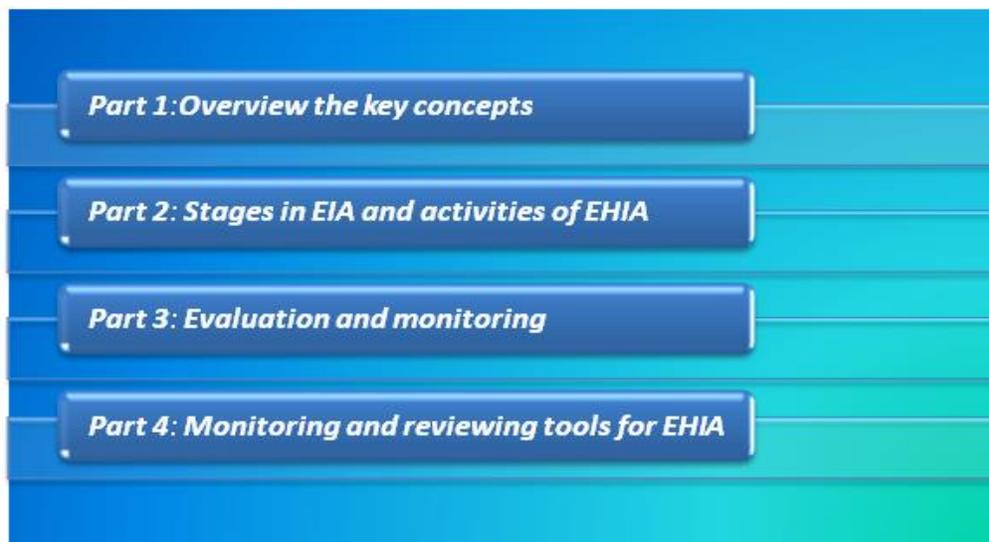


Figure 3-2: Guidelines of EHIA (Source: Created by author using Microsoft office)

In the past few decades, health prospects have been one of the major concerns in EIA. In South Africa, the EIA process is more active for those whose major occupation is mining and who are underdeveloped. For instance, risk of global health in the mining industry and in low and middle income countries are connected with the EIA process for handling the health system (Marais *et al.*, 2015). As enshrined in section 24 of the Constitution, EIA in South Africa is oriented towards environmental rights and the call for ecologically sustainable development. The constitution also draws attention to social and economic development, as well as noting its limitations and feasibility factors, such as time consumption, cost barriers and technical failures. The major focus of the EIA process in South Africa is to value the environmental resources by safeguarding against

negative and unacceptable challenges encountered during the development process. Mitigation measures are also adopted for human safety and protection.

As noted by Li and Zhao (2015), the socioeconomic proposition is also stimulated and developed through this process. For health integration, there are two major EIA processes, namely scoping and environmental impact reporting processes. The procedure for assessment requires the reporting of potential environmental impacts. This is different from scoping and assessment reports. The NEMA EIA Regulations in South Africa address every phase of the EIA process. They inform stakeholders how to approach the proposed project and how to explore alternatives for eradicating any negative impacts on the environment.

The regulations also provides people with the opportunity to disclose their views and perceptions in order to influence the design of the project in a positive manner. As De Vries *et al.* (2015) observe, conflicts can also be reduced through the identification of debatable issues. This increases public participation, as well as transparency and accountability of the authorities' decision-making process with respect to the project. Moreover, the authorities are also concerned with fulfilling the legal requirements by underpinning the objectives for public participation. As per Section 24(2) of the NEMA (Act No. 107 of 1998), the minister of is responsible for handling environmental prospects, or they have to be done with the minister's consent. Environmental management authority is handled with proper identification of the activities, which are required to be executed for the benefit of the Republic of South Africa (Bigard *et al.* 2017).

3.3 Effectiveness and efficiency of the current EIA regulations in South Africa

The current EIA regulations came into effect in 2006. South Africa adopted EIA as early as 1989. Policies were further developed and enacted under the Environmental Conservation Act of 1997. As Leonard (2017) states, EIA has long been an active component of the conservation of natural resources in South Africa. However, its effectiveness has been lacking with respect to the human health-related aspects. In the early days, EIA activities were limited to the environmental impacts of a development project and funding options to minimise the damage to the environment and ecology. The EIA regulations were then further expanded in 2014. The focus was on mining projects in the country, and the effect that these projects had on the health of people working in these mines and in the surrounding communities. EIA has highlighted the importance of the environmental assessment practitioner (EAP), who focuses on the effect of development projects on the health and safety of people. This was included in the year 2014.

According to Jorgensen *et al.* (2016), EIA can be considered marginally effective and it can be said that there is no other option that can be considered other than EIA. The ability of EIAs to attain the stipulated objectives can be considered in terms of their effectiveness and efficiency. However, EIAs have not been effective in all respects. The EIA regulations have also been identified as a limiting factor for the effectiveness of EIA process, in that several authorities would deal with the regulations in varied ways, eventually leading to the lack of effectiveness and efficiency of the EIA system. A five-point plan has also been developed to improve the effectiveness and efficiency of EIAs in the health sector of South Africa. As observed by Brownson *et al.* (2017) the five-point plan is designed to prevent the potential negative impacts on the environment and health of the people. The utilisation of natural resources and elimination of excessive waste products in various industrial regions is also performed. The plan has also been designed so that the hazardous risk factors can be minimised for the health and security of workers in mines and other industries.

3.4 Consideration of health issues in EIA in South Africa

EIA methods have gained vast acceptance for protecting the environment from the potential negative impacts of any sort of development. Health issues are a part of EIA procedures. Key health issues and public concerns are determinants that can be considered in the assessment. Health determinants that can be included in the EIAs include factors relating to the social and physical environment, the quality of living, personal or family circumstances, and access to public services. As Buse *et al.* (2019) indicate, the impact of environmental and social development can have a huge impact on the health of people who reside in the areas in which developments occur. Therefore, it is essential to evaluate the impact with the help of EIAs. The EAP needs to develop a policy to understand the impact of the project on the health of the citizens of the country. This can be achieved with the help of a screening process to assess policies, programmes or projects for the potential impact on the health of the population. The consideration of health issues in the process of screening can include economic issues, outcome issues or even epidemiology issues. The later stage is the scoping process, by means of which boundaries can be set to limit the impact on the human health.

For instance, the mining or mineral extraction industry has the potential to negatively impact the health of community and workers in the various areas of South Africa. The labours working in the mines can be susceptible to many kinds of illnesses that can affect their respiration, or even cause cancer or mental health problems. As Watts *et al.* (2015) state the communities living near such

mines can be subjected to polluted water and soil, as well as noise pollution. The past few years have been a growing phase for EIA as those responsible for major projects have been forced to implement communal health and safety programmes. The issue that has been the most significant problem in EIA processes is that health has not been the top priority of practitioners.

EIA regulations in the majority of countries cover a wide scope of health categories that can be negatively impacted due to resource development projects. As Bauer *et al.* (2015) assert, communities need to be increasingly concerned about the consequences of increasing industrial activity. Devoting increased attention to the health impacts of development projects within current EIA processes will provide the optimal opportunity to determine the health impacts. However, the main challenge is that the department of health should recognise and work with the EAP to improve the health of the public.

3.5 Legislation and guidelines pertinent to EIA regarding public health

There are a list of rules and regulations that are relevant to EIA and that influence the functionality of EIA with respect to public health. These legislations can influence EIA methods and related projects to improve public health. The most effective legislation is the Health Act 61 of 2003. The Act defines the duties, powers and responsibilities of some authorities to render health services in South Africa. As Woznicki *et al.* (2016) argue, this legislation can help stakeholders to deal with the issues if any development project causes a certain hazardous situation or endangers the health of the people. The EIA authority can take certain actions against such projects or activities of industrial growth on the basis of this legislation. The International Health Regulations of 1969 make it possible to ensure maximum security with respect to the international spread of diseases, with minimum interference with world traffic. Under this legislation, the EIA practitioner can propose activities on an international scale that should comply with the particular legislation of other countries. There are also health measures and processes that are applicable to international ports and airports to prevent the spread of any disease.

As suggested by Garrard *et al.* (2015) the Mine Health and Safety Act of 1996 is also one of the most fundamental acts with respect to health measures in South Africa. This legislation provides various measures to protect the health and safety of people who work in the mines and the citizens living in the nearby area. Its purpose is to provide regulations to protect both employers and employees so that they can determine the hazards and eliminate them, which can help them to control and minimise risks related to the health and safety of mineworkers. This can assist in

providing favourable conditions for working in the mines. The Act also stipulates treatments for various kinds of illnesses that the labours might be at risk of contracting. The management of such organisations needs to identify hazards and risk factors, and provide protection to the people who are directly or indirectly impacted by their mine activities.

In order to provide for the health and safety of people working on a plant or in machinery-related organisations, the staff have to be provided with proper protection. This regulation falls under the Occupational Health and Safety Act of 1993. This legislation can help the EAP to counsel the person at work, as well as to get their regular feedback in order to understand the areas that need to be improved; that is, to reduce the risk factors in a significant manner. It can be essential to determine the risk factors that can influence the health and safety of people who are working in the plant and with machinery. According to Banjoko and Eslamian (2016) the EIA practitioner can develop guidelines that can assist managers to manage hazardous conditions and mitigate the potential negative impacts of these particular areas. Other than the above-mentioned Act, certain laws, such as the Water Services Act of 1998, the National Water Act of 1998 and National Environmental Management Waste Act of 2008 can also impact the working and functionality of EIA in South Africa and other African countries.

3.6 International experiences of considering health impacts within the EIA

As noted by Kagstrom *et al.* (2013) when it comes to EIA and human health the interpretation of health is understood differently, allowing different practices to develop in EIA. The road development EIAs in Sweden are reliant on how health is framed in legislation and policies Kagstrom *et al.*, 2013. EIA is regarded as the main tool used to address human health and environmental impacts in the road development projects in Sweden. However, there is lack of evaluations of EIA practice and lack of assessing health in EIA. As Kagstrom *et al.* (2013) observed the findings gathered by were reliant on looking into approaches used in EIA to promote health or to prevent ill health, health determinants, health impacts and aspects of affected population. How health is framed is important as it gives better response to health solutions and health conceptualisation.

Kagstrom *et al.*, 2013 is of the view that how health is framed in legislation plays a huge role. The consideration of health in EIAs in various European Union (EU) countries is vague because it does not stress on health aspects to be addressed. The EU use different interpretations of directives and different concepts of health in their legislation. The EU approach is seen as a

narrow approach, while the rest of the world use a broad approach that favours the WHO health definition (Kagstrom *et al.*, 2013). The focus when it comes to health is still focused on environmental determinants and lack baseline data, identification and concern about vulnerable populations to health effects.

In Sweden the Environmental Code (SFS 1998:800) gives provision for EIA health frames. It provides for the protection of ill health (diseases). It does not include of social health determinants and impacts. The other legislation used is the planning and building act which provides a broader health frame. This act is rarely used in EIAs, and it promotes health determinants and health equity. The regulation stipulates all the requirements needed to address health clearly in EIA (Kagstrom *et al.*, 2013).

A fuller health spectrum is addressed when noise, air, soil and water pollution is prevalent due to the direct links to human health mainly it stipulates the diseases that might come with the road development projects. The Swedish framework has had improvements including more than just a disease in EIAs but minimal impact has been noted. The study revealed that the different health frames in Swedish legislation and policies provided poor conditions for guiding EIA practice.

In the Canada 60% of EIAs are under the federal jurisdiction in concern with various laws and regulations of the territorial government. There are projects that follow the Mackenzie valley resource management act this gives the Mackenzie valley environmental impact review board and Nunavut land claims agreement act the responsibility to assess projects. This gives context to evaluating how EIA and health integrate (Noble & Bronso, 2005). The Canadian environmental assessment is divided into screening, mediation and comprehensive EIA study and review panel assessment.

The comprehensive EIA is applied to the larger projects which might result in adverse environmental effects and public concerns. The study used panel reports from proponents, libraries and government websites to acquire project impact statements, terms of reference, management plans, monitoring documents to analyse consideration of health impacts with the assistance of WHO definition of health and the Canadian health framework (1999) which identifies determinants of health, education, childhood development, genetic endowment, health services, personal health practices, skill levels, income, social status, physical environment, employment and working conditions (Noble & Bronso, 2005). The study found that where health issues were identified as important to consider in EIA, the focus was on the direct impacts of the project on

human health specifically the physical health due to environmental change that the developmental project might cause. As Noble & Bronso (2005) states that the scope of health is limited to the physical health and potential health risk. In order to integrate health in EIA more inclusive approach which considers physical, social, environmental well-being, cultural, economic and spiritual relations to land. Conceptualising health and well-being is needed. Because when health and well-being is considered it was observed by (Noble & Bronso, 2005) that the emphasis is on elements which the proponent has direct control of e.g. local employment and business opportunities. The complexity of the relationship between health and environment often makes it difficult to construct a model to quantify, predict with accuracy the health impacts of a projects. According to (Noble & Bronso, 2005) prediction of social health impacts posed a challenge to EIA as the link between the project actions, environmental change and health outcomes are often difficult to establish. Birley (2002) observed also observed that the linkage of health outcomes and environmental change to be complex and multi-factorial. To achieve better health assessment in the Canadian context, EIA needs to focus on health determinants, sources of change contributing to health impacts, direct and indirect effects of projects action to those identified determinants. Very few projects managed to integrate health according to the latter scope, this is regarded as good progress in considering health in EIA. Consideration of health in EIA is limited to the level of baseline studies and impact prediction, social health, quality of life. It does not go through to the monitoring stages of EIA. With the experience that Canada has in conducting EIA there appears to be little consistency in integrating health issues in projects assessment. Health is there in EIA however there was no evidence that human health issues are being incorporated very well. Social human health has seen less attention in the Canadian mining context. Adapting more inclusive definition of health to include physical, social, cultural aspects are needed also giving attention to health determinants, designing management and mitigation programs and monitoring health determinants and health outcomes (Noble & Bronso, 2005).

According to Arquiaga *et al.* (1994) 11 EIA reports from nuclear power plants and waste disposal to determine the extend health is integrated. 4 of the EIA reports were found to have addressed the potential health impacts and 7 did not address any health impacts. The study found that health impacts were not consistent and thoroughly addressed. Different approaches were used in the 4 reports found to have health impacts. To determine health impacts in EIA decision making between alternatives and usage for identifying appropriate mitigation measures approach was used. 2 of the reports was found to have used the risk assessment technique to address health

impacts. According to Arquiaga *et al.*, 1994 the following application were used to assess how health impacts were integrated in the activities conducted when preparing EIA;

1. Preparation of description of project
2. Review and analysis of pertinent institutional information
3. Identification of impacts
4. Description of affected environment
5. Prediction of impacts
6. Interpretation of predicted impacts
7. Identification and evaluation of mitigation measures
8. Selection of proposed action
9. Communication of findings
10. Monitoring of environmental impacts

After looking into the way health was integrated (Arquiaga *et al.*, 1994) recommended 4 approaches that would address health impacts in EIA holistically as to adapting the typical EIA activities to systematically include health impacts, using health impact methodology as the focus of EIA study e.g. EHIA, using targeted approaches in which empirical indices show the related health concerns (pollutant emissions) and by using the risk assessment because it will aid to addressing the identification of hazard, dose-response, exposure rate and risk characterisation (Arquiaga *et al.*, 1994). A generic methodology is said to be effective if it addresses the broader policy making context followed in the EIA process, impact identification, prediction and evaluation must be the main framework Arquiaga *et al.* (1994).

As noted by Hilding-Rydevik *et al.*, 2006 the EU' different developmental projects has bestowed mounting pressures among policy and decision makers due to several protest movements sprouting as a result of health impacts that projects might pose to communities. This has led to research and evaluation that weakens the EIA legislation and practice to deal with human health, quantitative health risk assessment with EIA and health impact assessment as a separate and

distinct impact assessment. The study looked into the triangle approach which included literature review on EIA, quantitative data in a questionnaire format and qualitative data in a form of interviews from experts (Hilding-Rydevik *et al.*, 2006).

The literature review included the

1. EIA directive (European Commission 1997)
2. Directive 2001/42/EC of European parliament and council on assessment of plans and programmes on environment
3. EIA national laws
4. European environmental & health action plan 2004-2010
5. 6th environmental action programme of the European community environment 2010
6. Sustainable development strategy

The questionnaire was targeted to EIA stakeholders including government, regional bodies, NGOs, private sector consultants and researchers. The interviews were conducted among all member state and were selected according to the geographical areas based on old member states and new ones, large and smaller member states. According to Hilding-Rydevik *et al.*, 2006 the following are key concept when dealing with human health and EIA; health, health determinants health inequalities, health impact assessment and health risk assessment. Health should therefore be addressed in terms of medical, wellness, health determinants including social determinants. As Dahlgren & Whitehead (1999) noted, a health model which showed the importance of social, cultural, community factors affecting individuals, family and community health and well-being.

Health impact assessment (HIA) which is a combination of procedures, methods and tools which a policy, project, programme may be judged as to its potential effects on the population health and how the effects are distributed throughout the population. As Hilding-Rydevik *et al.*, 2006 noted, the elements that the HIA must follow to have evidence on the relationship between policy, programme and project and the health of population, opinions experiences, expectations of those might be affected by project, provision of more informed decision making process, adjustment proposals to maximise positive health impacts. The HIA is said to have roots within EIA as it

follows similar processes. However not all countries are practicing HIA, countries such as Australia, Canada, New Zealand, Netherlands and US has established and are practicing HIA. The study is of the view that the starting point for including health in the EIA is to develop existing legislation that clearly defines human health, stresses out the importance of assessing human health impacts and requires its assessment within the EIA to be explicitly addressed. The following were regarded as stumbling blocks to including health impacts adequately in EIAs (Hilding-Rydevik *et al.*, 2006)

- Analytical complexity due to health impacts being able to be indirect and cumulative
- Lack of standardised, readily available, agreed method
- Lack of access to reliable and existing health data
- Lack of systematic evaluations of application of HIA
- Missing legal requirements for assessing health impacts within the existing EIA framework
- Separation of environmental and health issues (EIA often conducted with no input from the health sector)
- Lack of reference to health in identification or scoping phase
- Fear of EIA being much longer and more complicated
- Lack of community participation in the assessment process

Health issues addressed within EIA legislation and guidelines are those relating to air, water, soil and noise pollution. They are often analysed using the quantitative assessment methods. The definition of human health was found to be different and often not specific and it was regarded as vague (Hilding-Rydevik *et al.*, 2006).

3.7 Best practice guidelines

The existing guidelines use different approaches from risk assessment to HIA approaches. According to Hilding-Rydevik *et al.*, 2006 the best practice can be framed from national, regional and local context. Focus has been made on the development and provision of effective tools to measure environmental impacts. The barriers of inclusion of health is not only about lack of

information concerning human health issues and they vary from country by country as a lot of factors are needed for project plan and decision making focusing mainly on the legislation. This gives platform to formulate best practice and guidelines out of context and on a general level Hilding-Rydevik *et al.* (2006). What is considered good practice in one country might not be good practice for another. To promote effectiveness of including human health in EIA, country specific activities and regulations which allows targeting of important context barriers are needed. The choice of definition of health in EIA constitute to the best practice. The guidelines of best practice should not be limited to

- Providing thorough definition of health, health impacts, health determinants
- Identifying and describing quantitative and qualitative methods to assess health impacts not limited to health risk assessment
- Identifying and providing good practice case studies, literature and resources

For practitioners to consider health impacts in EIA holistically the IAIA and WHO have set out the best practice guidelines Quigley *et al.* (2006) through addressing the aim of HIA and its potential to address risk associated with health hazards, health improvement opportunities in developmental projects. The guideline is divided into e key principles

- What HIA is (which covers a wide range of key determinant) the determinants of health are further subdivided into individual (gender, age, etc.) social and environmental (access to services, diseases, air, water, soil, noise pollution etc.) and the institutional factors which addresses availability of health facilities, transport educational facilities etc.
- The guiding principles gives a comprehensive approach to address health by focusing on democracy, equity, sustainable development and ethical consideration.
- Operational principles are more of the EIA process and they are intended to address the concern of health to show the positive health gains Gosselin *et al.* (2010)

The main purpose of HIA is to identify the most critical environmental and social determinants of health that might influence objectives of sustainability. The best practice guidelines allows health impacts to be evaluated based on the magnitude and likelihood of impact occurrence. The public health significance of impacts is the ultimate goal. It allows health impacts to be assessed objectively and individual against proposed criteria (Gosselin *et al.*, 2010). Canada, Australia, US,

New Zealand have adopted the best practice guidelines to integrate health impacts assessment with environmental and social. Lessons can be learned from their experiences to incorporate health impacts holistically in EIA.

3.8 Summary of the chapter

This study is focused on the utilisation of EIAs in South Africa. The regulations, policies, plans, and guidelines are available which respond to the functionality of EIA within the environmental and health sectors. The effectiveness and efficiency of EIA in South Africa and the necessary integration that needs to be done was also addressed. The important health issues that require consideration in South Africa and the methods by which this organisation can improve its performance in the country were also highlighted.

CHAPTER 4 RESULTS, DATA ANALYSIS AND DISCUSSION

In this chapter, the findings of the analysis of the 23 EIA reports using the adapted Lee-Colley package are presented. The chapter begins with an analysis of the individual EIA reports. This is followed by a presentation of the results according to sectors and, lastly, a discussion of the overall results of the EIA reports. The results of all the review areas are then discussed, with a primary focus on the identification of health impacts, mitigations and alternative health impacts, and the manner in which these are communicated within the reports. Graphs and pie chart are used to demonstrate the findings. The raw data is shown on a matrix (**Annexure 2**).

4.1 Findings

4.1.1 Individual EIA Reports

Phezukumoya wind power report

The overall report was graded A on the basis of the following: review area 1 (RA1), the description of development, was allocated an A, with category 1.1 rated A. There were a significant number of A ratings within the subcategories, where important tasks were performed well without any omissions. Category 1.2 received an A and subcategories 1.2.1–1.2.9 were awarded A's due to the required tasks needed under the site description being well conducted. Category 1.3, a section that is specific to waste management, was not done well and it was graded C. This section was not included in the table of contents, so was difficult to locate the waste residues types, quantities, disposal and transportation methods within the report.

Review area 2 (RA2) was graded A. Despite the fact that the facility was located far away from residential and commercial areas, farms were identified in the vicinity and thus necessitated the health impacts section being filled in. This is stipulated according to the requirements of the IAIA international health guidelines. This section included all the health determinants: individual, social and environmental, and operational and institutional. Category 2.3 was given a C because it was found that the prediction of the magnitude of health risks was only just satisfactory, with some information missing from the report.

Review area 3 (RA3) received a C (just satisfactory). This was due to the consideration of the development, because it was supposedly a production of clean energy as an alternative to coal production. Therefore alternatives and mitigation measures were not dealt with.

Review area 4 (RA4) was graded A. Category 4.1 scored an A, with 4.1.1 and 4.1.3 graded A for providing all the necessary information, and 4.1.2 being given a B. Even though the information was provided in a logical order, the omission of the waste and health dedication section in the table of contents led to a B grading for the overall category. The report had no information in category 4.2, which required that a summary of health impacts be provided. Even though there were deficiencies in category 4.2, RA4 was given an A. The report had a well-structured layout, with appropriate presentations of the sections.

Wind power report

The report's overall score was B. RA1 was rated B. Category 1.1 was well done, with no tasks left out, and obtained a grading of A. Due to some deficiencies that were noted in the description of the project site, subcategory 1.2.6 and 1.2.7 of category 1.2 were given C's due to the omission of a timeframe for the operational phase. The turbine infrastructure lifespan was estimated at 20–30 years, the transportation method was not indicated, and local routes and the quantities of raw materials were not mentioned. Category 1.3 was allocated a C. The type of waste that would be generated was specified (oil, grease, lubricants); however, no quantities were detailed in the section. Subcategory 1.3.3 was graded E due to insufficient information being provided regarding the methods that would be used to establish the waste quantities.

RA2 was graded C; the minimal inputs were indicated, and health impacts, health determinants and categories of health were identified. The report focused mainly on environmental impacts. In category 2.2, the stakeholders were identified well. However, key health issues were not applicable to the type of development. This impacted on category 2.3, which addresses the prediction of the magnitude of health risks. The category was graded N/A for this study due to the nature of the development.

RA3 was well presented following a thematic analysis. Certain conditions of the report had to be considered while grading the review area, and categories and subcategories. Overall, all the alternatives were mentioned. The mitigation measures documented in the report were more on the environmental impact; there were no health impact mitigations in the report, which was not health focused. Section 7 contained the mitigation measures, cumulative impacts and the extent to which mitigation measures would be implemented.

RA4 was given an A. The document was well laid out. However, the summary of the report mentioned only environmental impacts. Due to the fact that this was a clean energy development, information on the health impact in the summary was deemed inapplicable.

SKASA telescope array report

The overall rating of the report was a B. It was regarded as generally satisfactory, with minor omissions. RA1 was found to be generally satisfactory, with a grading of B. The majority of the tasks were performed well. However, the diagrams and maps were omitted in the description of the development. Table 2 and figure 1 was blank, with no graphics attached to subsections 4.2.4–4.2.7. There were many omissions in the Category 1.2 section, which was the site description. A dominance of E ratings was accorded to the subcategories, in which no timeframe was provided for the various phases of the project. Moreover, the lifespan was not provided and specific activities were not mentioned in the report. Category 1.3, under waste, was well done and got a grading of A. Category 1.4 and 1.5 were rated B, with a variation of gradings within the subcategories. Subcategory 1.4.6 did not contain existing data and under section D we get to notice the provision of the desktop study.

RA2 was graded A. Category 2.1 and 2.2 contained all the information required by the IAIA health guidelines and were thus rated A. Category 2.3 was not applicable to this study due to the type and nature of the development. RA3 was given a B, with a significant number of B's present in subcategories 3.1 and 3.3. Subcategory 3.2 was very well done and all the sections received A gradings. Proper mitigations and alternatives were dealt with in the report, with a clear statement of the commitment to mitigate risks. RA4, which was well laid out and structured, was graded B. However, the report did not have a specific section on health impacts. Health-related information was scattered throughout several sections of the report. The health impacts were outlined properly in the conclusion of the report; however, the main issues were not discussed in the summary, which led to subcategory 4.2.2 being graded E.

FAD6 ash facility report

The overall assessment report was graded B. RA1 was rated B. This grading was obtained from category 1.1, which had a significant number of A's. It contained all the necessary details about the development. The only omission was a lack of graphics in 1.1.3. Under the description of site, the category scored a B, even though its subcategories reflected a significant number of A's. Subsection 1.2.6 was rated E due to a lack of sufficient information on the duration of the

construction and operational phases. Category 1.3 was not adequately performed, with a just satisfactory grading of C. The waste types, quantities, treatment and methods to obtain waste quantities were not reflected properly in the report, resulting in an E grading for that subsection. Category 1.4 and 1.5, with all their subcategories, were allocated A's because all necessary information was provided in these sections.

RA2 was graded B. B grades dominated in the subcategories of category 2.1, with minor omissions. 2.1.1 and 2.1.4 were adequately executed, without any omissions and thus graded A, well-executed category 2.2 got an A grading, with all its subcategories receiving A's. Category 2.3 was rated B; the prediction of the magnitude of health impacts was satisfactory, with only minor inadequacies. RA3 received A's for all the categories and subcategories. The necessary information was presented according to the requirements for addressing the alternatives and mitigation measures. RA4 scored a B, due to minor omissions. Category 4.1 and all its subcategories were rated A, because all necessary information was provided. 4.2 was graded C, because the health impacts were not stipulated in the summary and the main health impacts were not discussed. However, the environmental impacts were well reflected in the summary.

Matimba ash facility report

The overall report received an A, although some subcategories were not completed well. The most necessary and important data were well detailed throughout RA1, 2 and 3. RA4 lacked some of the information necessary for this particular study and was therefore graded C. RA1 was rated A, with category 1.1, 1.3 and 1.4 achieving a significant number of A's, because they contained all the important details without any omissions. Category 1.2 was graded B, due to the omission of the duration of the construction and operational phases. This omission impacted on the category grading, irrespective of the fact that a significant number of subcategories were rated A.

RA2 was allocated an A, with category 2.1 graded B and subcategories 2.1.1-2.1.5 graded A. The health impacts were identified and defined very well, according to the IAIA health guidelines. The categories of health and individual determinants were well addressed in the report, including a well-structured social and environmental report on determinants affecting the health impacts. Subcategories 2.1.6 and 2.1.7 were graded E, because a lot of information was omitted, resulting in the overall category being graded B. Category 2.2 and all its subcategories were graded A. The scoping process was performed well, with the identification of stakeholders and health issues, and meetings conducted with the relevant people. Category 2.3 and all its subcategories were

graded A due to the provision of all the requirements needed to determine the magnitude of the health impacts. RA3 was a well-structured review area in every sense, with a significant number of A's throughout the categories and subcategories. RA4 did not contain the necessary information and, due to the omission of certain information, it was graded C, irrespective of a well-executed category 4.1, which received an A rating, along with its subcategories. Category 4.2 was graded E, together with all its subcategories, because the information was poorly presented and important details were omitted. The summary did not address health issues.

Bloemendal coal mine report

The overall assessment received a B, that is, generally satisfactory with minor omissions. RA1 was graded A. This was based on the majority of the categories and subcategories being rated A. The exception was category 1.3, waste management, which was given a B, with 1.3.3 being graded F because it did not address any issues relating to the methods put in place to determine the quantity of waste. RA2 was just satisfactory. Certain omissions resulted in a grading of a C. Category 2.1 and 2.3 were poorly presented, with some important information not included in the report. The subcategories had about four F's, a D and mostly C's. The identification of the health impact was well executed and the identification of stakeholders was very well presented and graded A. RA3 was rated B, which was satisfactory, with minor omissions. Subcategory 3.1.1 received a D because the main advantages and disadvantages of the health impacts were not discussed adequately; there was only a superficial attempt to address them. RA4 was graded B. Category 4.1 received an A for all its subcategories. Category 4.2 was just satisfactory; health issues were not mentioned in the summary and it was graded C.

BVG gold mine report

This report was well executed and the overall grade was A. All the review areas (1, 2, 3 and 4) were graded A. RA1 was extremely well done, with all the categories and subcategories graded A. RA2 had A's. The only deficiencies were observed in the following: the RA2 subcategory 2.1.7 scored an F because there was no attempt to address the operational health principles. RA3 had a significant number of A's throughout the subcategories. The section on alternatives and mitigation measures and the commitment to mitigate health impacts was excellent. RA4 category 4.2 and its subcategories, graded B, were missing small details. Even though category 4.2 was rated B, category 4.1 and its subcategories were well executed, resulting in a grading of A.

Lanxess chrome mine report

The overall score for the report was B. RA1 was graded B after obtaining a variety of symbols for the categories within the review areas. Categories 1.1, 1.2, 1.4 and 1.5 got a rating of A. Category 1.3 was given a C because there were omissions regarding determining the type of waste and quantities. However, the treatment and disposal routes were detailed in the report. Subcategory 1.3.1 was graded C and subcategory 1.3.3 was given an F due to the lack of an attempt to detail the methods to be used to determine the quantities of waste. RA2 was only satisfactory because of omissions. Category 2.1 was graded C and a significant number of the subcategories were scored C, with important information omitted. In subcategories 2.1.6 and 2.1.7 there was no mention of guiding health principles or operational health principles, and they received a grading of F. Category 2.2 had a few details missing, including the identification of key health issues and concerns, and was rated B. Category 2.3 was just satisfactory (C), with all three subcategories also graded C. The method of predicting the magnitude of the health impacts and possible measurable quantities and qualities were not well described. However, an attempt was made to address the topic. RA3 was rated B, with omissions of the main advantages and disadvantages of health. Subcategory 3.1.1 was given an F. Subcategory 3.2.4 scored an F because the mitigation measures for cumulative impact were left out. Category 3.3 was well done, with a grading of A, because all the tasks had been performed, a clear commitment to mitigate statement provided and the monitoring plan was described well. An important aspect to note is that there was a very clear statement of monitoring measures under 3.3.1, which in most reports was not articulated as well as in this report. RA4 was graded B, category 4.1 and all its subcategories were rated A, because they were executed extremely well, without any omissions. Category 4.2 was graded C because subcategory 4.2.1 was given a B, with generally important information stipulated in the report, and 4.2.2 was graded F due to containing no mention of health impacts in the summary. This variation in scores impacted on the category grading.

Kendall power station report

This report was regarded as one of the well-constructed ones. The overall assessment was well executed, with all the review areas (1, 2, 3 and 4) beings given A's. All the categories received A's, as well as the majority of subcategories. The exception was subcategory 2.1.7, which scored a C, because most of the information regarding operational principles was omitted. The subcategory was mostly concerned with the public participation process. This minor omission had

on impact on the grading of the category, but the significant presence of A's compensated for this deficiency. A well-executed report.

Digwells Palmietkuilen power station report

The overall grade for this report was B, generally satisfactory with minor omissions. RA1 was graded B; categories 1.1 and 1.5 received A's, category 1.2, 1.3 and 1.4 were graded B and subcategory 1.2.7 scored a C because the details of the transport method and quantities were not adequately conveyed. Subcategory 1.3.3 under category 1.3 was rated D because the section lacked information about the method that would be used to obtain the quantities of waste. All that was mentioned in the report was quantities, but no clear details of the methods utilised to arrive at these amounts. Subcategory 1.4.3 was graded D because no mention was made of the atmospheric environment and other tasks relevant to the section were not detailed. RA2 was given a B. Category 2.1 received a B. Category 2.1.1 was graded A because the expected environmental and public health impacts were well detailed without any omissions. There was a dominance of B's under the subcategories 2.1.2–2.1.5, indicating that the efforts to perform the relevant tasks were generally satisfactory, with only minor omissions. Subsection 2.1.6 and 2.1.7 scored E's due to a significant omission of the necessary requirements prescribed by the IAIA health guidelines relating to the guiding principles of health and the incorporation of the operational principles of health. A well conducted category 2.2 and all its subcategories received an A grading. Under the prediction of the magnitude of health impacts category, the tasks were generally conducted satisfactorily, with minor omissions, resulting in a B. RA3 was graded A, even though category 3.1 received a B due to the omission of some tasks in subcategory 3.1.1 which lacked elaboration on the main advantages and disadvantages of health impacts. Category 3.2 and 3.3, together with all their subcategories, were well executed and graded A. RA4 scored a B. Category 4.1 was well executed, with all its subcategories graded A. Category 4.2 impacted on the grading of 4.1, because the efforts made in 4.2 were regarded as just satisfactory, with inadequacies that resulted in a score of C.

Dorstfontein power station report

The overall assessment was graded A, with the majority of the required tasks conducted immaculately. RA1 scored an A. category 1.1 received a B, with subcategory 1.1.11, 1.1.2 and 1.1.4 and 1.1.6 all graded A. Only subcategory 1.1.3 and 1.1.5 were rated C because there was a failure to address the presence and appearance of the development, the nature and quantity of

the raw material needed. A well-constructed category 1.2 led to a grading of A. Only one subcategory, 1.2.7, was rated F, because the transportation of material was not mentioned in the report. Categories 1.3, 1.4 and 1.5 also scored A's, with most of the subcategories getting A's, except for subcategory 1.3.1, which received a B, because some of the information regarding the quality and type of waste were not addressed adequately.

RA2 was graded B. Category 2.1 received a B, category 2.2 an A and category 2.3 a B. Subcategories 2.1.6 and 2.1.7 were rated C, with some of the information omitted regarding the guiding and operational principles. Subcategories 2.3.2 and 2.3.3 received D's because the way in which the tasks were performed contained deficiencies. Other subcategories scored A's because all the tasks were performed without omissions. RA3 also got an A, with categories 3.1 and 3.2 and all their subcategories being graded A. Category 3.3 scored a B, because there were some omissions in 3.3.1, resulting in a grading of D. RA4 was executed very well, with all the tasks performed without any omissions of important data throughout the categories and subcategories; a grading of A was therefore allocated.

KZN railway report

The overall assessment was graded B. Review areas 1, 2, 3 and 4 received B's. RA1 was rated B based on the following: category 1.1 and 1.3 and all its subcategories received A's because all the tasks were well executed without any omissions. Category 1.2, 1.4 and 1.5 were scored B. Under category 1.2, subcategories 1.2.1, 1.2.3, 1.2.4 and 1.2.5 were allocated A's because all the information required was provided. Subcategories 1.2.6 and 1.2.7 were graded F due to the failure to provide information regarding the duration of the construction and operational phases, as well as the transport method for raw materials. Subcategories 1.2.9 were rated C, because the lifespan of the project, including the reconditioning and decommissioning plans, were only partially addressed. Category 1.3 and all its subcategories were graded A, because all the information regarding the tasks was provided in the report, without any omissions. Category 1.4 was graded B, and subcategories 1.4.1–1.4.5 and 1.4.7 were rated A. Subcategory 1.4.3, atmospheric environment, was regarded not applicable and 1.4.6 was graded C because the data presented was considered just satisfactory. Category 1.5 received a B, even though subcategories 1.5.1 and 1.5.3 obtained an A because all the necessary information regarding the local land use policies and imperative components of the affected environment was provided without any omissions. Subcategory 1.5.2 was rated C because the data sources were just satisfactory. This grading in the subcategory impacted on the grading of category 1.5, despite the dominance of A

grades. RA2 was graded B. Category 2.1 was given a C due to a lack of sufficient information within the subcategories. Subcategories 2.1.1 and 2.1.5 were well conducted; all the environmental and public health impacts were stipulated in the report. Subcategories 2.1.2 and 2.1.3 were rated C because the determinants of health and individual determinants of health were just satisfactory. The social and environmental determinants in 2.1.4 were generally satisfactory and graded B. Subcategories 2.1.6 and 2.1.7 were not filled in at all in the report, resulting in an F rating. Category 2.2 was graded B, with subcategories 2.2.1 and 2.2.3 very well conducted and graded A. An unfortunate grading of E was allocated for subcategory 2.2.2, in which significant information was missing. Consequently, despite the A grading for 2.2.1 and 2.2.3, the category grading was impacted by the deficiency of 2.2.2. Under category 2.3, subcategory 2.3.1 was rated B because most of the necessary information was provided, with a minor omission regarding the methods used to estimate the magnitude of health impacts and the physical environment. Subcategories 2.3.2 and 2.3.3 were satisfactory and graded C. RA3 scored a B. Category 3.1 was rated B due to the grading obtained for subcategories 3.1.1 (graded C because some of the information was omitted) and 3.1.2-3.1.3 (graded A because all the necessary information was provided). Category 3.2 received a B, with subcategory 3.2.1 graded C, which was due to insufficient information being presented regarding the advantages and disadvantages of health impacts. Subcategories 3.2.2–3.2.4 scored A's because all the required information was presented, without any omissions. An of A was allocated to category 3.3, as well as to subcategories 3.3.1 and 3.3.2, because they were conducted well, with all necessary tasks covered without any omissions. RA4 was given a B because it was generally well done, with minor omissions. Category 4.1 and all its subcategories were graded A. The layout and the structure of the report were excellent. Category 4.2 was allocated a C, with subcategory 4.2.1 being regarded as generally satisfactory, because a summary of the health impacts was included in the conclusion. Subcategory 4.2.2 was graded E, because most of the required information on health issues was omitted from the summary.

N17 road construction report

The overall assessment report was given a C. RA1 was allocated a C due to omissions. Category 1.1 was graded B. Subcategories 1.1.1, 1.1.2 and 1.1.4, under the description of the development, were well presented, with the purpose and objective of the development described very well, without omissions. Subcategories 1.1.3 and 1.1.6 were graded C; the description of the presence and appearance of the development was regarded as just satisfactory, because the information provided was in a summarised form. Moreover, the legal aspects of the project were not

adequately emphasised in the report. Category 1.2 was rated B, with a significant number of A's in subcategories 1.2.1–1.2.5 and 1.2.8, which were well presented with no omissions. Subcategory 1.2.6 and 1.2.7 lacked sufficient information on the duration of the construction and operational phases, as well as the transportation method for raw materials, and were thus graded E. A deficiency was also noted in 1.2.9, in which no details of the project lifespan were mentioned in the report, resulting in an F. The dominance of A's within the subcategories led to the category being allocated a B, irrespective of some deficiencies experienced in the latter paragraph. The waste management category 1.3 was graded D. An attempt was made to provide some of the information, but it was not satisfactory. Category 1.4, the environmental description, was rated C due to missing information. The subcategories had a variety of scores, which impacted on the grading of the category. Subcategories 1.4.1, 1.4.2 and 1.4.4 were well done, without any omissions, and consequently received A's. 1.4.3 and 1.4.5 were graded B. Subcategories 1.4.6 and 1.4.7 were just satisfactory and were graded C because the information provided in the report was minimal and summarised. Category 1.5 was allocated a B, with 1.5.1 being graded B, and 1.5.2 and 1.5.3 being given C's because they were generally performed well, providing a fairly adequate description of the baseline condition. RA2 was graded C. Category 2.1 was given a B and so were subcategories 2.1.1–2.1.3 and 2.1.5. They were generally filled in well, with just minor omissions. In subcategory 2.1.4, the social and environmental determinants were addressed very well, which led to an A rating. Subcategories 2.1.6 and 2.1.7 were not represented in this report. Category 2.2 was completed very well, with subcategories 2.2.1 and 2.2.3 graded A and 2.2.2 graded B. Category 2.3 was poorly executed, leading to an E. Subcategory 2.3.1 was found to be just satisfactory, because the methods used to estimate the health impacts and those on the physical environment were not mentioned. With 2.3.2 and 2.3.3 graded F for not conducting important tasks required in the subcategories. Moreover, every task in this report was summarised, with many important details missing. RA3 was graded B. Category 3.1 and all its subcategories received A's. All the necessary information was presented, with no omissions. Category 3.2 scored a B. Due to a lack of information in subcategory 3.2.4 on mitigation measures for cumulative impacts, this subcategory was rated F. Subcategories 3.2.1 and 3.2.3 were well conducted, without any omissions. Category 3.3 scored a B due to the variation of gradings within the subcategories: 3.3.1 was graded A because it had all the necessary information and 3.3.2 was lacking some information but regarded as satisfactory, so it received a C. RA4 was allocated a B. Category 4.1 and all its subcategories were given A's because the layout and chapters were arranged in a logical order. Category 4.2 was given a D due to major omissions regarding health impacts in the summary. Subcategory 4.2.1 was graded C and 4.2.2 received an F, which

impacted on the overall category grading. Little effort was made to provide detailed information in the majority of the categories and subcategories in this report.

K56 road construction report

The overall assessment was graded B. This report had a lot of deficiencies, with the majority of the requirements stipulated in the Lee-Colley package not adhered to. RA1 was rated B, with category 1.1 graded B, and subcategories 1.1.1, 1.1.2, 1.1.4 and 1.1.6 all receiving A's. The legal aspects and guidelines were scattered throughout the report. There was no section or chapter dedicated to addressing the legislation pertaining to the project, as in the majority of the reports assessed. Category 1.2 was allocated a B. Subcategories 1.2.1, 1.2.3, 1.2.5 and 1.2.8 received A's and the rest of the subcategories were graded F because no attempt was made to address them in the report. No site description, or details of the construction and operational duration were provided, and no mention was made of the lifespan of the project or of the transportation method for raw materials. Category 1.3 and all its subcategories were graded C due to a failure to address waste management aspects. A well-structured description of the environment category (1.4) and all its subcategories were graded A. Category 1.5 and its subcategories were also executed well and graded A. RA2 received an A. Category 2.1 was allocated a B due to a prevalence of B's for the subcategories, except for subcategories 2.1.6 and 2.1.7, which were rated C. Category 2.2 and 2.3 and all their subcategories received A's. RA3 was given an overall grading of B. Category 3.1 and all its subcategories were rated A. Category 3.2 was graded B, following two A gradings and two B gradings. Category 3.3 was poorly executed; deficiencies were prevalent, and 3.3.1 was graded E and 3.3.2 D. The report contained information about the mitigation measures but there was no monitoring statement. RA4 was given a B. Category 4.1 received a B. Subcategories 4.1.1 and 4.1.2 were well executed. Subcategory 4.1.3 was generally satisfactory. The information in this report was of a mixed quality and often difficult to interpret.

Nomalanga estate KZN building construction report

The overall assessment received a B. RA1 was rated A and category 1.1 A, with all its subcategories having the same grading, because all the requirements for describing the development were fulfilled without any omissions. Category 2.1, the site description, was generally satisfactory, with just minor omissions. There were a significant number of A's in subcategories 1.2.1–1.2.5 and 1.2.8, which were well presented without any omissions. However, the subcategories 1.2.6, 1.2.7 and 1.2.9 were graded F because no attempt to address the

duration of the construction and operational phases, the transportation method for raw materials, or the quantity of raw material. Subcategories 1.3.1 and 1.3.2 were well presented and rated A. Subcategory 1.3.3 lacked necessary information on the method of establishing the quantity of waste and was given a D. This variety of gradings within the subcategories led to a B rating for category 1.3, irrespective of the dominance of A's. Category 1.4 was immaculately conducted, with a significant number of A's throughout the subcategories. A commendable effort was made to address the environmental aspects of the development. Category 1.5 was also immaculate, with all the subcategories graded A. All the required information regarding the baseline condition of the environment was provided. RA2 was generally satisfactory, with minor omissions, and was therefore graded B.

Category 2.1 was allocated a B, due to the following: subcategories 2.1.1-2.1.5 were rated A, with no omissions of important tasks, and 2.1.6 and 2.1.7 were fairly well attempted and graded D. Category 2.2 scored a B because most of the required information was included in the report. Subcategories 2.2.1 and 2.2.3 were graded A, because all the necessary information was included without omissions. Subcategory 2.2.2 was rated D due to insufficient information on health issues. Moreover, key concerns were lacking in the report. Category 2.3 had a variety of gradings for the subcategories, with 2.3.1 rated A, 2.3.2 C and 2.3.3 B. The category grading was based on the amount of information that was included in the report. It was found to be generally satisfactory, with only minor omissions, and was allocated a B. RA3 was given an A due to adequate information. Category 3.1 received a B, which was impacted by subcategory 3.1.1, which did not contain the details of the advantages and disadvantages of health impacts, resulting in a grading of C. Subcategories 3.1.2 and 3.1.3 were rated A. Category 3.2, together if with all its subcategories, and category 3.3, also with all its subcategories, were immaculately presented. They received a significant number of A's due to the provision of all the required important information, without omissions. This included clear mitigation measures, a proper commitment to mitigate statement and well defined alternatives. RA4 was rated B, even though category 4.1 and its subcategories were graded A. Category 4.2 led to this downgrade, because it was given a C.

SUN building construction report

The overall assessment received a B. RA1 was graded A due to how well the information regarding the development was presented. Category 1.1 and its subcategories were rated A. Category 1.2 was graded A, with subcategories 1.2.1–1.2.6 and 1.2.8 reflecting a significant presence of A's. Subcategory 1.2.7 was allocated a B because it was satisfactory but lacked

details about the transportation method of raw materials. Subcategory 1.2.9 got an F because no information was provided regarding the lifespan of the development, or the decommissioning and reconditioning plans. Despite the B and F scores within the subcategories, the grading of category 1.2 was A, because all the necessary information was immaculately presented. Category 1.3 was graded B. Subcategory 1.3.1 and 1.3.2 received A's, because all the types of waste to be generated were mentioned, and the quantities of waste, treatment and disposal of waste were detailed in the report. Subcategory 1.3.3 was rated E, because it lacked the necessary information on the methods of obtaining waste quantities. Category 1.4 and all its subcategories, and category 1.5 and all its subcategories were graded A, because all the required information was provided in the report. RA2 was allocated a C due to omissions. Category 2.1 was rated C. This grading resulted from the fact that subcategories 2.1.1 and 2.1.3–2.3.5 were well conducted and received a grading of A. Subcategory 2.1.2 was rated C because some required details were omitted. There were no health determinants and other relevant essential information was missing. Subcategories 2.1.6 and 2.1.7 were poorly presented and graded E. The report did not address the health guiding and operational principles in accordance with the prescripts of the IAIA health principles. Category 2.2 was given a C. Subcategory 2.2.1 was, however, rated A, because all the stakeholders were identified. Subcategories 2.2.2 and 2.2.3 received C's because of significant omissions. Category 2.3 was allocated a B because the prediction of the magnitude of the health impacts was only satisfactory. Subcategory 2.3.1 was well executed, with all the required information needed to estimate the magnitude of the health impacts. Subcategory 2.3.2 was graded C and in 2.3.3 a lot of information was left out, leading to a score of D. Despite the variation of gradings within the subcategories, the category was rated B because necessary information was presented in the report. RA3 and all the categories and subcategories within the review area were rated A. This was a well-executed review area, without any omissions. RA4 was allocated a B with, category 4.1 and all its subcategories graded A, because the information, layout and structure of the report were good. Category 4.2 was graded B, generally satisfactory, due to minor omissions. Subcategory 4.2.1 was also rated B because the health impact information was provided in the conclusion. Subcategory 4.2.2 was not attempted at all and graded F, with no information provided in the summary about the main health issues.

Witkop power station report

The overall assessment received a B, with the majority of tasks performed and only minor tasks omitted. RA1, the description of the development, was graded B. Category 1.1 was rated B, with subcategories 1.1.1, 1.1.2–1.1.4 and 1.1.6 graded A. Subcategory 1.1.3 was regarded as not

applicable because it was annotated in the report that the presence and appearance of the completed development had not yet been finalised when the document was generated. Category 1.2 was rated B, with subcategories 1.2.1, 1.2.3 and 1.2.8–1.2.9 being graded A under the site description. Subcategory 1.2.2 received an F because no attempt was made include an overview of the site in the summary. Subcategory 1.2.8 got a D because some tasks were only partially completed. Category 1.3 was allocated a B. Categories 1.4 and 1.5 and all their subcategories were graded A. RA2 was partially completed and it received a C. Category 2.1 had a prevalent number of E gradings. Subcategory 2.1.1. was rated A, because all the expected environmental and public health impacts were addressed well. Category 2.2 was graded B. Subcategories 2.2.1 and 2.2.3 received A's. Key health issues and concerns were well addressed. Category 2.3 was graded B, with a variety of scores for the subcategories: 2.3.1 was given an A because all the information on the estimation of the magnitude of health impacts was well presented; 2.3.2, a poorly completed section in which tasks such as the qualities and quantities were omitted, was scored D; and 2.3.3 received a B. RA3 was the only review area in the report graded A. Categories 3.1, 3.2 and their subcategories all received A's. Category 3.3 was allocated a B, with subcategory 3.3.1 graded D due to the poor attempt at a clear commitment to mitigation measures. The subcategory contained proper monitoring arrangements. RA4 was given a B because the majority of tasks were well performed, with minor omissions. Subcategories 4.1.1 and 4.1.2 were graded A and 4.1.3 B in category 4.2. However, subcategory 4.2.2 received an E due to information the health issues not being adequately dealt with in the summary.

Final Kusile power station report

The overall assessment was represented by a B. RA1 was graded B because the development description was adequately compiled, albeit with small details missing. Subcategories 1.1.1, 1.1.3 and 1.1.6 were rated A, because all the tasks were adequately performed. Subcategories 1.1.2, 1.1.4 and 1.1.5 were graded B due to minor omissions; however, the most important information was provided. The overall category therefore received a B. Category 1.2, the description of the site was also given a B due to minor omissions. Subcategories 1.2.1–1.2.5 and 1.2.8-1.2.9 were graded A, with all the details regarding the history of project, overview of site, existing land use, maps detailing location and activities being provided without omissions. Subcategory 1.2.6 was given a D because tasks regarding the duration of construction and operational phases were only fairly attempted, but with inadequacies. Subcategory 1.2.7 received a C due to a lack of detailed information regarding the transportation methods and the quantities of materials needed. The deficiencies in 1.2.6 and 1.2.7 led to a B grading for category 1.2, despite the significant presence

of A's for the subcategories. The waste category was graded B. Subcategories 1.3.1 and 1.3.2 were allocated A's due to well-stipulated types and quantities of waste to be generated, and the treatment and disposal routes were defined without omissions. Subcategory 1.3.3 was omitted and therefore a score of F was allocated. Categories 1.4 and category 1.5 and all their subcategories were executed well, without any omissions, and received a grading of A. RA2 was given a B because it was fairly well presented, with only a few inadequacies. Category 2.1 was also rated B, with just few omission in identifying and defining health impacts. Subcategories 2.1.2–2.1.5 were graded A, because the tasks were executed well, in accordance with the prescripts of IAIA health guidelines. Subcategory 2.1.6 was rated D because, although an attempt was made to address some aspects, there were several inadequacies. Subcategory 2.1.7 was given an F because it was omitted from the report. The subcategories were dominated by the A gradings; however the deficiencies in 2.1.6 and 2.1.7 impacted on the overall category grading. Category 2.2 and all its subcategories were graded A. Category 2.3 was rated B, with subcategories 2.3.1 and 2.3.3 being given A's due to containing detailed methods to estimate the magnitude of the health impacts and toxicology exposure. Subcategory 2.3.2 was graded C because there was no determination of the measurable quantities and qualities of health impacts. RA3 was well executed, with clear and detailed alternatives and mitigations measures, which led to the grading of A. Category 3.1 and all its subcategories were also rated A. Category 3.3 was given a B. Subcategory 3.3.2 was rated C due to the monitoring of mitigation measures not being addressed well. However, clear mitigation measures were presented and 3.3.1 was graded A. RA4 was awarded a C. Category 4.1 and all its subcategories were rated A. Category 4.2 was poorly presented, with a grading of E. Subcategory 4.2.1 was given a D because, although some parts were attempted, omissions were prevalent. Subcategory 4.2.2 was not addressed at all and was therefore graded F.

Kusile Bravo power station report

The overall assessment received a B. RA1, the description of the development, was rated B. Subcategories 1.1.1, 1.1.2 and 1.1.4–1.1.6 were graded A. Subcategory 1.1.3 was given a B and 1.1.5 a C, because it did not detail the nature and quality of the materials. Category 1.2 was given a C, with subcategories 1.2.1, 1.2.3–1.2.5 and 1.2.8 getting an A rating for details of the project history, land use data, maps of the location, and the environmental and cultural structures. Subcategory 1.2.2 received a C because some of the figures and tables were missing from the report, there were mismatching tables and the page numbers did not correspond with the chapters or sections. Subcategories 1.2.7 and 1.2.9 were rated F because no transportation methods were

specified and no project lifespan information was supplied. The subcategories contained a variety of gradings. Category 1.3, on waste management, was generally satisfactory and received a B. Category 1.4 and category 1.5 and all their subcategories were given A's because they were well presented without any omissions. RA2 was well executed, with the majority of tasks completed. Subcategory 2.1.7 was graded C due to failing to address the operational principles of health in accordance with the IAIA guiding principles. Category 2.2 and all its subcategories were rated A. Category 2.3 was allocated a B. However, subcategories 2.3.1 and 2.3.3 were graded A and 2.3.2 scored an F due to missing information on the possible measurable quantities and qualities, and measuring methods. RA3 was presented well, with all categories and subcategories graded A. Alternatives and mitigation measures were clearly defined. In RA4, the layout of the report had several errors due to "copy and paste" type errors, with wrong page numbering, which made it extremely difficult to navigate through the document. Figures and tables were missing, and some tables were inserted in incorrectly labelled spaces. These factors led to a grading of C for the review area. Category 4.2 and all its subcategories were poorly completed and graded E.

Medupi power station report

The overall report assessment was graded A because all the important tasks were executed extremely well, with all four review areas graded A. Categories 1.1, 1.3, 1.4 and 1.5 and all their subcategories were graded A, because all the tasks were performed without omissions. Category 1.2 was the only category under review area 1 to be graded B, due to minor omissions. Subcategories 1.2.1–1.2.5 and 1.2.8–1.2.9 were rated A. subcategories 1.2.6 and 1.2.7 were graded D because some of the tasks were only partially performed, with details missing about the duration of the construction and operational phases. RA2 was allocated an A due to the prevalence of A's for all the categories and subcategories. Only subcategory 2.1.6 was awarded a B because some of the information was not provided, and 2.1.7 was graded C because the information presented related only to the public participation process; no comprehensive health approach was specified and sustainable development efforts were omitted. RA3 received an A, with category 3.1 and 3.2 and all their subcategories being graded A, with clear alternatives and mitigation measures provided. Category 3.3 was allocated a B due to insufficient information in subcategory 3.3.1, which was graded F. No commitment to mitigate impacts was provided. RA4 was graded A with both categories and their subcategories being graded A. The report was well compiled, especially addressing the health impacts.

Richard Bay CCPP report

An overall grading of B was allocated to this report, which also contained an excellent executive summary. RA1 was graded A, with categories 1.1 to 1.1.3 rated B, the latter due to the omission of the presence and appearance of the development. Subcategory 1.1.5 was not addressed in the report, which was consequently graded F. Subcategory 1.2.7 also received an F, because no information was provided about the transportation method of the raw materials. All the other subcategories were allocated A's, with all the tasks performed well, without omissions, including details about waste management, and the description of the environment and the baseline conditions. RA2 was given a B, with category 2.1 also graded B with a significant presence of A's, although subcategories 2.16 and 2.17 were rated C due to omissions. Category 2.2 was well done and scored an A, along with all its subcategories. Category 2.3 was graded B. Subcategories 2.3.1 and 2.3.3 were rated A, because all the required tasks were executed well. The methods to be utilised for the prediction of the magnitude of health impacts and the interpretation of exposure to pollutants, noise and danger that might be posed by the project were well explained. RA3 received an A grading, with a significant presence of A's in categories 3.1 and 3.2. Category 3.3 was graded B, with subcategory 3.3.1 not addressed in the report, resulting in an F. Subcategory 3.3.2 was awarded an A, because all the monitoring arrangements to determine the conformity of predictions were emphasised. RA4 was graded B, with a variety of gradings throughout the categories. Category 4.1 was fairly well completed, with minor omissions, such as lists of figures and tables. Category 4.2, was well done, with the main health issues included in the summary.

Atlantis report

The overall assessment was allocated a B. The grading was based on the following output: RA1 was graded B, with category 1.1 and 1.2 also rated B. In category 1.1, subcategory 1.1.3 was given an E due to a significant omission and inadequacies in addressing the presence and appearance of the completed development. Subcategory 1.2.7 was graded C, because the explanation of the transportation method for raw materials was only satisfactory. The tasks for other subcategories were executed very well, without any omissions, and graded A. Category 1.3 was regarded as not applicable for this report because the project was being conducted within a development that was already operational; therefore, the waste management issue had been dealt with in the previously-conducted report for the development. This impacted the grading of the report. Category 1.4 and 1.5 and all their subcategories were graded A. RA2 was poorly conducted, with the health impacts not addressed in accordance with the IAIA international health

guidelines. The review area was graded C. The review area was dominated by a number of C gradings in category 2.1. Category 2.2 was rated A, because all the key health issues and stakeholders were identified in the scoping phase. Category 2.3 received a B, with subcategory 2.3.1 graded B, 2.3.2 D and subcategory 2.3.3 A.

RA3 was well executed, with a significant presence of A ratings throughout category 3.1. Category 3.2 was graded B because no attempt was made to address commitment to mitigation measures. Subcategory 3.2.1 was given an F and 3.2.2 an A, because it contained clear monitoring arrangements and conformity with predictions, and adjustments were provided for in the mitigation measures. RA4 was given a B, with category 4.1 and all its subcategories being rated A. Category 4.2 was rated C, with subcategory 4.2.1 presented generally well but with minor omissions, while 4.2.2 received an F, because no main health issues were included in the summary.

Acacia Pot Rex power station report

The overall assessment was graded B because it was generally satisfactory, but with minor omissions. RA1 received a B grade. Category 1.1, and subcategories 1.1.1–1.1.4 and 1.1.6 received A's because they were well done, without any omissions. Subcategory 1.1.5 got a B because some of the information regarding the nature and quantity of raw materials was missing from the report. However, some aspects were satisfactory and relevant information was available. Category 1.2 was rated B, with the following subcategories receiving A's: 1.2.1–1.2.4, 1.2.6 and 1.2.8–1.2.9. Subcategory 1.2.5 was given a B and 1.2.7 a C, with only a mention of abnormal vehicles and the permission needed for those types of vehicles on the development site under the subcategory. These omissions led to the grading of B for the category, despite the dominance of A's in the subcategories. Category 1.3 and all its subcategories were graded F, because no attempt was made to address the tasks required regarding waste management. Waste is an important task, which is required to be addressed in reports. Category 1.4 and category 1.5 and all their subcategories were rated A, with all the important tasks having been well executed with no omissions.

RA2 was graded B, with category 2.1 being allocated a B because there were some deficiencies in some of the subcategories, which impacted the review area grading. Subcategories 2.1.1 and 2.1.3–2.1.5 were well done. Subcategory 2.1.2 was rated C, because it was just satisfactory in addressing the determinants of health. Subcategory 2.1 omitted to address important tasks and was rated D. Subcategory 2.1.7, which is the operational health principles according to the IAIA

health guidelines, was not filled in. This omission led to a grading of F. Category 2.2 was well executed and received an A, despite a subcategory 2.2.2 grading of B. Subcategories 2.2.1 and 2.2.3 received A's. Category 2.3 was rated C, because some of the important tasks were omitted. In subcategory 2.3.1, the method of prediction of the magnitude of the health impacts was generally satisfactory. However, subcategory 2.3.2 had several omissions and got a grading of D, while 2.3.3 was graded F because it was not covered in the report. RA3 was well conducted without any omissions when addressing the alternatives and mitigation measures, and received a grading of A. The only B rating was seen in the commitment to mitigate category, 3.3. RA4 was graded B because it was satisfactory, with minor omissions. Category 4.1 was graded A due to an immaculate execution of tasks, with 4.1.1 and 4.1.3 graded A. Subcategory 4.1.2 was rated C because a list of tables and figures was omitted on the contents page, making it difficult to manoeuvre within the document. Category 4.2 was given an A, with summary of the health impacts contained in the report. Subcategory 4.2.1 was rated B, whereas 4.2.2 was well executed.

4.2 Developmental sector discussion

4.2.1 Wind power and telescope EIA

This sector is regarded as a renewable energy source, which produces clean energy with minimal detrimental human health impacts. Wind farms are commissioned and erected far away from residential areas, in undeveloped forest landscapes, where the winds are steady and strong. During the construction phase, the focus is mainly on the preparation of site activities such as large machinery, the transportation of turbine elements and transmission lines that lead from the wind-energy facility to the electricity grid, all of which can have negative environmental impacts.

Human health impacts are often not a focus because such developments are regarded as low risk. The focus is more on species such as birds, bats, wildlife and fauna. Even though many of the development activities are relatively short-term during the construction phase, health must be included in the construction phase because human beings will be commissioning the site and erecting the turbines.

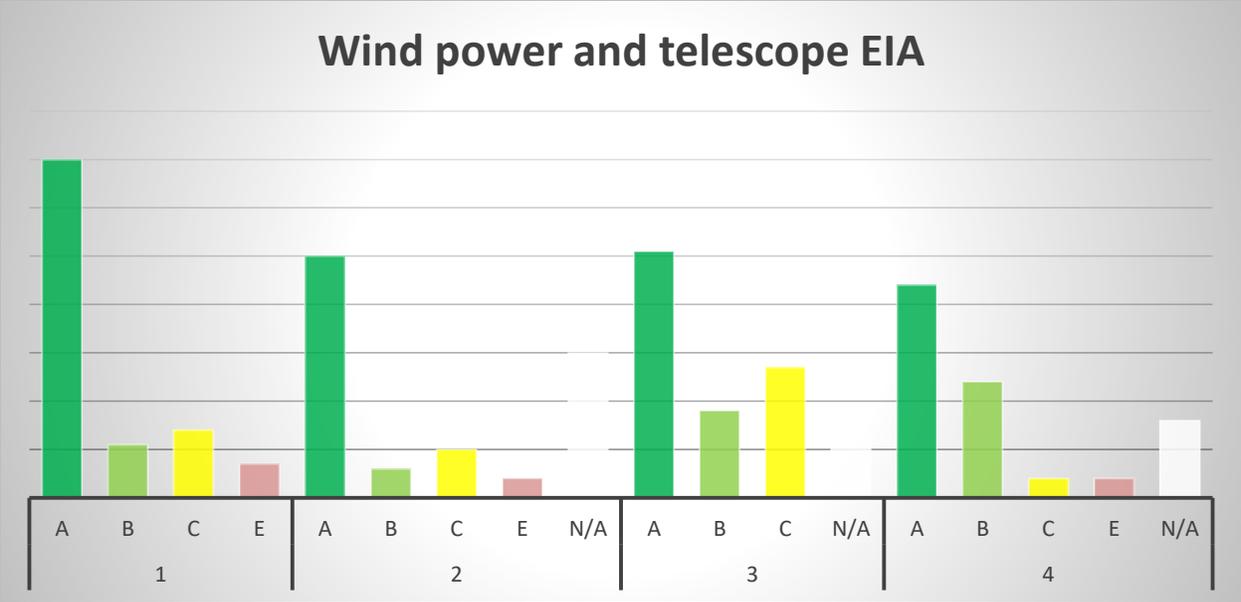


Figure 4-1: Illustration diagram of all wind farms and telescope EIA

In RA1, which in the above figure 4-1 is represented by 1, we observed a significant number of **A** gradings, which indicated that the review area was well executed without omissions, although some deficiencies were observed. For example, little effort was made in one of the reports to address the direct construction and operational phase activities, the project lifespan and the time set for the construction and operational phases. Waste residues were satisfactorily addressed. The review area was on average well executed. According to Bigard *et al.* (2017), in order to handle environmental issues, proper identification of activities is necessary for the benefit of South Africans.

RA2 in the latter diagram is indicated by 2. The findings indicated that the sector was able to identify health impacts, and the scoping process, including public participation was conducted. According to the results, the sector does not seem to be focusing on the prediction of the magnitude of health impacts. This is due to the nature of the development, which is clean energy production. The health impacts identified are not inclusive of the construction phase but of the nearest residential areas.

RA3 was satisfactorily conducted, with the report being graded **A**, including all the mitigations and alternatives in the reports. Other reports had no alternatives because a development of such a nature is regarded as an alternative to fossil fuel energy. The category and subcategories were then regarded as N/A rather than a grading of **F**. When it came to

commitment to mitigate, the reports reflected a solid commitment and all of them were graded **A**. RA4 was very well executed, with a significant number of **A** ratings. Most of the A's were achieved due to the layout of the reports and **N/A** was observed in the summaries due to the nature of the developments, which did not require the summaries to address the health issues, but rather the environmental issues. However there were two reports that included the health issues in the summary and were generally well conducted.

4.2.2 Mine and ash cement facilities' EIAs

Marais *et al.* (2015) is of the view that, in South Africa, the EIA process is more predominant in the mining sector. The risk of global health in the mining sector and in low and middle-income countries are connected with the EIA process for handling the health system. Mining can have detrimental effects on the environment and human health. If proper environmental management processes are not implemented, it can lead to deforestation and discharges of toxic amounts of minerals and heavy metals into the soil and water. The effects of mining can persist for years, even after the coal is removed. Ash cement can have direct and indirect impacts on human health and proper identification and mitigation measures are required for these types of facilities.

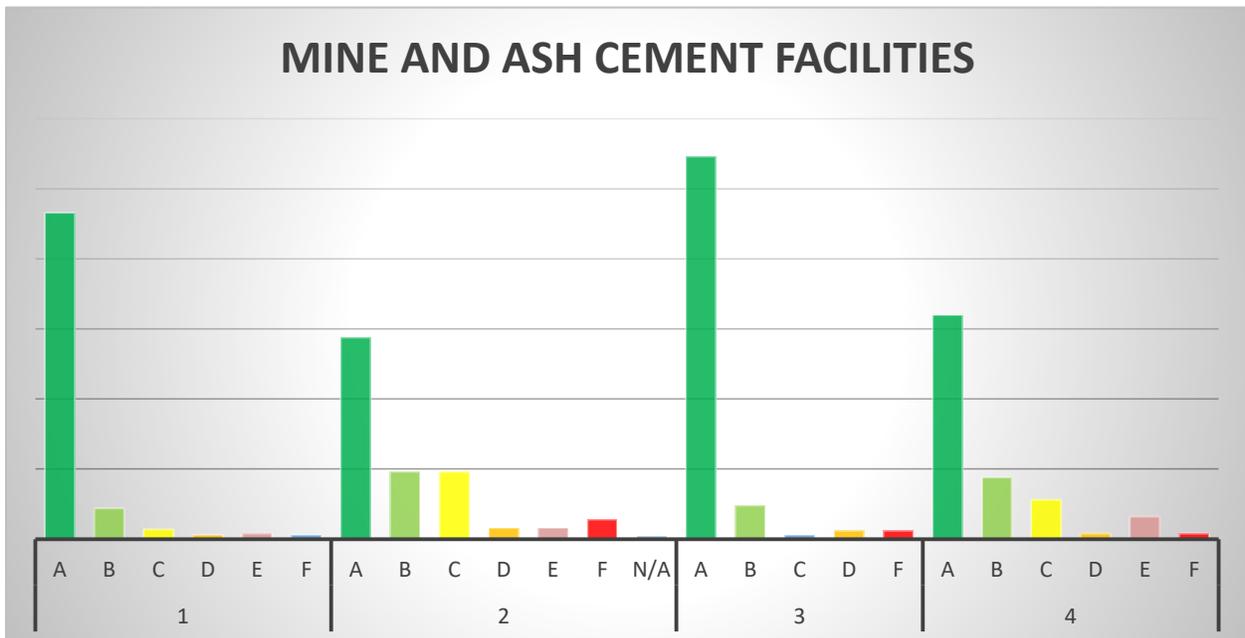


Figure 4-2: Illustration of mine and ash cement facilities' reports

Figure 4-2 is a graphic illustration of the eight reports in the mining and ash cement sector. The numbers 1 to 4 at the bottom of the graph represent the review areas 1 to 4. The symbols **A to N/A** represent the gradings. In RA1, a large number of reports obtained **A** ratings, because all the necessary requirements to describe the development were well met without any omissions. Two of the reports were found to be missing significant information regarding a timeframe for the construction and operational phases. In category 1.3, a significant number of reports were graded **B**, which meant they were generally well executed but with minor omissions. Only one report was found to have deficiencies throughout category 1.3, with its subcategories being graded **D–E**. Another major deficiency was found in subcategory 1.3.3 related to the methods for measuring the quantity of waste, which was omitted in two reports and resulted in **F** (very unsatisfactory) grades.

The IAIA health principles require that the following aspects under health impacts be stipulated in reports: the identification of health impacts, determining determinants, categories of health determinants, social and environmental determinants. RA2 in this sector is expected to focus on the health impacts due to the nature of the development that might directly or indirectly impact human health. The health impacts were identified well, which is reflected by the large number of **A–C** gradings. Two reports were regarded as satisfactory and graded **C** throughout the subcategories of RA2, but both reports had a defect in subcategory 2.1.6, in which the information regarding the incorporation of IAIA health principles was omitted. All eight reports under 2.17 were graded **D–F** due to lacking sufficient incorporation of operational health principles in accordance with the IAIA health principles. Scoping was graded **A–C** for the reports and only one report lacked sufficient details on the prediction of the magnitude of the health impacts, and was graded **E–F**.

RA3 demonstrated a significant presence of **A's to C's**. Only one report was graded **D–F** under subcategory 3.1.1. The report failed to address the advantages and disadvantages of health impacts. Mitigation measures and alternatives were described very well. Under the mitigation of cumulative impacts, only one reports failed to address the cumulative impacts and resulted in being given an **F**. The rest of the reports were very well conducted and graded **A**.

RA4 was graded **A–C** because the layouts were excellent and the information was presented logically, without any technical terminology. The aims of projects were well described. Category 4.2 had a fluctuation of gradings from **A to C** and **D to F** due to a lack of required information in the summaries, especially when it came to addressing the main health issues.

4.2.3 Road, buildings and railway EIAs

According to Marzouk *et al.* (2017), the construction of buildings and roads inevitably result in an enormous amount of emissions that fluctuate from the commencement of project implementation until the decommission phase. These emissions can affect human health, the environment and the economy severely. Most of the negative impacts are anticipated during the construction phase of the projects.

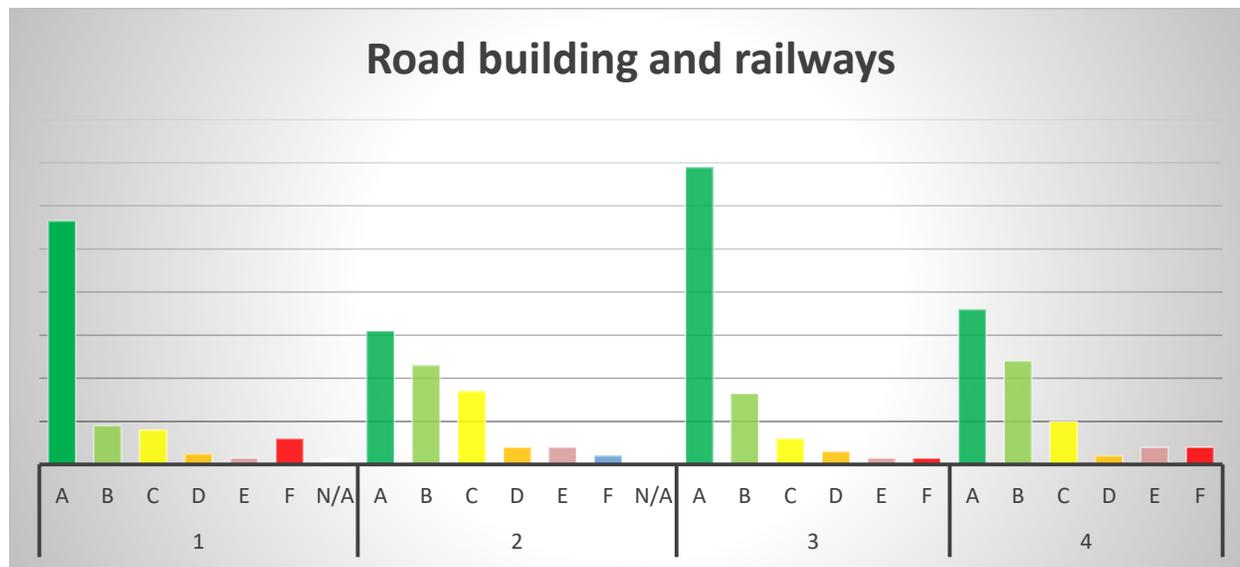


Figure 4-3: Overall illustration of road, building and rail construction reports

Five reports from this sector were analysed. RA1 was generally well executed, with the **A to C** gradings. However, the reports in this sector lacked details of the period for the construction and operational phases, the transportation method for raw material to the site and the quantity of materials required for the projects, and the lifespan of the projects. Thus these categories were graded **E–F**. Defects were also observed under the waste residual categories resulting in **C–D** gradings. The sector described the environmental issues very well, with a significant number of **A** gradings obtained.

RA2 for this sector was satisfactorily conducted, with a significant number of **B–C** grades. Subcategories 2.1.6 and 2.1.7 lacked sufficient information required in terms of the IAIA international health guidelines and were graded **D–F**. Two of the reports were unable to interpret the exposure of pollutants and noise, which led to an **F** rating.

RA3 was well conducted, with **A–C** grades and with a dominance of **A** ratings throughout the review Area. In RA4, under category 4.1, we observed very well conducted **A–B**-rated reports; however, category 4.2 had a fluctuation of gradings of **B to C** and a predominance of **E to F**'s due to the main health issues being omitted in the summary of the reports.

4.2.4 Power stations' EIAs

Power station emissions can be detrimental to human health and to the environment, according to the International Atomic Energy Agency, 1999. These emissions include solid, liquid, gaseous and radioactive discharges.

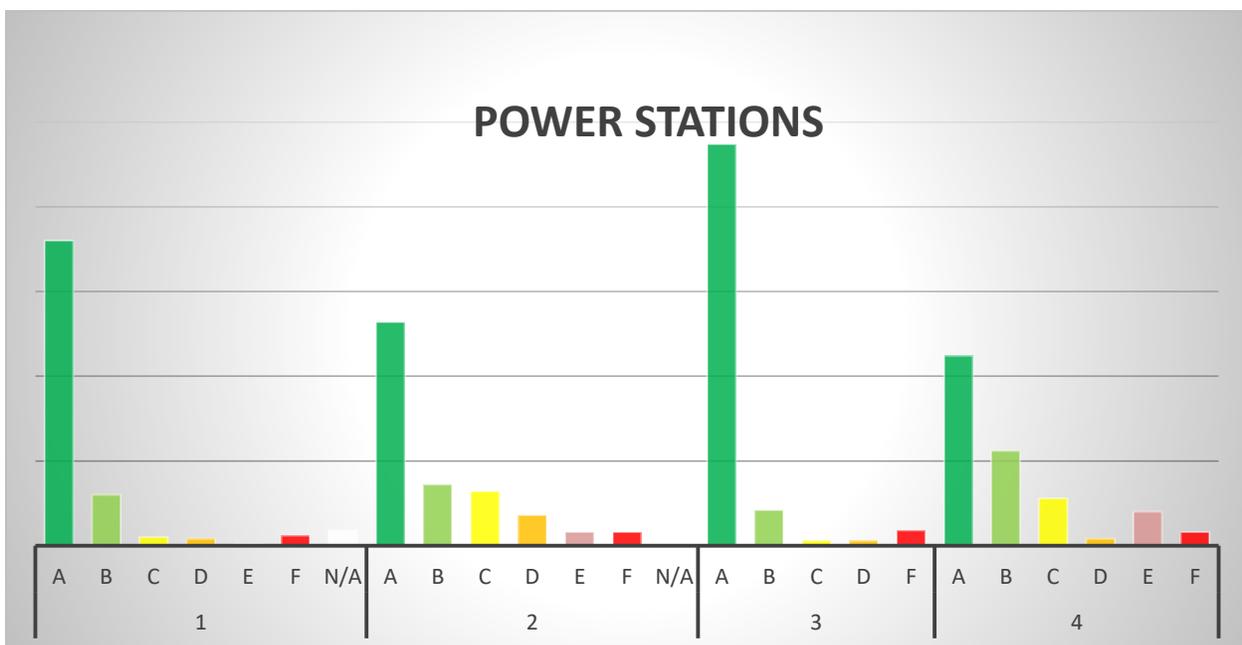


Figure 4-4: Illustration of power station EIA reports

The above graph is an illustration of the seven power station reports analysed. The review areas (RA1-4) are represented by the bottom numbers, 1 to 4. RA1 was well conducted, with most of the required information under “description of development”, which was graded **A–C**. Under “site description”, we observed unsatisfactory results, which were reflected by a fluctuation of **D** and **F** gradings for subcategories 1.2.6 and 1.2.7. The reports in this sector did not have sufficient information regarding the construction and operational phase periods, and transportation for materials and quantity required. Other subcategories under the same category were graded **A–C** because they were conducted well. A large number of **F** gradings was observed under the waste residual category, 1.3. It was also found that one of the reports did

not contain the waste section because it was regarded as a continuation of the overall development and was graded **N/A** throughout the waste category. The environment description was executed very well, with all reports graded **A**.

RA2 was graded **A–C** due to satisfactory information being provided in the reports when it came to the identification of health impacts, including the individual, institutional and social and environmental determinants. One report did not contain the necessary information in terms of the IAIA health principles and, throughout the review area, it was graded **D-E**.

Subcategory 2.1.6 and 2.1.7 had a fluctuation of gradings, with only two **A's** present in the seven reports. A dominance of **D–F** gradings reflected the lack of sufficient information required by the IAIA health principles when addressing the health impacts. The scoping was well conducted in all the reports and graded **A–C**.

These sectors provided very clear, detailed mitigation measures and all the reports provided detailed alternatives for the projects. According to (Kruger & Sandham, 2018), the purpose of EIAs is to explore and propose mitigation strategies for compensating and finding remedies for adverse health effects. All the advantages and disadvantages of health impacts were well stipulated and in RA3 and all the reports were graded **A**. Three reports lacked a clear declaration statement on mitigation measures by the developer and were rated **F**.

RA4 category 4.1 was satisfactorily conducted and it was graded **A–C**. The layout of the reports was logical. Under category 4.2, we observed a fluctuation of ratings, from **A** to **C**, with the main health impacts in the summary not being discussed in the majority of the reports, resulting in **E–F** scores for these categories.

4.3 Overall assessments discussion

Table 4-1: Overall assessment gradings

EIA TYPE	OVERALL GRADING
WIND POWER AND TELESCOPE EIA	
1. Construction of Wind Power Facility (PHEZUKOMOYA)	B
2. Construction of Wind Power (ESKOM)	B
3. Construction of Telescopes (SKASA)	B
MINES AND ASH CEMENT FACILITIES EIA	
4. Construction of Gold Mine (BVG)	A
5. Construction of Mine Project (Palmietkuilen)	B
6. Construction of Chrome Mining (Lanxess)	B
7. Construction of Ash Disposal Facility (Kendal)	A
8. Construction of Mine (Bloemendal)	B
9. Construction of Mine (Dorstfontein)	A
10. Construction of Ash Facility (FAD6 Sasol)	B
11. Construction of Ash Facility (Matimba)	B
ROAD, BUILDINGS AND RAILWAYS EIA	
12. Construction of Railway Line (KZN)	B
13. Construction of N17 Toll Road	C
14. Construction of Road (K56)	B

15. Construction of Building (Nomalanga KZN)	B
16. Construction of Facilities (SUN FEIA)	B
POWER STATIONS EIA	
17. Construction of Power Lines (WITKOP)	B
18. Coal Power Station (KUSILE FINAL)	B
19. Coal Power Station (KUSILE BRAVO)	B
20. Coal Power Station (MEDUPI)	A
21. Gas to Power Station (ATLANTIS)	B
22. Combined Cycle Power Plant (CCPP RBAY)	B
23. Relocation of Acacia and Pot Rex Gas Turbines	B

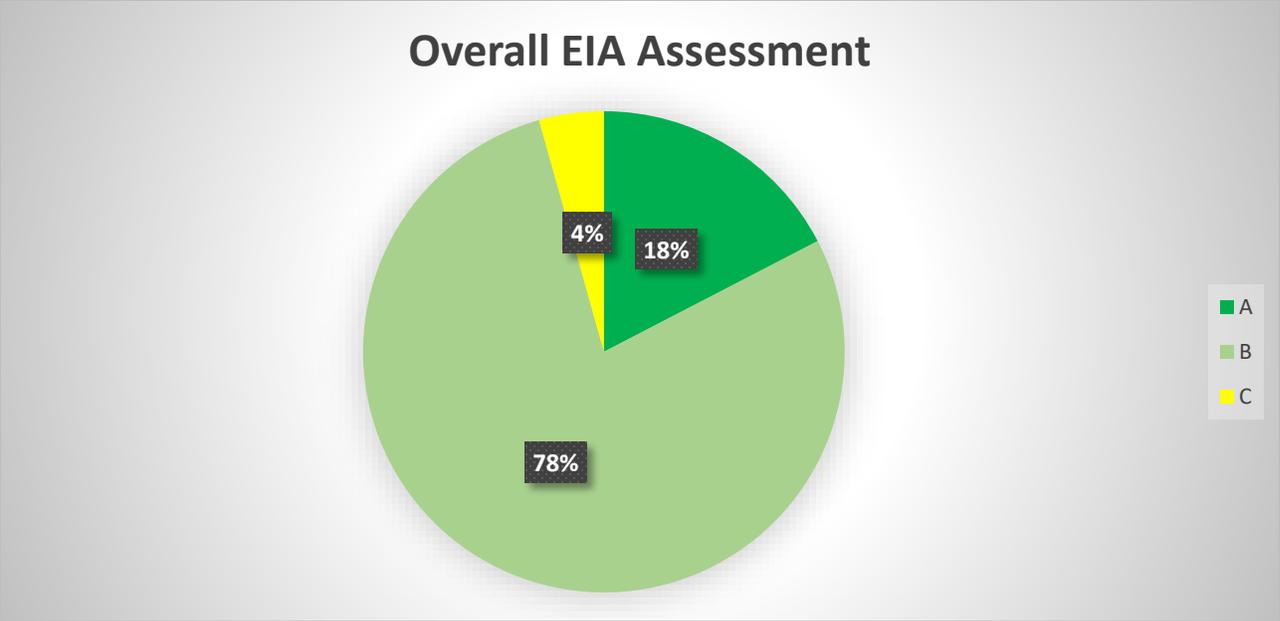


Figure 4-5: Illustration of the overall assessment of EIAs

According to the data in table 3-1 above and the pie diagram, figure 4-5, the overall percentage of the assessments was predominately 78% for 18 of the EIAs. The overall assessment of the reports was a grading of **B**; that is, generally satisfactory with minor omissions. Out of the 23 EIAs, only four or 18% were found to be graded **A** (very well executed tasks without any inadequacies) and only one EIA was rated C (just satisfactory) due to the omission of tasks. The overall assessments did not have any **D–F** gradings.

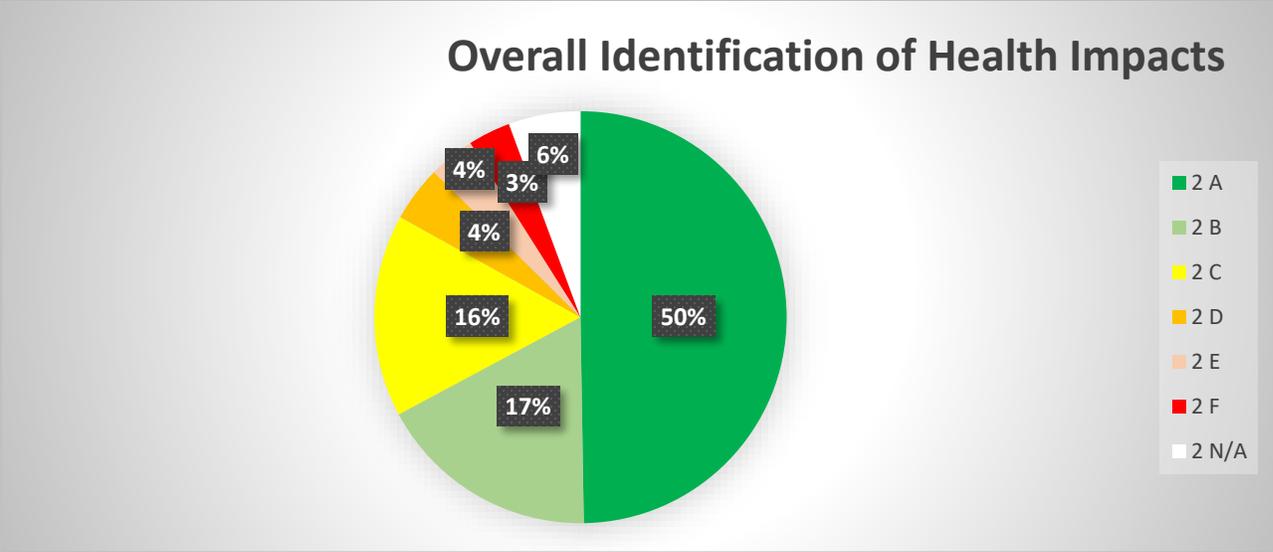


Figure 4-6: Illustration of review area 2 (Health impacts)

The RA2 represents the identification of health impacts. It was found that, of the 23 reports analysed, seven were graded **C**, eight reports were graded **A** and eight were graded **B**. As the results illustrated in the RA2 pie diagram indicate, only half of the reports addressed the health impacts in accordance with the IAIA international health guidelines. The number of **A** gradings was found to be 50%. This was an extremely low percentage and it can thus be argued that not much attention is being paid to the section on health impacts. Several deficiencies were evident, with many details omitted. Some reports did not attempt to address other important aspects needed to address health impacts, which, irrespective of the nature of the development, must be thoroughly presented, including the health impacts on those people who would be working in the construction, operational and decommission phases.

The scope of health the impacts must be wide and all the requirements stipulated by the IAIA health guidelines must be adhered to for all the proposed development projects. Some reports identified only health determinants, social and environmental determinants. However, the IAIA health guidelines requires many details for the report to be considered effective in addressing health issues.

Overall Communication of results

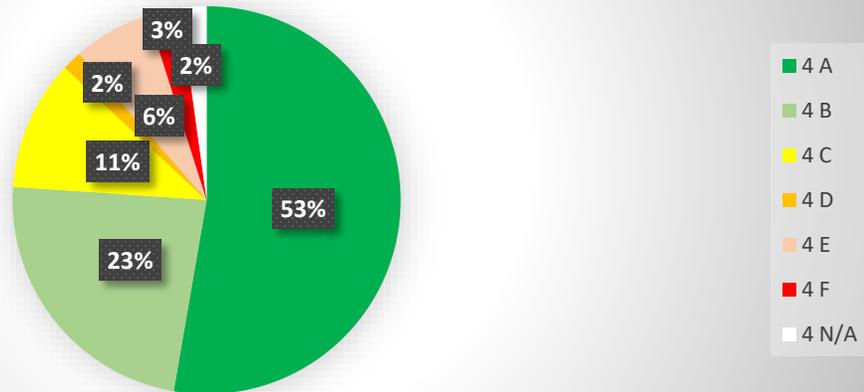


Figure 4-7: Illustration of review area 4

In terms of the communication of the results in review area 4, it was found that it was dominated by **A** gradings. Such an average score indicates that the reports did not address the tasks sufficiently well. The **A** gradings were mainly due to the layout of the reports, most of which had well-structured sections and/or chapters with a clear table of contents. However, the table of contents in most reports did not have a section specific to health (with a topic and page number allocated in the documents). The summary of category 4.2 was not well executed in the reports, with very few of them addressing the main health issues in the summary.

Overview of review areas:

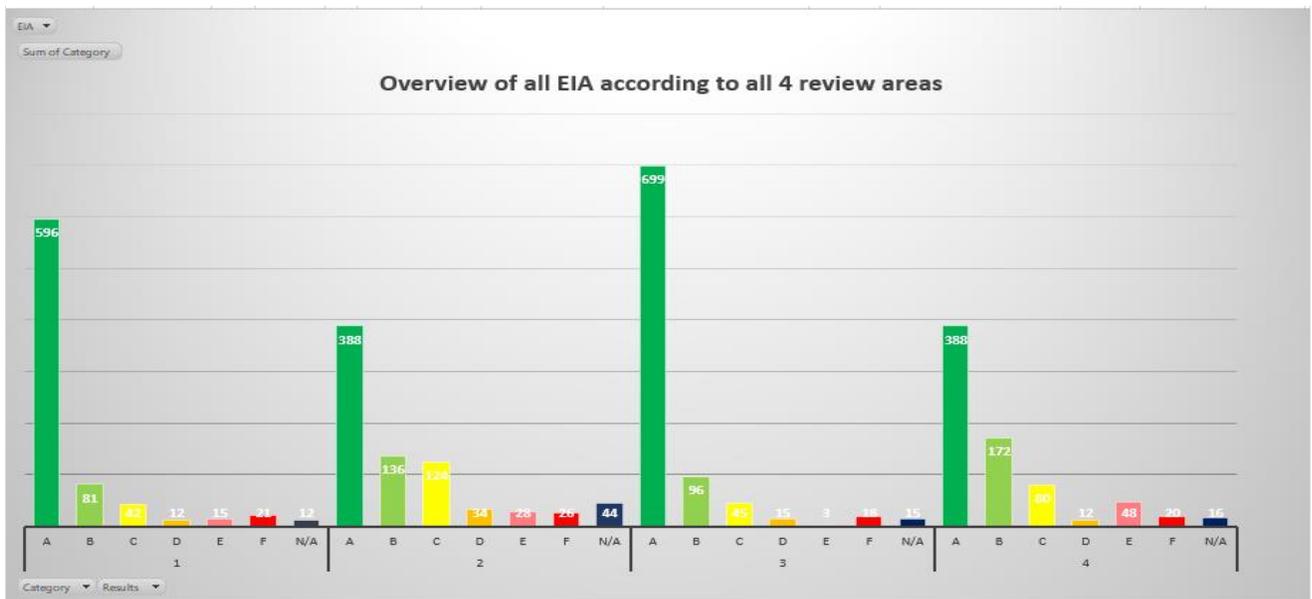


Figure 4-8: Illustration of the overview of all review areas

According to Figure 8, the mitigation and alternatives in RA3 were well presented in the reports, with a significant number of **A** scores. This was followed by review area 1, which also received a significant number of **A's**.

The focus of the study was mainly on RA2, supported by RA3 and 4. RA2 was not well conducted; according to the diagram, it managed to get only a 50% score. It has very few **A's** compared to RA1 and 3. Some of the tasks were omitted and more attention needed to be paid to addressing the health impacts. RA2 had the majority of **C** ratings. Also notable within RA2 was the prevalence of **F** gradings. Another review area that was not well conducted was RA4, which received only 50% **A** gradings, representing a low number compared to those in RA1 and 3, attained more than 74%. More effort is required to integrate health impacts within EIAs in South Africa. We also noticed a high number of **E** (poorly executed) gradings in RA4.

4.4 Chapter summary

The findings reveal that health impacts are integrated into the EIAs differently in the differing developmental sectors. The reports that were analysed had strengths and weaknesses within all the review areas. The size of the reports was found to matter, because bigger reports/documents were found to contain all the necessary information. The mining and power station reports were expected to address health impacts in far more detail than the wind and road reports. It was found that the mines and power stations addressed health impacts satisfactorily, but with several omissions.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

This chapter concludes the study by indicating the extent to which health impacts are addressed within the EIAs in South Africa, by a reflection on the strengths and weakness of the EIA reports, focusing on the health impacts in section 5.1. Concluding remarks are presented in section 5.2. The findings are also linked to the research questions in section 5.3. Furthermore, practical recommendations for further study are made in section 5.4. The limitation is shared in the end of the chapter.

5.1 Strengths and weakness of health impacts

The following categories were regarded as being the well-executed tasks in the reports. All the necessary information was present and well presented:

- Environmental description determined the affected areas, effects happening away from affected areas, atmospheric and socio economic conditions.
- Baseline conditions – existing data was shared and the imperative components of affected areas were shared also the local land policies.
- Scoping - allowed identification of stakeholders, identification of health issues, and engagement of public and interested parties.
- Mitigation measures of health impacts - all identified health impacts had mitigation measure and methods of mitigation were considered.
- Commitment to mitigation of health impacts by developers- most developers committed to mitigation measures.

All four review areas were found to have weaknesses. The weakness of the subcategories were, however, the greatest in the following:

- Waste residuals; the reports failed to address this section well. The category was poorly conducted in all reports. Waste can be detrimental to human health and it requires the EAPs to address it adequately.

Under RA2, category 2.1 and 2.3 were not well done, with the following subcategories also poorly conducted (the majority of the reports did not execute the following subcategories well at all. If they were attempted, they had severe omissions and were graded E or F):

- Incorporation of guiding principles according to IAIA health guidelines
- Incorporation of operational health principles according to IAIA health guidelines
- Summary and communication of results not adequately addressed

5.2 Conclusions

It can be agreed that the type of project development plays a role in determining which components of the report are more important or relevant to discuss. The findings revealed that different developmental sectors address prioritise health impact differently. Even though health impacts are address differently, the health impacts were not adequately addressed in the EIAs that were analysed. The mining and powers station sector do emphasis on human health impacts even those the focus is on health determinants and not holistically addressed It was found that some practitioners choose to address the expected public health impacts, categories of health, and individual determinants in the social aspects section of their reports.

Due to lack of standardised method to approach health impacts in EIA, the IAIA health guidelines can aid as a standardised method to address health issues holistically in EIA. It was found that there were a few factors that influenced the EAs in this country. These factors include pollution, biodiversity and other forms of ecological hazards. The emissions, effluents, discharges and other hazardous substances are having an unfavourable influence on people's health. Different health definitions might also play a role in lack of considering health impacts by EAPs. EIA is mandatory adapting the current environmental and health legislation to ensure practitioners include health impacts holistically will improve the consideration of health impacts adequately in EIA.

5.3 Linking research questions

Sub question 1: *“What are the requirements for the consideration of health impacts within the EIA framework?”*

In the literature review, we saw that in South Africa multiple regulations, policies and plans related to the **EIA** process have been promulgated since the year 1994. All of these regulations are

required to be known by the EAP so that they can advise the developers to continue with their projects without any kind of environmental and human health hazards. Amongst some of such regulation are **GN no. R 982, GN. No. R 983, GN. No. R. 385, No. R 386, GN. No. R387**. Among these regulations, some of the activities are mentioned to assist the EIA practitioners. Most of the regulations are focused on the environment. The current legislations and the regulations related to the EIA process are focused on the environmental aspects of the health, not the other aspects of the public health.

Knowledge, practical experiences and skills on environment issues and on health issues exist within environment and health departments. However, there is lack of communication between the two departments. These communication between the two departments is required to address health impacts to a large extent within the EIA. The concept of sustainable development can be rationalised when the health of the people is secure and their demands are satisfied.

Sub question 2: “What are the international best practices requirements for incorporating health impacts in EIA?”

The IAIA stipulates the health best practice guidelines that must be considered when addressing the health issues in an EIA. The guidelines require that the human health determinants be addressed in the report. This determinants are divided into:

- Individual determinants: genetic, biological, lifestyle/behavioural or circumstantial.
- Social and environmental determinants: physical, community conditions or economic status.
- Institutional determinants: the capacity, capabilities and jurisdiction of public sector institutions and the wider public policy framework supporting the services they provide.

The guiding and operational principles of health impacts are required to be followed holistically. The equity, sustainable development, ethics and comprehensive approach to health should play a role in the report. The physical, mental and social wellbeing is determined by a broad range of factors relating to all sectors of society.

The guidelines require a proper screening process of health impacts be conducted followed by the scoping process. According to Morgan (2010) the scoping process is important because it makes it possible to identify issues in a systematic and informed manner, including engagement

of interested and affected parties. A proper public participation process is required to address health impact issues. The health impacts need to be monitored; therefore the monitoring process is also imperative in this regard.

Primary research question: *“To what extent are health impacts considered in South African Environmental Impact Assessment practice?”*

South Africa is not an economically affluent country. The major impediments to the development of the nation and to the adaptation to EIA regulations include widespread poverty, unemployment, risk of infection or communicable diseases, and a lack of awareness of health impacts among the masses. It was found that there was lack of utilisation of the IAIA health guidelines among practitioners regarding the necessity for the incorporation of human health status in the assessment criteria.

Different developmental sectors have differing impacts on the living conditions of the people. The inclusion of health in EIA is dependent on the nature of developmental project. It was found that possible health impacts in the reports are at times included as estimates of population groups to be affected by the developmental project. However, the vulnerabilities of populations were not addressed in detail. There was a great deal of inclusion of indirect health impacts due to noise, air, water pollution, dust and traffic. These environmental pollutions are indeed having a drastic deteriorating effect on the health status of communities (who.int, 2019). It was found in the reports that the focus of health impacts were mainly on how the projects degraded the air or water quality, or could increase the noise pollution. Several reports lacked a specific chapter on health, with most health impacts being classified under the environmental impacts (noise, air, water etc.). The overall reports revealed that health impacts are included to the lesser extent in the EIAs.

5.4 Practical Recommendations

1. To educate the environmental practitioners about the need to include health impacts in their EIAs, with an adherence to the IAIA international guidelines. They also need to allocate a section in the reports to health impacts, irrespective of the type of development, and not address health issues in the social categories.
2. In order to maintain the wellbeing of the population the South African, EIAs need to be drastically improved to enhance the inputs related to the health of the citizens of our country.

3. If the IAIA health requirements are followed in the South African context, the health impacts will then be well addressed within the EIA.

4. Future study should look into interviews and questionnaire method with EAPs.

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ANNEXURE

Annexure 1: Adapted EIA review criteria

REVIEW AREAS	REVIEW TOPIC	REVIEWER' COMMENTS	A	B	C	D	E	F	N/A
OVERALL REPORT QUALITY									
RA 1	DESCRIPTION OF THE DEVELOPMENT								
1.1	Description of development								
1.1.1	Purpose and objective of the development								
1.1.2	Design, size, diagrams, plans and schedule of the development described								
1.1.3	Presence and appearance of completed development								
1.1.4	Nature of production processes								
1.1.5	Nature and quantity of raw material								
1.1.6	Legislation and guidelines of proposal indicated								
1.2	Site description								
1.2.1	History of project								
1.2.2	Overview of site area in summary must be included								

1.2.3	Description of the existing land use of the site								
1.2.4	Location and activities should be indicated by means of a map								
1.2.5	The closeness of the project to the designated environmental or cultural structures must be identified								
1.2.6	Time of the construction and operational phases								
1.2.7	Transport method for materials and quantity required								
1.2.8	Direct activities required for construction and operation decommissioning phase								
1.2.9	Identification of project lifespan of project including reconditioning and decommissioning plans								
1.3	Waste residuals e.g. inclusive of air, noise, effluents								
1.3.1	Types and quantities of waste								
1.3.2	Treatment, disposal routes								
1.3.3	Methods of obtaining quantity of waste. (How were the quantities of residual and solid waste obtained)								
1.4	Environmental description								
1.4.1	Area of affected development								

1.4.2	Effects occurring away from immediate affected environment								
1.4.3	Atmospheric environment								
1.4.4	Socioeconomic condition								
1.4.5	Methods and investigations deployed of the affected environment								
1.4.6	Existing data should be searched for and utilised								
1.4.7	Local land use plans, policies and data collected should be deployed								
1.5	Baseline conditions								
1.5.1	Imperative components of the affected environment								
1.5.2	Existing data sources								
1.5.3	Local land use policies consulted								
RA2 IDENTIFICATION OF HEALTH IMPACT									
2.1	Identification and definition of health impacts								
2.1.1	Anticipated environmental and public health impacts								
2.1.2	Categories of determinants of health								

2.1.3	Individual determinants (genetic, lifestyle, behaviour, circumstantial)								
2.1.4	Social and environmental determinants (physical, community condition, economic condition)								
2.1.5	Institutional determinants(capacity, capabilities, jurisdiction of public sector services, policy framework)								
2.1.6	Incorporation of guiding health principles (democratic, equity, sustainable development, comprehensive health approach, public participation)								
2.1.7	Incorporation of operational health principles(screening, scoping, resource allocation, monitoring, etc.)								
2.2	Scoping								
2.2.1	Identifying stakeholders								
2.2.2	Identifying key health issues and concerns								
2.2.3	Engagement with public and interested parties								
2.3	Prediction of magnitude of health impacts								
2.3.1	Method used to estimate the magnitude of HI associated with physical								

	environment e.g. (specialist study, pp, questionnaires, environmental assessment)								
2.3.2	Where possible, measurable quantities and qualities described								
2.3.3	Interpreting the exposure of pollutants, noise, danger, and mitigation/magnitude.								
RA3 ALTERNATIVES AND MITIGATION MEASURES									
3.1	Alternatives: feasible alternatives should be considered and should be outlined and implications presented and reasons for rejection discussed								
3.1.1	Main advantages and disadvantages of health impacts should be discussed and reason for final choice given e.g. (employment, noise, air, education, HIV/Aids, TB)								
3.1.2	Alternative processes, designs and operating conditions should be considered at an early stage of the project planning, implications investigated and reported								
3.1.3	If unexpected severe adverse impacts are identified during the investigation, which are difficult to mitigate, alternatives rejected in the earlier planning should be reappraised								
3.2	Mitigation measures: all adverse health impacts should be considered								

	for mitigation. Evidence provided to show that proposed mitigation measures will be effective when implemented								
3.2.1	Mitigation for all health impacts should be considered. Any residue or unmitigated impacts should be indicated and justification offered as to why the impacts should not be mitigated								
3.2.2	Mitigation methods considered should include modification of project, compensation and provision of alternative facilities, as well as pollution control								
3.2.3	It should be stipulated to what extent mitigation measures will be effective when implemented								
3.2.4	Mitigation measures for cumulative impacts should be indicated and described								
3.3	Commitment to mitigation: developers should be committed to and capable of carrying out mitigation measures and should present plans of how they propose to execute the measures								
3.3.1	Clear declaration statement on mitigation measures from the developer should be presented								
3.3.2	Monitoring arrangements should be proposed to check the impact resulting								

	from implementation of the project and their conformity with predictions within the EIA. Provision should be made to adjust mitigation measures.								
RA 4 COMMUNICATION OF RESULTS									
4.1	Layout: layout of the EIA should enable the reader to find and assimilate data easily and quickly. External data sources should be acknowledged								
4.1.1	Introduction should briefly describe the project, aims and how the aims are going to be achieved								
4.1.2	Information should be logically arranged in sections/chapters through proper structuring and in the table of contents								
4.1.3	Presentation of information should be accessible to the non-specialist; tables and graphs should be used accordingly								
4.2	Summary								
4.2.1	Summary of health impacts and conclusions of study should be provided								
4.2.2	Main health issues should be discussed in the summary								

Annexure 2: Raw data matrix

Review criteria	EIA Reports																						
	Pzmoya	wind	SKASA	BVG	Palmiet	Lanxess	Kendal	Bloem	Dorstfont	FAD6	Matimba	KZN Rail	N17 Toll	K56 Road	Nomalan	SUN FEIA	Witkop	Kusile F	Kusile B	Medupi	Atlantis	CCPP	Acacia
Overall grading	B	B	B	A	B	B	A	B	A	B	B	B	C	B	B	B	B	B	B	A	B	B	B
RA1: Description of the development	A	B	B	A	B	B	A	A	A	B	A	B	C	B	A	A	B	B	B	A	B	A	B
1.1 Description of development	A	A	B	A	A	A	A	A	B	A	A	A	B	B	A	A	B	B	B	A	A	B	A
1.1.1 Purpose and objective of development	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1.1.2 Design, size, diagrams, plans and schedule of development	A	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A
1.1.3 Presence and appearance of completed development	A	A	C	A	A	A	A	A	C	B	A	A	C	N/A	A	A	N/A	A	B	A	E	B	A
1.1.4 Nature of production processes	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A
1.1.5 Nature and quantity of raw material	A	A	A	A	A	A	A	A	C	A	A	N/A	B	F	A	A	B	B	C	A	A	F	B
1.1.6 Legislation and guidelines of proposal indicated	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A
1.2 Site description	A	A	C	A	B	B	A	A	A	B	B	B	B	C	B	A	B	B	C	B	B	B	B
1.2.1 History of project	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1.2.2 Overview of site area in summary must be included	A	A	C	A	A	A	A	A	A	A	A	B	A	F	A	A	F	A	C	A	A	A	A

1.2.3 Description of existing land use of the site	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1.2.4 Location and activities should be indicated by means of a map	A	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1.2.5 The closeness of the project to the designated environmental or cultural structures must be identified	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B
1.2.6 Time of the construction and operational phases	A	C	E	A	A	A	A	A	A	E	E	F	E	F	F	A	A	D	B	D	A	A	A
1.2.7 Transport method for materials and quantity required	A	C	E	A	C	A	A	A	A	A	A	F	E	F	F	B	D	C	F	D	C	F	C
1.2.8 Direct activities for construction and operational phase	A	A	E	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
1.2.9 Identification of project lifespan	A	B	E	A	A	C	A	A	A	A	A	C	F	F	F	F	A	A	F	A	A	A	A
1.3 Waste residuals (inclusive of air, noise, effluents)	C	C	A	B	B	C	A	B	A	D	A	A	D	C	B	B	B	B	B	A	N/A	A	F
1.3.1 Type and quantities of waste	C	C	A	B	B	C	A	B	B	E	A	A	D	C	A	A	B	A	B	A	N/A	A	F
1.3.2 Treatment, disposal routes	C	C	A	B	B	B	A	A	A	C	A	A	D	C	A	A	A	A	B	A	N/A	A	F
1.3.3 Methods of obtaining quality of waste	C	E	B	A	D	F	A	F	A	E	A	A	D	C	D	E	N/A	F	A	A	N/A	A	F
1.4 Environmental description	A	A	B	A	B	A	A	A	A	A	A	B	C	A	A	A	A	A	A	A	A	A	A
1.4.1 Area of affected development	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1.4.2 Effects occurring away from immediate affected environment	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1.4.3 Atmospheric environment	A	A	B	A	D	A	A	A	A	A	A	N/A	B	A	A	A	A	A	A	A	A	A	A
1.4.4 Socioeconomic conditions	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

1.4.5 Methods and investigations deployed in the affected environment	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A
1.4.6 Existing data should be searched for and utilised	A	A	E	A	A	A	A	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A	A
1.4.7 Local land use plans, policies and data collected should be deployed	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A
1.5 Baseline conditions	A	A	B	A	A	A	A	A	A	A	A	B	B	A	A	A	A	A	A	A	A	A	A	A
1.5.1 Imperative components of the affected environment	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A
1.5.2 Existing data sources	A	A	E	A	A	A	A	A	A	A	A	C	C	A	A	A	A	A	A	A	A	A	A	A
1.5.3 Local land use policies consulted	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A
RA2 IDENTIFICATION OF HEALTH IMPACTS	A	C	A	A	B	C	A	C	B	B	A	B	C	A	B	C	C	B	A	A	C	B	B	
2.1 Identification and definition of health impacts	A	C	A	A	B	C	A	C	B	B	B	C	B	B	B	C	D	B	A	A	C	B	B	
2.1.1 Anticipated environmental and public health impacts	A	C	A	A	A	A	A	A	A	A	A	A	B	B	A	A	A	A	A	A	A	A	A	
2.1.2 Categories of determinants of health	A	E	A	A	B	C	A	C	A	B	A	C	B	B	A	C	E	A	A	A	C	B	C	
2.1.3 Individual determinants (genetic, lifestyle, behaviour, circumstantial)	A	N/A	A	A	B	C	A	C	A	B	A	C	B	B	A	A	E	A	A	A	C	A	A	
2.1.4 Social and environmental determinants (physical, community condition, economic condition)	A	C	A	A	B	C	A	C	A	A	A	B	A	B	A	A	D	A	A	A	C	A	A	

2.1.5 Institutional determinants (capacity, capabilities, jurisdiction of public sector services, policy framework)	A	N/A	A	A	B	C	A	C	A	B	A	A	B	B	A	A	D	A	A	A	C	A	A
2.1.6 Incorporation of guiding health principles (democratic, equity, sustainable development, comprehensive health approach)	A	N/A	B	A	D	F	A	F	C	B	E	N/A	N/A	C	D	E	E	D	A	B	D	C	D
2.1.7 Incorporation of operational health principles (screening, scoping, resource allocation, monitoring, etc.)	A	N/A	E	F	E	F	C	F	C	N/A	E	N/A	N/A	C	D	E	E	F	A	C	N/A	C	F
2.2 Scoping	A	A	A	A	A	B	A	B	A	A	A	B	A	A	B	C	B	A	A	A	A	A	A
2.2.1 Identifying stakeholders	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2.2.2 Identifying key health issues and concerns	A	N/A	N/A	A	A	C	A	C	A	A	A	E	B	A	D	C	C	A	A	A	N/A	A	B
2.2.3 Engagement with public and interested parties	A	A	A	A	A	A	A	C	A	A	A	A	A	A	D	C	A	A	A	A	A	A	A
2.3 Prediction of magnitude of health impacts	C	N/A	N/A	A	B	C	A	E	B	B	A	B	E	A	A	B	B	B	B	A	B	B	C
2.3.1 Method used to estimate the magnitude of HI associated with physical environment (specialist study, pp, questionnaire, environmental assessment)	B	N/A	N/A	A	B	C	A	F	A	B	A	B	C	A	B	A	A	A	A	A	B	A	B

2.3.2 Where possible, measurable quantities and qualities described	C	N/A	N/A	A	C	C	A	F	D	C	A	C	F	A	C	C	D	C	F	A	D	C	D
2.3.3 Interpreting the exposure of pollutants, noise and danger	N/A	N/A	N/A	A	B	C	A	D	D	B	A	C	F	A	A	D	B	A	A	A	A	A	F
RA3 ALTERNATIVES AND MITIGATION MEASURES	C	A	B	A	A	B	A	B	A	A	A	B	B	B	A	A	A	A	A	A	A	A	A
3.1 Alternatives: feasible alternatives should be considered and outlined	C	N/A	B	A	B	B	A	B	A	A	A	B	A	A	B	A	A	A	A	A	A	A	A
3.1.1 Main advantages and disadvantages of health impacts should be discussed and final choice give e.g. (employment, noise, air, HIV/Aids, TB)	C	N/A	B	A	C	F	A	D	A	A	A	C	A	A	C	A	A	A	A	A	A	A	A
3.1.2 Alternative processes, designs and operating conditions should be considered at an early stage of project planning	C	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
3.1.3 If unexpected severe adverse impacts identified during investigation that are difficult to mitigate, all rejected in earlier planning should be re-appraised	N/A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
3.2 Mitigation measures	C	A	A	A	A	B	A	A	A	A	A	B	B	B	A	A	A	A	A	A	A	A	A

3.2.1 Mitigation for all health impacts should be considered. Any residue/ unmitigated impacts should be indicated	C	N/A	A	A	A	A	A	B	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A
3.2.2 Mitigation methods considered should include modification of project, compensation etc.	N/A	N/A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
3.2.3 It should be stipulated to what extent mitigation measures will be effective when implemented	C	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	A	A
3.2.4 Mitigation measures for cumulative impacts should be indicated	C	A	A	A	A	F	A	A	A	A	A	A	F	B	A	A	A	A	A	A	A	A	A
3.3 Commitment to mitigation	A	A	B	A	A	A	A	A	B	A	A	A	B	D	A	A	B	B	A	B	B	B	B
3.3.1 Clear declaration statement on mitigation measures from developer should be presented	A	A	A	A	A	A	A	A	D	A	A	A	A	E	A	A	D	A	A	F	F	F	B
3.3.2 Monitoring arrangements should be proposed to check the impact resulting from implementation of project and conformity with prediction of EIA	A	A	C	A	A	A	A	A	A	A	A	A	C	D	A	A	A	C	A	A	A	A	A
RA4 COMMUNICATION OF RESULTS	A	A	B	A	B	B	A	B	A	B	C	B	B	B	B	B	B	C	C	A	B	B	B
4.1 Layout: Layout of EIA should enable reader to find data easily	A	A	B	A	A	A	A	A	A	A	A	A	A	B	A	A	B	A	B	A	A	B	A

4.1.1 Introduction should briefly describe the project, aims, how they will be achieved	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
4.1.2 Information should be logically arranged in sections/chapters	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	C	C
4.1.3 Presentation of info should be accessible to non-specialists, tables and graphs used accordingly	A	A	B	A	A	A	A	A	A	A	A	A	A	B	A	A	B	A	C	A	A	B	A
4.2 Summary	N/A	B	C	B	C	C	A	C	A	C	E	C	D	B	C	B	C	E	E	A	C	A	A
4.2.1 Summary of health impacts and conclusion of study should be provided	N/A	B	A	B	C	B	A	B	A	B	E	B	C	B	C	B	B	D	E	A	B	B	B
4.2.2 Main health issues should be discussed in the summary	N/A	N/A	E	B	C	F	A	E	A	D	E	E	F	E	C	F	E	F	E	A	F	A	A

Dark green=A(well conducted),Lime= B (generally satisfactory),Yellow=C(satisfactory), Orange=D(parts attempted), Pink=E(not satisfactory),Red=F(not satisfactory, White=N/A(not applicable)