

Predicted versus actual psycho-socio-economic impacts of mining and infrastructure projects

by

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Abstract

In this study, the accuracy of predicted psycho-socio-economic impacts resulting from mining and infrastructure projects is investigated by comparing it to impacts shown to actually occur. A systems theoretical approach was followed in conjunction with a qualitative methodology in order to conceptualise impacts in the social systems they occur. Data was collected through a document review (which included a total of 17 documents pertaining to predicted impacts, and 24 documents pertaining to actual impacts) and analysed by means of thematic analysis, which rendered four main themes and 20 subthemes. The findings of the thematic analysis were subjected to second-order analysis, which enabled the categorisation of impacts according to the level of accuracy with which they are predicted. To understand why some impacts are incorrectly predicted, a third-order analysis was performed. The study suggests that many of the commonly predicted psycho-socio-economic impacts are less accurate than what they should ideally be, suggesting that some of the assumptions on which these predictions are based should be revised, as should the conceptualisation of the impacts. The researcher argues that, in order to make accurate predictions about the impacts resulting from mining and infrastructure projects, sufficient knowledge of the attributes of the project, the nature of the receiving environment, the causal processes by which the project will bring about changes in the receiving environment, and the value systems according to which communities judge whether a specific change constitutes a negative or positive impact, is required. This argument is substantiated by highlighting instances of inaccurate predictions relevant to each category of required information. More fundamentally, however, the researcher argues that inaccurate predictions are the result of inadequate consideration of the systemic nature of psycho-socio-economic impacts and the context in which they occur, precipitated by the incorrect use of the “social *impact*” metaphor.

Keywords: social impact assessment, accuracy of predicted impacts, systems theory, thematic analysis, document review.

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Abbreviations and acronyms

AIDS	Acquired immune deficiency syndrome
APA	American Psychological Association
ARV	Antiretroviral
CAR	Central African Republic
DRC	Democratic Republic of Congo
EIA	Environmental impact assessment
EIS	Environmental impact statement
HIV	Human immunodeficiency virus
HMV	Heavy motor vehicle
HPCSA	Health Professions Council of South Africa
IAIA	International Association for Impact Assessment
IBRD	International Bank for Reconstruction and Development
ICSID	International Centre for the Settlement of Investment Disputes
IDP	Integrated Development Plan
IFC	International Finance Corporation
kV	Kilovolts
MIGA	Multilateral Investment Guarantee Agency
MPRDA	Mineral and Petroleum Resources Development Act
NEMA	National Environmental Management Act
NEPA	National Environmental Policy Act
NGO	Non-governmental organisation
OHS	Occupational Health and Safety
PCR	Physical cultural resources
PP	Public participation
PPE	Personal protective equipment
PPP	Public participation process
PS	Performance Standards
SD	Sustainable development
SIA	Social impact assessment
SLP	Social and labour plan
STI	Sexually transmitted infections
USA	United States of America

VCT Voluntary counselling and testing
WB World Bank
WBG World Bank Group

Chapter 1: Introduction

1.1 Introduction

In this chapter, justification for the current study is provided by contextualising it through the presentation of background information, considering previous research conducted on the subject matter, and highlighting the importance of the research. The research question, aims and objectives are set out, after which the relevance of the topic to the discipline of psychology is considered. The chapter concludes with a brief overview of the theoretical perspective adopted, methodology employed, and the structure of the remainder of the document.

1.2 Justification for the study

Sustainable development (SD) has become a household term; this term is simply defined as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (World Commission on Environment and Development, 1987, p.43). In a world where capitalism is at the order of the day, the environment has long been suffering greatly as a consequence of our quest to become wealthy entrepreneurs (Magdoff & Foster, 2011; Stretton, 1976). Allen (1993) states that the natural world has been reformed and restructured in order to make it consistent with profitable accumulation. Environmental degradation as a result of human activities was first noted by the United States of America (USA) during the late 1960s, who subsequently put legislation in place in an attempt to protect the environment (Joyce & MacFarlane, 2001; Tarlock, 2009) (this is elaborated on in Section 2.3). This practice was quickly adopted by other countries and such legislation dictates much of what happens in the business world today (Hay, Stavins, & Vietor, 2005).

There are numerous mechanisms through which SD is purportedly achieved, including the formulation of various environmental policies, institutional transformation of different kinds, biophysical conservation and poverty alleviation strategies (Dale & Robinson, 1996). Another mechanism intended to promote SD, related to the abovementioned ones, is by conducting environmental impact assessments (EIAs) prior to the development of a commerce enterprise. The purpose of such an assessment is to ensure that adequate consideration is given to the environmental impacts of a project or development before it is implemented (Holder, 2004). The definition of the term “environment” in the concept of an “environmental impact assessment” is intended to include all aspects of thereof, including the biophysical, economic and social or human environments (Holder, 2004). As such, one of the subsets of an EIA is a social impact assessment (SIA), which is conducted to examine the impacts of a development on the social environment in

which the development is intended to occur. The term “social impacts” is used to collectively describe the effects of a project on the human environment, which includes the psychological domain of individuals, impacts relevant to the broader community or social system, as well as the local economy (Vanclay, 2003).

The definition and process of SIAs is presented in the next chapter. For the purposes of the current discussion, however, it will suffice to say that during a SIA, both positive and negative impacts that are expected to arise as a result of a particular development are predicted or identified on the basis of knowledge gathered about the social context in which the development is intended to occur (the receiving environment), the specifics of the project under consideration (such as the size of the project footprint and the nature of required project infrastructure), as well as professional judgment of the SIA practitioner (rooted in experience with previous SIAs). In addition to predicting likely psycho-socio-economic impacts, the practitioner also suggests mitigation measures intended to minimise the negative impacts and maximise or enhance the positive ones. The results of a SIA are captured in a SIA report, and the salient points of this report (including the predicted impacts and recommended mitigation measures) are summarised for the EIA report, which is considered by the relevant authorities who weigh up the collective impacts of a project on the different aspects of the environment and decide whether the project should be implemented or not. Essentially, predictions regarding possible social impacts play a role in whether a particular development is authorised to commence (The Interorganisational Committee on Guidelines and Principles for SIA, 1994).

In light of the above, the necessity for accurate predictions regarding possible impacts on the human environment (as well as predictions regarding other aspects of the environment) stems from two main sources, as follows:

- The psycho-socio-economic impacts predicted in SIA reports influence the relevant authorities’ decision whether or not to allow a project to be implemented. Certain projects, such as the upgrading of roads, hold unquestionable benefits for (at least some of) the people in the area or country where it is implemented, while other projects have the propensity to be detrimental to most who experience its physical intrusion.
- Both positive and negative social impacts have a profound impact on the lives of the affected communities (those communities in the receiving environment). Impacts resulting from projects alter a community’s structure, change its financial profile and possibly disturb the normal movement patterns of community members, all of which has an impact on the psychological well-being of those affected.

Despite the obvious necessity for accurate predictions regarding psycho-socio-economic (and other) impacts, little effort is made to monitor social impacts when a project is implemented. As such, little concrete evidence exists on whether predictions (and the assumptions on which they are based) are in fact accurate. As Duthie (2007) states:

We [environmental management practitioners and authorities in South Africa] currently place so much emphasis on impact prediction (even in cases where impacts are well known and management is simple) and so little on implementation and enforcement that our quest for sustainable development is becoming a farce... We cannot continue to live in the vain hope that perfect EIAs prepared by registered environmental practitioners will automatically translate into environmental protection. (p. 4)

1.2.1 Previous research

Vast volumes have been written about the field of SIA since the 1980s and various aspects of the field and its processes or methodologies have been subjected to academic research. Literature on SIA include a number of handbooks (for example, Becker & Vanclay, 2003; Cox & Miers, 1995; Wildman & Baker, 1985), guidelines and principles (for example, Burdge et al., 1995; The Interorganisational Committee on Guidelines and Principles for SIA, 1994; Vanclay, 2003), and other writings linking it to environmental and other impact assessments (for example, Gramling & Freudenburg, 1992; Sloomweg, Vanclay, & van Schooten, 2012). Another body of literature is concerned with the conceptualisation of the SIA process and social impacts (for example Burdge, 1994, 2004; Becker, Harris, McLaughlin, & Nielsen, 2003) and with the development of frameworks for conducting a SIA (for example Dietz, 2007; Ross, 1990). Relevant as what these pieces of research and writings are to understanding the various aspects of the SIA field, reviewing it all lies outside the scope of this study. What is of interest to this study is literature that addresses the accuracy with which impacts are predicted, which is far less common in literature than other aspects of the field of SIA.

Studies that are directly relevant to the research question (and that were used to inform this study) can be broadly categorised as follows:

- **Case-study specific studies:** these studies consider the extent to which the anticipated impacts and benefits of a single project have materialised after implementation of the project, or how the project in question has changed various aspects of the affected communities in a given region, such as their livelihoods or social organisation. Many of these studies are required by a project's funding agency (thus representing specialist reports that fall outside the academic arena, such as Project Completion Reports and Project

Performance Evaluation Reports), while others are intended mostly for the academic arena. Typical examples of such studies are briefly discussed below:

- Kitula (2006) investigated the severity of socio-economic and environmental impacts resulting from the mining industry in a district in Tanzania, using both quantitative and qualitative methodologies (including surveys and participatory rural appraisal techniques). The researcher focussed and commented on the impact of mining on livelihoods of local people, the contribution of the mining sector to the local economy, affected individuals' perceptions about mining, and other social and cultural impacts of the mining industry, such as displacement, employment (including child labour), safety impacts and social pathologies.
- Lockie, Franettovich, Petkova-Timmer, Rolfe, and Ivanova (2009) conducted a longitudinal assessment of the social impacts that arose from a coal mine in Australia, by means of comparing two SIAs conducted for the same project: one prior to implementation and one four years later (post-implementation). Their research yielded information about both the accuracy of the predictions contained in the original SIA, as well as how social impacts resulting from a project may change or vary over time.
- Similar to the above, Rossouw (2008) sought to verify the social impacts of a particular project by reviewing its SIA and comparing the predictions contained in it to the contents of monitoring reports compiled for the project in question.
- **High-level informal research by SIA practitioners:**¹ the findings of this category of research are presented in, inter alia, EIA or SIA reports as justification for the predictions contained in the report. The author of the research does not reveal his/her methodology but merely summarises findings regarding the types of impacts evident from other mining and infrastructure projects, which seems to be based largely on professional experience and exposure to other projects (for example, Arup Pty Ltd & ENSR Australia Pty Ltd, 2009). SIA practitioners will, for example, include a statement like “an influx of job-seekers is a commonly experienced impact, as evident from other projects in the province”. As will be discussed in Section 2.10, much of this category of research can be considered grey literature (literature not commonly available via the conventional channels as it is not published commercially, or literature that is generally inaccessible (Debachere, 1995)) and is of limited use to academic research.

¹ The term “high-level” is intended to refer to research that provides an overview of a problem or topic, focusing rather on a concept as a whole, as opposed to individual components comprising the concept. The converse is “low-level” research, which is concerned with a detailed description of a concept.

As mentioned above, previous research relevant to the current research was used to inform this study. However, the author was unable to identify any research that address the current research question (defined in Section 1.3.1 below) as its primary objective, in the same manner or to the same extent than what is proposed for this research. While both of the abovementioned categories of research are essential for the field of SIA, it does not allow for the identification of trends and patterns in the prediction of impacts; the main difference between the current study and previous relevant research discussed above, is that it is more conceptual and general than the case-study specific research, and more methodologically rigorous than the informal research conducted by SIA practitioners. In addition, the current study seeks to understand why SIA practitioners sometimes inaccurately predict psycho-socio-economic impacts, which is not considered in the previous research identified by the current author. The author is of the opinion that the current research will allow for recognising trends in predictions, which will enable SIA practitioners to assess whether it is necessary to revise the assumptions on which they base their predictions.

1.2.2 Need for the study

As alluded to in the previous section, there is a lack of broad-based research investigating the accuracy of predictions regarding psycho-socio-economic impacts. If it can be found that actual impacts resulting from mining or infrastructure projects differ significantly or consistently from predicted impacts, it would pave the way towards revising the assumptions on which social impact predictions are made.

Furthermore, if light can be shed on the impacts that do indeed occur (not only the types, but also their magnitude), concrete evidence will be provided that can be cited in future SIAs when making predictions regarding the social impacts of as-yet unrealised projects. It is acknowledged, however, that one's ability to extrapolate from the actual social impacts of existing projects will depend on the degree of similarity between the existing and proposed projects, as well as on the socio-economic environments of those projects.

1.3 Research question, aims and objectives

In order to delineate the scope of the research, as well as to focus the research process, the researcher clearly defined the research question and the aims of the study. A number of research objectives were also developed. This section presents the aforementioned specifications of the research.

1.3.1 The research question

This study investigates the extent to which predictions regarding psychological, social and economic impacts resulting from mining and infrastructure projects correspond with the impacts that actually arise as a consequence of such projects. Thus the fundamental question it seeks to answer is as follows: are predictions regarding psycho-socio-economic impacts of mining and infrastructure projects accurate?

1.3.2 Aim of the study

The aim of this study is to compare the predicted and actual psycho-socio-economic impacts resulting from mining and infrastructure projects in order to make preliminary and qualitative statements about the accuracy of the predicted impacts. As a secondary aim, the study seeks to provide possible reasons for the discrepancy between predicted and actual impacts in cases where it was clear that they do not correspond. The information obtained through this study may provide a basis for increasing the accuracy of future SIAs.

1.3.3 Objectives of the study

In order to achieve the aims of the current study, and ultimately to answer the research question, the following specific objectives have been identified:

- To identify which social impacts are commonly predicted for mining and infrastructure projects;
- To identify the social impacts that resulted from these mining and infrastructure projects;
- To qualitatively assess the accuracy of predicted psycho-socio-economic impacts by means of comparing it to the actual impacts identified;
- In cases where a discrepancy between the predicted and actual social impacts is evident, to investigate possible reasons for why this discrepancy exists; and
- On the basis of this analysis, to formulate recommendations for enhancing the accuracy of future SIAs.

1.4 Relevance to psychology

As will become evident in Chapter 2, the relevance of the SIA field to psychology is twofold, as follows:

- In order to make accurate predictions about psycho-socio-economic impacts, one needs a good understanding of social systems and the elements making up those systems (that is,

people). Psychology in general, and community, social and cross-cultural psychology particularly, deals with the subject matter that enables such an understanding.

- A large part of the SIA process is data collection, analysis, integration and reporting. The current study is required in partial fulfilment of the degree MA (Research Psychology). According to the Department of Psychology at the University of Pretoria, Research Psychologists apply research methods to investigate any of the other fields in psychology in order to contribute to the knowledge base of that field (Department of Psychology, 2011).

The current research question can be addressed as part of many other disciplines, including human geography, sociology, community development or anthropology. However, the divide between different disciplines is becoming increasingly blurred and emphasis is placed on multidisciplinary research (Haaland, 2012). As such, for her mini-dissertation the researcher chose a field of interest and one she is familiar with in order to fulfil the role of a Research Psychologist, which is primarily to contribute to the knowledge base of psychology-related fields.

1.5 Overview of the study

This section introduces the theoretical perspective from which the study was conducted, and briefly presents the research design and methodology employed. This is followed by an overview of the structure of the remainder of the document.

1.5.1 Theoretical perspective, research design and methodology

This research is conducted from a systems theoretical perspective. As is elaborated on in Section 3.2, this perspective allows both for the understanding of dynamic and complex of social systems, as well as for the explanation of the core processes that take place within such a system (Bateson, 1979).

A qualitative research design was employed to answer the research question. This enabled the researcher to gain a comprehensive and holistic understanding of the subject matter, as is required for research conducted from a systemic perspective (Capra, 1996). Data was collected by means of a document review and analysed using thematic analysis techniques as prescribed by Braun and Clarke (2006).

1.5.2 Outline of the study

The remainder of this mini-dissertation is structured as follows:

- **Chapter 2** provides an overview of the field of SIA, including its development from the early 1960s, the process involved in conducting a SIA, commonly predicted social impacts and the difficulties faced by practitioners in the field.

- **Chapter 3** contains a discussion on systems theory, which was chosen as the theoretical basis for this study. Justification for choosing this theoretical approach for the research question at hand is provided and the main tenets of systems theory relevant to this study are summarised.
- **Chapter 4** provides a detailed description of the methodology employed during this study in order to answer the research question and fulfil the aims and objectives of the study (as set out above). The research design and method are presented, and the researcher makes explicit how her own experience within the field of SIA has influenced the research process. The first-, second- and third-order data analysis procedures are explained, the soundness of the research is investigated and relevant ethical considerations are highlighted.
- **Chapter 5** contains the findings of the first-order (thematic) data analysis. The chapter opens with an exposition of the major themes and subthemes that arose from the data, after which the data sources are introduced. The findings relevant to each of the identified themes and subthemes are presented, thereby meeting the first two research objectives set out in Section 1.3.3.
- **Chapter 6** presents the second- and third-order interpretative analyses. In this chapter, the accuracy of predicted impacts is qualitatively evaluated and possible reasons for inaccurate predictions are presented (satisfying the third and fourth mentioned objectives). On the basis of these reasons, recommendations are made to improve the accuracy of future SIAs, thereby meeting the last-mentioned research objective. The limitations of the research, recommendations for future research and the intended dissemination of the current research results are also considered.

1.6 Conclusion

This chapter provided justification for the need of the study by highlighting the importance of the research question and the lack of previous research conducted that help answer the research question. The aims and objectives of the study were clearly defined, and the relevance of the topic to psychology was explored. It was presented that the study was conducted from a systems theoretical perspective and employed a qualitative design.

The following chapter explores the various aspects of the field of SIA, which is required to fully comprehend the remainder of the study. It places the field in context, explains the SIA process and lists the most important social impact variables. The main problems confronting the field are set out, which further justifies the need for the current study.

Chapter 2: Literature review

2.1 Introduction

This study's research question is primarily concerned with the SIA process and the shortcomings thereof. Prior to tackling the research question, an understanding of the SIA field, its process and problems is required. This chapter provides the necessary background information about the field to appreciate the remainder of this mini-dissertation.

Chapter 2 commences with a definition of the specialist field of SIA, provides a brief history of its development and considers the contexts in which SIAs are required. The common social impact variables are presented. The necessity of conducting SIAs in the context of mining and infrastructure projects is considered, followed by an explanation of how social impacts are rated in SIA reports. Best practice guidelines are presented, as are the main problems confronting the field of SIA. Finally, the importance of post hoc assessments, such as the research presented in this document, is highlighted.

2.2 Defining social impacts assessment

SIA, as a field of applied social research, is yet to be defined in a universally accepted manner. However, most of the definitions contain some common central tenets. Du Pisani and Sandham (2006) define SIA as 'the efforts to assess, in advance, the social consequences, whether intended or unintended, positive or negative that are likely to follow from specific actions, projects, policies and programs' (p. 2).

Elaborating on the above definition, Vanclay (2003) describes SIA as including:

the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change process invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment. (p. 2)

In the above definition, social consequences pertain to consequences to any human population, and include alterations of the manner in which these populations live, work, play, relate to one another, organise to meet their needs and generally cope from day to day (Vanclay, 2003). Due to the comprehensive nature of Vanclay's definition, it is often used as the working definition of SIA by practitioners in the field, and is accepted as the definition of SIA for the purpose of this study.

As the definition suggests, SIA is closely related to other kinds of impact assessments. Generally, an EIA (of which a SIA is considered to be a subset of) consists of a number of specialist studies, depending on what kind of impacts a development is expected to have. Examples of specialist studies include ecological, terrestrial, visual, heritage, hydrological and noise impact assessments. Although these specialist studies are often conducted independently and by different specialists, SIAs often make use of information generated by other specialist studies (such as heritage and noise impact assessments). This connection is usefully illustrated with the following simple example: if the land usage in a particular area changes (a terrestrial impact), it will change the physical appearance of that area (a visual impact), which may influence the success of businesses close by, such as a restaurant (an economic impact), which can significantly alter a community's organisation (a social impact).

Similarly, the findings of a SIA can inform other specialist studies. For example, interaction with stakeholders during the course of collecting social information on a potentially affected area often serves to identify possible environmental impacts that fall in the province of other specialist disciplines.

Another specialist activity, albeit not an impact assessment, is the Public Participation Process (PPP), which is a statutory requirement in almost all promulgated environmental legislation. As is the case with SIAs, the exact definition of public participation (PP) and what it entails is lacking. In essence, however, it can be said to be a process leading to a joint effort by stakeholders, technical specialists, the authorities and the project proponent who work together to produce better decisions than if they had acted independently (Consultative Forum on Mining and the Environment, 2002). It is thus a process that informs project-related decision-making. This definition implies that a prerequisite for a successful PPP is the identification of all key stakeholders, which is equally important for the SIA process as it ensures that no relevant social groups are overlooked when assessing social impacts on the receiving environment during the SIA process.

A SIA is thus not an independent specialist study but relies heavily on other specialist studies, as well as the EIA process. What distinguishes SIA from the other forms of impact assessment and the PPP, however, is the emphasis on social impacts that cause psychological responses amongst humans. It is thus not concerned with the economic implications of a project on a national level nor is it concerned with the preservation of natural habitats. It is, however, concerned with the social implications of these aforementioned impacts, such as potential widespread poverty or the loss of the community's sense of place. According to Gilpin (1995), such social impacts are those changes in social relations between members of a community, society or institution, resulting from external

alterations, and include change involving social cohesion, general lifestyle, cultural life, attitudes and values, social tranquillity, relocation of residents, and severance.

2.3 A brief history of SIAs

The historical development of social impact assessments can be traced back to changes in environmental legislation in the USA in the late 1960s – in particular, to the passing of the National Environmental Policy Act (NEPA) in 1969 (Joyce & MacFarlane, 2001). This act made provision for the integration of the assessment of development impacts on the “human environment”. In Section 102(2)(C), NEPA required that any ‘major federal actions significantly affecting the quality of the human environment’ (National Environmental Policy Act of 1969 [As Amended Through Dec. 31, 2000], 2000, p. 5) be included in the environmental impact statement (EIS), which until 1969 aimed to estimate only the environmental impacts of a development.

The second significant milestone in the history of SIAs emanates from the inquiry by Chief Justice Thomas Berger of the Canadian province British Columbia into the proposed Mackenzie Valley pipeline in the mid-1970s (Burdge & Vanclay, 1995). This proposed pipeline was envisaged to stretch from the Beaufort Sea in the Yukon Territory to Edmonton, Alberta, and represents the first case in which social impacts had been formally considered in project decision-making (Joyce & MacFarlane, 2001). Due to the adverse social impacts of the proposed project, it was decided that the project must be postponed for at least 10 years to allow sufficient time for land claims to be settled and for new institutions to be established to support the native population (Joyce & MacFarlane, 2001). Prior to this inquiry, 12 SIAs were documented in Canada. In the three years to follow the inquiry, over 3000 SIAs were conducted in Canada alone.

Shortly after the abovementioned inquiry which took place in the late 1970s, the first international SIA conference was held in Vancouver in 1982 (Freudenburg, 1986). This conference marked the beginning of the struggle to obtain credibility for the field. The lack of credibility stems from two main sources, as follows:

- To this day, there is no statutory body that regulates the quality or scope of SIAs, or an organisational body, such as the Health Professions Council of South Africa (HPCSA), to which SIA practitioners are required to be affiliated with (Vanclay, 2003). As such, any person can claim to be a SIA practitioner and produce a SIA report.
- Personal experience in the field of SIA has shown that impact assessment studies (including SIAs) are often funded by the project proponent, who has the freedom to choose the practitioners. This leaves plenty of room for biased impact assessments, considered to be

supporting documentation for why the project should be authorised, as opposed to unbiased, methodologically rigorous impact assessments.

After the first conference in 1982, SIA issues were combined with other impact assessment topics to be addressed during the general International Association for Impact Assessment (IAIA) conferences (Burdge & Vanclay, 1995).

Since the birth of SIAs, numerous regulations and pieces of legislations have aided the formalisation of SIAs in the USA. The most prominent of these are listed in Table 1 below, which includes legislation and regulations from 1970 to 1986. The main provisions of each piece of legislation or regulations are also provided. It is largely due to the legislation and regulations listed in Table 1, as well as legislation implemented by other countries, that South Africa has formulated the Environment Conservation Act, (Act 73 of 1989), which governed SIA in our country until the promulgation of the National Environmental Management Act (Act 107 of 1998) (NEMA).

Table 1: Regulations that mandate or contain provisions for the conduct of SIAs

Date	Law	Provisions
1970	National Environmental Policy Act of 1969	Calls for the integrated use of the social sciences in assessing impacts on the human environment. It requires the identification of methods and procedures that ensure that presently un-qualified environmental amenities and values be given appropriate consideration.
1976	Magnuson Fishery Conservation and Management Act	Where a system for limiting access to fishery in order to achieve optimum yield is deemed necessary, the Act requires the Secretary of Commerce and the Regional Fishery Management Councils to consider in-depth the economic and social impacts of the system.
1978	US Council on Environmental Quality 1978. Regulations for implementing the procedural provision of the NEPA	Human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment.
1978	Outer Continental Shelf Lands Act	The term "human environment" means the physical, social and economic components, conditions and factors which interactively determine the state, condition and quality of living conditions, employment and health of those affected directly or indirectly by the resource development activities in question.
1980	Comprehensive Environmental Response, Compensation and Liability Act	Calls for working with affected publics through community relations programs and assessing community and state acceptance of Superfund plans and affecting local populations.
1982	Nuclear Waste Policy Act	Calls for the preparation of an EIS, specific demographic limitations on siting the nuclear repository; inclusion of affected Indian tribes in the siting process and impact assistance.
1986	Superfund Amendments and Reauthorisation Act	Work with an affected public through community relations programs and assessing the acceptance of plans by local communities.
1986	Council of Environmental Quality re-issue of regulations implementing the procedural provisions of the NEPA	The treatment of incomplete or unavailable information is clarified.

Note: From *Guidelines and Principles for Social Impact Assessment* (p. 3) by The Interorganisational Committee on Guidelines and Principles for Social Impact Assessment, 1994, retrieved from NOAA Fisheries: Office of Science and Technology website.

The World Bank (WB) is a major role player in the field of impact assessments due to the fact that it offers financial and technical assistance to developing countries. As such, many impact assessments are conducted under the auspices the WB and as such have to adhere to a number of conditions and criteria as set out in the Bank's Operational Manual. Despite the abovementioned legislation, the WB only formalised their need to pay adequate attention to the social environment in the 1990s when it developed a set of safeguard policies included in their Operational Manual (Park, 2005).

Safeguard policies were designed to prevent unintended adverse effects (that could result from, inter alia, mining and infrastructure projects) on third parties and the environment

(www.worldbank.org). A total of 10 policies were developed, each with specific objectives as detailed in Table 2.

Table 2: World Bank environmental and social safeguards and their policy objectives

Safeguard	Policy objectives
Environmental assessment	Help ensure the environmental and social soundness of sustainability of investment projects, and support integration of environmental and social aspects of projects in the decision-making process.
Natural habitats	Promote environmentally SD by supporting the protection conservation, maintenance and rehabilitation of natural habitats and their functions.
Pest management	Minimise and manage the environmental and health risks associated with pesticide use. Promote and support safe, effective and environmentally sound pest management.
Physical cultural resources (PCR)	Assist in preserving PCR and in avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, religious, aesthetic or other cultural significance.
Involuntary resettlement	Avoid or minimise involuntary resettlement, and where this is not feasible, assist displaced persons in improving or restoring their livelihoods and standards of living in real terms relative to pre-displacement levels.
Indigenous people	Design and implement projects in such a way that fosters full respect for indigenous peoples' dignity, human rights and cultural uniqueness and so that they (1) receive culturally compatible social and economic benefits, and (2) do not suffer adverse effects during the development process.
Forests	Realise the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests.
Safety of dams	Ensure quality and safety in the design and construction of new dams and the rehabilitation of existing dams, and in carrying out activities that may be affected by an existing dam.
Projects on international waterways	Ensure that the international aspects of a project on an international waterway are dealt with at the earliest possible opportunity and that riparians are notified of the proposed project and its details.
Projects in disputed areas	Ensure that other claimants to the disputed area have no objection to the project, or that the special circumstances of the case warrant the Bank's support of the project notwithstanding any objection or lack of approval by other claimants.

Note. From *Safer Homes, Stronger Communities: A Handbook for Reconstructing after Natural Disasters* (p. 313-314) by A. K. Jha, J. Duyne Barensteinn, P. M. Phelps, D. Pittet and S. Sena, 2010, Washington D. C.: The World Bank.

The policies governing WB funded projects have undergone some refinements since their conception in 1991 and have to some extent become international industry standards, whether a project is funded by the WB or not (Section 2.9 below elaborates on industry standards and best practice).

2.4 Contexts in which SIAs are undertaken

Globally, SIAs are not a legal requirement for EIAs per se, despite the fact that its inclusion has become the industry standard. Thus, a SIA is often commissioned at the discretion of the EIA practitioner. The projects that benefit from SIAs are enormously diverse and the social impacts identified for each of the projects will vary as a function of the type of project or development. Based on the researcher's experience in the field, SIAs are usually conducted for the following three broad types of developments:

- Developments that will occupy a certain physical footprint and will thus require the displacement of people, entail the loss of assets or impact on people's daily movement patterns and/or access routes to resources or services. Examples include mineral extractions, waste sites, power plants, industrial plants, reservoirs and transportation facilities to mention a few. A common denominator of such developments is often that their precise location is constrained by technical considerations or extraneous factors that prevent them from being placed in such a way as to avoid impacts on people. For example, a mine has to be located at an ore body, the location of a reservoir is determined by topology, etc.;
- Developments that are likely to have a significant impact on the biophysical environment, which could indirectly lead to impacts on people. An example would be industrial plants, which often impact on air quality or the visual environment, which affects a person's or community's sense of place; and
- Developments that will change the economic, institutional, regulatory or socio-cultural environment and will thereby incur changes in the lives or livelihoods of people. For example the establishment of schools, trade facilities or sacred sites, changes in land use designation or changes in policies or legislation.

The above three categories of developments are not mutually exclusive: mining operations, the footprint of which is defined by the location of the ore body (first category), also generally have biophysical impacts (second category) resulting in psycho-socio-economic impacts on the local communities.

2.5 The SIA process

Regardless of the context in which a SIA is undertaken, the methodology employed remains more or less unchanged. Burdge (1994) proposes an eight-step process, which appears logically sequential but often overlaps in practice. This process, as mentioned under Section 2.3, has become industry

standard which is why it is presented here. The SIA process is graphically presented in Figure 1, followed by a brief discussion of each of the stages presented in the figure.

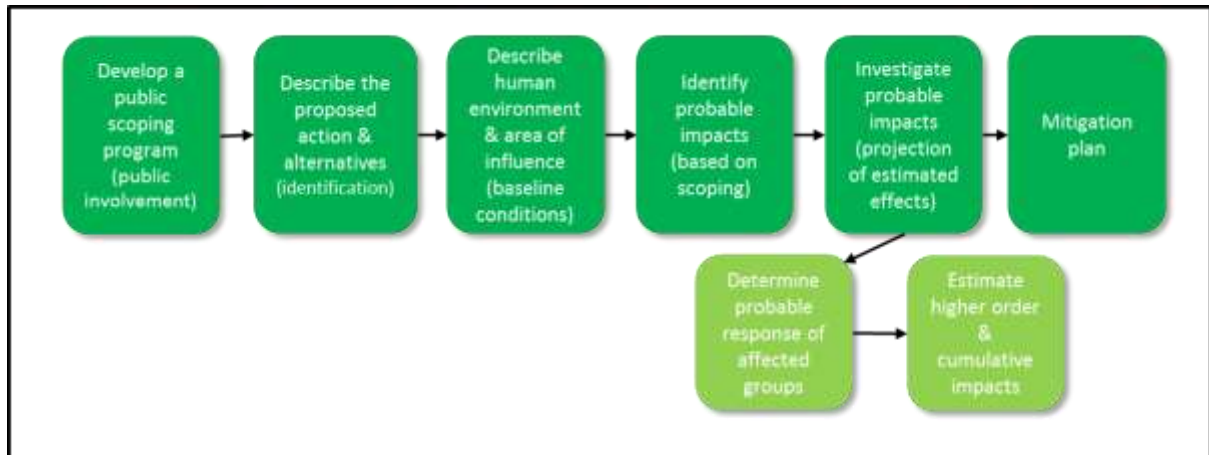


Figure 1: The SIA process (Burdge, 1994)

2.5.1 Public involvement: developing an effective public involvement plan to involve all potentially affected publics

The first stage requires the identification of and collaboration with all potentially affected groups starting at the beginning of planning for the proposed development. Such groups include those who live nearby the proposed site for development, those who will be able to hear and see the proceedings, as well as those who have an interest in the project but do not live in proximity. Others who may be affected include those affected by the influx of seasonal/recreational residents who will have to pay more for rent or food, or whose taxes may rise due to the increased community development. Once all the affected groups are identified, meetings should be scheduled during which the SIA practitioner explores their concerns and perceptions of impacts. Also, the relevant groups can be surveyed in order to obtain additional information.

2.5.2 Identification of alternatives: describing the proposed action or policy change and reasonable alternatives

This phase of a SIA process involves the collection of information relevant to the proposed development. Such data includes information pertaining to the location of the development, land requirements, needs for ancillary facilities (such as roads, sewer and waterlines), the construction schedule, facility size and shape, need for a local workforce and institutional resources. In addition,

data pertaining to alternative project designs and locations, amongst other project details, are also considered.

2.5.3 Baseline conditions: describing the relevant human environment / area of influence and baseline conditions

Baseline studies are essential since they shed light on the existing conditions and past trends associated with the human environment in which the proposed development is to take place. The study should include information pertaining to relationships with the biophysical environment, historical background, political and social resources, culture, attitudes and social-psychological conditions, as well as population characteristics. Such information can be obtained from surveys, focus groups or interviews and relevant databases such as the South African database of the Municipal Demarcation Board.

2.5.4 Scoping: identifying a range of probable social impacts

After establishing baseline conditions and acquiring a technical understanding of the proposed development, a list of probable impacts should be compiled. During the compilation, consideration should be given to both the impacts perceived by the project proponent as well as those perceived by the affected groups.

2.5.5 Projection of the estimated effects: investigating the probable impacts

This involves a detailed investigation of the potential impacts identified during the scoping phase, sifting out impacts for which it is found that they are unlikely to occur or to have significant effects, and obtaining additional information to evaluate and (where possible) quantify the remaining impacts.

The probable social impacts are formulated in terms of the following:

- Predicted conditions without the development (baseline projection);
- Predicted conditions with the development; and
- Predicted impacts, which can be interpreted as the differences between the future with and without the proposed development.

The information on which such projections are made can include other specialist impact assessment studies for the same proposed development, census statistics, records of previous experience with similar developments, as well as field research.

2.5.6 Predicting responses to impacts: determining the significance of the identified social impacts

This is a vital step since the responses of the affected groups can lead to significant subsequent impacts. After direct impacts are estimated, the SIA practitioner should estimate how the affected groups will respond in terms of attitude and actions, while keeping in mind that their attitudes prior to the development is a strong predictor for their attitudes and actions thereafter.

2.5.7 Indirect and cumulative impacts: estimating subsequent and cumulative impacts

This phase involves the estimation of indirect impacts, which are caused by the direct impacts. Cumulative impacts should also be estimated, which result from the incremental impacts of an action added to other past, present and foreseeable future conditions and actions.

2.5.8 Mitigation: Developing a mitigation plan

The mitigation phase involves both the identification of social impacts requiring mitigation and the development of such mitigation plans. The aim of such plans is to avoid, minimise or compensate for adverse impacts, as well as to enhance the positive social impacts.

2.6 Social impact variables

When conducting SIAs, many practitioners adopt an approach of working from a predetermined list of possible social impact variables. Using such a list as a starting point has the advantage of directing the SIA practitioner's investigations and minimising the possibility of overlooking a critical area (Burdge, 1994). Though there are many versions of such a matrix, one of the most inclusive was developed by Burdge (1994), whose template contains 26 variables sub-divided into five categories or themes as presented in Table 3. Typically, relevant variables are selected from the list and investigated further. The relevance of a variable depends on the likelihood of it occurring and the number of people who would be affected if it did occur. It should be noted that such a matrix is by no means exhaustive and serves only as a tool.

Table 3: Social impact assessment variables

Theme	Social Impact Variable
Population impacts	Population change Influx or outflow of temporary workers Presence of seasonal/leisure residents Relocation of individuals/families Dissimilarity in age, gender, racial/ethnic composition
Community/institutional arrangements	Formation of attitudes toward the project Interest group activity Alteration in size and structure of local government Presence of planning and zoning activity Industrial diversification Enhanced economic inequalities Change in employment equity of minority groups Change in occupational opportunities
Conflict between local residents and newcomers	Presence of an outside agency Introduction of new social classes Change in the commercial/industrial focus of the community Presence of weekend/recreational residents
Individual and family level impacts	Disruption in daily living and movement patterns Dissimilarity in religious practices Alteration in family structure Disruption in social networks Perceptions of public health and safety Change in leisure opportunities
Community infrastructure needs	Change in community infrastructure Land acquisition and disposal Effects on known cultural, historical and archaeological resources

Note. From *A Conceptual Approach to Social Impact Assessment* (p. 108) by R. J. Burdge, 1994, Middleton: Social Ecology Press.

2.7 SIA in the mining and infrastructure sectors

As with most other projects, any mining or infrastructure project will inevitably bring about social change in at least one community. This is because mining and infrastructure developments fit into several of the categories defined in Section 2.4 as contexts requiring a SIA, as follows:

- In the case of mining projects, the location of a mine is determined by the location of ore bodies. Infrastructure developments face the same constraint, for example the upgrade of roads have to take place at the location of existing roads, power stations have to be constructed in the vicinity of power lines and the location of dams is determined by the hydrological characteristics of a river. Thus a mine or infrastructure development cannot be moved to avoid impacts on people and their movement patterns.
- Mining and infrastructure development projects impact on several aspects of the biophysical environment (for example groundwater and air quality) and therefore will have an impact on nearby communities.

- Even if a mine or newly developed infrastructure facility is situated far from existing communities (thus not affecting them in either of the above two ways), it is likely to change the economic and cultural environment through, for example, the creation of job opportunities, stimulating the local economy, attracting job-seekers and possibly leading to the creation of a new community in the vicinity of the mine or infrastructure facility.

Due to the wide range of impacts that can result from a mining or infrastructure project, it is likely to have far-reaching and often irreversible impacts on the lives of the people living or working in its vicinity, or even on the economy of the region or country as a whole, depending on the scale of mining operations and the use of newly acquired infrastructure. Conducting a SIA is thus an unavoidable element in mine and infrastructure development projects. According to Joyce and MacFarlane (2001), SIA is currently the most widely applied management tool in (at least) the mining industry, used in order to do the following:

- Assist the industry in meeting the challenges of SD;
- Provide information and understanding that can be applied to achieve durable benefits for people affected by such projects;
- Address the impact and mitigation of social issues associated with the process of mine and infrastructure development; and
- Managing the social impacts on an on-going basis throughout the life of a project.

In addition, SIAs are usually conducted as part of the process of obtaining regulatory authorisation for a mine or infrastructure development. For mines in South Africa, one of the acts governing this regulatory authorisation is the Mineral and Petroleum Resources Development Act (MPRDA), which, amongst other things, requires the formulation of a Social and Labour Plan (SLP) for each mine to be developed. One of the prerequisites of a SLP is an understanding of the baseline socio-economic conditions among the affected communities, as well as community needs, both being aspects investigated in a SIA.

A review of various mining and infrastructure development-related SIA reports (Barbour & Van der Merwe, 2007; Bohlweki Consulting, 2006; Digby Wells & Associates, 2008; ERM, 2009; Golder Associates, 2007; Golder Associates, 2008; Hall, 2008; Huggins, 2002; Matli, 2005; Naledi Development, 2009; Octagonal Development, 2011), revealed that there are a number of seemingly common predicted impacts. The following impacts, both positive and negative, were identified as

likely to occur in any mining and infrastructure project during one or more of the project phases (construction, operational, decommissioning).²

2.7.1 Positive impacts

2.7.1.1 Creation of employment opportunities

Construction activities in particular create a number of temporary employment opportunities for community members. During the operational phase of a project, some longer-term employment opportunities often become available to the local communities. In addition, these activities have the potential to indirectly increase job opportunities in the informal sector in the form of, for example, food stalls for the convenience of the construction workers. In both cases, the local community temporarily benefits economically.

2.7.1.2 Local/regional economic benefits

In addition to employment creation, the local and regional economies are stimulated through, for example, local expenditure by mine employees.

2.7.1.3 Social investment and upgrading of infrastructure

The economic benefits mentioned above are often amplified by social investment activities. Such activities include donations to, for example, community development events, supporting the development of quality education, supporting initiatives aimed at improving the skills of the local community and contributing to the unremitting improvement of physical infrastructure.

2.7.2 Negative impacts

2.7.2.1 Physical and/or economic displacement of households

This pertains to the resettlement of households due to project activities.

2.7.2.2 Reduced access to land and loss of livelihoods

Often, the proposed location of a mine or infrastructure facility is in close proximity to, or precisely on, the local community's homesteads. This has severe implications for the community in terms of their access to land and the purposes they use it for. For example, a household may lose their access to grazing land and subsequently also their livestock, which is often a source of income.

² These commonly predicted impacts are presented here only to provide the reader with an idea of the types of impacts considered in SIA reports. The accuracy of these predicted impacts are investigated in Chapters 5 and 6 of this mini-dissertation.

2.7.2.3 Influx of job-seekers

As news regarding a project spreads, expectations regarding possible employment opportunities develop. Subsequently, the area surrounding the project site experiences an influx of job-seekers, which increases the local population and has a rippling effect on numerous social phenomena, such as prostitution and social fragmentation, as well as all the predicaments associated with it.

2.7.2.4 Increased pressure on social services and infrastructure

This impact is related to the above in that the migrant workers, as well as the construction workforce, cause population influx which could place pressure on public services such as water supply, sanitation and housing. Because of an increased demand for housing, informal settlements could develop and/or expand. However, this impact is cumulative and thus also depends on numerous other factors, including the economic situation of an area.

2.7.2.5 Social pathologies arising from the population influx

As was discussed above, the impacts resulting from an influx of job-seekers go far beyond the mere increase of population. The most common impacts include an increase in crime resulting from conflict between newcomers and local residents, an increase in prostitution and sexually transmitted infections (STIs), as well as an increase in the prevalence of alcoholism and drug abuse.

2.7.2.6 Impacts related to traffic and roads

Project activities lead to an increase in the volume of traffic, which affects the quality of the roads and at times leads to increased traffic in residential areas.

2.7.2.7 Impacts related to physical intrusion

The physical presence of a project is felt through the noise associated with construction and operation, the sometimes appalling visual images of the site, the decreased quality of air resulting from dust, etc. These intrusions impinge on the lives of the local community by affecting their sense of place.

2.7.2.8 Negative community perceptions and responses

Depending on the nature of the project and baseline conditions, amongst other factors, the surrounding communities may become resistant to the proposed development. This holds negative implications for both the project's development and the communities.

2.7.2.9 Impacts on safety and daily movement patterns

The normal flow of community activities are disturbed due to project requirements, including the redistribution of land and its uses. The physical presence of the project alters the daily movement patterns, which may impact on the safety of the community.

2.7.2.10 Loss of employment

Upon decommissioning, job losses, loss of income and loss of local expenditure are experienced. A community thus has to re-establish its equilibrium in the absence of many economic benefits initially offered by the project.

2.7.2.11 Reduced economic activity

Related the above, local suppliers of services and goods suffer a great loss when their contracts with the project expire.

2.8 Rating of impacts

Even though the above-mentioned impacts feature in many of the mining and infrastructure development reports reviewed for the purposes of Section 2.7, they differ in terms of their severity, duration, extent, probability and significance. Subsequently, it is necessary to rate and comment on each of these dimensions when predicting social impacts for a specific project. Through this process, one gains a more comprehensive understanding of the predicted impacts and thus allows for meaningful mitigation suggestions. In addition, environmental legislation (such as NEMA, refer to Section 2.3) requires for impacts to be rated in this way.

The impact dimensions according to which impacts are rated are outlined below. They are based on the criteria contained in the EIA regulations for South Africa, published by the Department of Environmental Affairs and Tourism (April, 1998) in terms of the Environmental Conservation Act (Act. 73 of 1989).

2.8.1 Nature of the impact

This includes a qualitative description of the manner in which the project or development is anticipated to affect the surrounding social environment.

2.8.2 Extent of the impact

This includes a description of the geographical focus of an impact. In other words, this dimension describes where and over what area an impact is likely to occur, and usually includes the following categories: site-specific, local, regional and national.

2.8.3 Intensity and status

The intensity and valence (positive or negative) of the impact is classified using a rating scale as depicted in Figure 2. A rating of none is define as having no impact on the social environment, low as having a minor influence and thus requiring some mitigation, moderate as having a more pronounced impact and requiring more stern mitigation, high as having a significant impact requiring significant mitigation measures and very high as having an even greater significant impact on the social environment requiring extensive mitigation measures.



Figure 2: Rating scale for the intensity of impacts

2.8.4 Duration of the impact

This dimension serves to indicate the time frame associated with each potential social impact and is sub-divided into permanent, long-term, short-term or temporary.

2.8.5 Probability of occurrence

This includes a description of the probability of the identified impact occurring and is sub-divided into improbable, probable, highly probable or definite.

2.8.6 Significance

The significance rating of an impact is a measure of the overall importance of an impact. It is partially determined by the ratings assigned to an impact on the aforementioned scales. However, there is also a value element that comes into play when assessing significance. For example, an impact on a highly-valued social characteristic or resource could be rated as highly significant even if it is localised, short-term and improbable.

Each social impact is assigned a significance rating in addition to its classification as either positive or negative. The degrees of significance are as follows:

- No significance: the impact will not influence the social environment and/or the proposed development in any way.

- Low significance: the impact will have a minor influence and requires some attention to modification of the project design or otherwise mitigation.
- Moderate significance: the impact will have a restrained impact on the social environment and/or the proposed development. Modification of the project design or valuable mitigation plans can improve this impact.
- High significance: the impact will have a major influence, indicating that the proposed project, or facets thereof, should be terminated since no mitigation measures will be able to compensate for the impact.

The significance of impacts is often determined under two conditions: under the assumption that no mitigation measures are implemented and under the assumption that the recommended mitigation measures will be implemented. The difference between these two significance ratings therefore reflects the expected effectiveness of the recommended mitigation.

2.9 Best practice guidelines

A number of authors have defined different procedures for conducting SIAs, developed matrices of possible impacts to consider and provided guidelines for the rating of impacts (for example, Burdge, 1994; Burdge & Vanclay, 1995; Gramling & Freudenburg, 1992; Ross, 1990; Vanclay, 2002). Consequently, SIAs are carried out in a number of different ways, although for the same purpose (contributing to the lack of credibility of SIAs as discussed in Section 2.3). As such, it became necessary to develop an overriding set of guidelines and principles to govern the process and accomplish the following (Vanclay, 2003):

- Aid with the development of national legislation and policy;
- Provide and establish minimum standards for SIA practice in international contexts;
- Increase the appeal of SIA to a wider range of audiences through increasing its legitimacy; and
- Provide an articulation of best practice in SIA as a model to aspire to.

The most widely recognised and frequently applied set of best practice principles are the Performance Standards (PS) on Social and Environmental Sustainability, developed and finalised by the International Finance Corporation (IFC) in 2006. The IFC is one of the five organisations that

make up the World Bank Group (WBG)³. The eight PS, as well as a brief explanation and the objectives of each, is provided below (International Finance Corporation, 2006).

2.9.1 PS 1: social and environmental assessment and management system

This PS emphasises the importance of managing social and environmental performance throughout the life of the project and is applicable to all projects with social and/or environmental risks and impacts that should be managed both at the early stages of the project as well as on an on-going basis. Its objectives are as follows:

- To identify and assess social and environmental impacts, both positive and negative, in the project's area of influence;
- To avoid, minimize, mitigate or compensate for adverse impacts on communities and the environment;
- To ensure that affected communities are appropriately engaged on issues that could potentially affect them; and
- To promote improved social and environmental performance of companies through the effective use of management systems.

2.9.2 PS 2: labour and working conditions

This PS recognises that the pursuit of economic growth through employment creation and income generation should be balanced with protection for basic rights of workers. Its objectives are as follows:

- To establish, maintain and improve the worker-management relationship;
- To promote the fair treatment, non-discrimination and equal opportunity of workers, and compliance with national labour and employment laws;
- To protect the workforce by addressing child and forced labour; and
- To promote safe and healthy working conditions, and to protect and promote the health of workers.

³The World Bank Group (WBG) consists of five organizations, namely the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA) and the International Centre for the Settlement of Investment Disputes (ICSID) (www.worldbank.org). Generally, when one speaks of the WB, it includes only the IBRD and the IDA. The IFC provides investments and advisory services to build the private sector in developing countries (www.ifc.org).

2.9.3 PS 3: pollution prevention and abatement

This PS recognises that increased industrial activity and urbanisation often generate increased levels of pollution of air, water and land that may threaten people and the environment at a local, regional or global level. The objectives of this PS are as follows:

- To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities; and
- To promote the reduction of emissions that contribute to climate change.

2.9.4 PS 4: community health, safety and security

This PS recognises that project activities, equipment and infrastructure often bring benefits to communities, including employment, services and opportunities for economic development. It also recognises, however, that development can increase the potential for community exposure to risks and impacts arising from equipment accidents, structural failures and releases of dangerous materials. The objectives of this PS are as follows:

- To avoid or minimise risks to and impacts on the health and safety of the local community during the project life cycle from both routine and non-routine circumstances; and
- To ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimises risks to the community's safety and security.

2.9.5 PS 5: land acquisition and involuntary resettlement

This PS refers both to physical displacement (the relocation or loss of shelter) and to economic displacement (loss of assets, or access to assets that results in the loss of income or means of livelihoods) and recognises that unless properly managed, involuntary resettlement may result in long-term hardship and impoverishment of affected persons and/or communities. Its objectives are as follows:

- To avoid/ minimise involuntary resettlement where feasible by exploring alternative project designs;
- To mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of land by providing compensation for loss of assets at replacement cost, and ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected;
- To improve or at least restore the livelihoods and standards of living of displaced persons; and

- To improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.

2.9.6 PS 6: biodiversity conservation and sustainable natural resource management

This PS acknowledges that protecting and conserving biodiversity, as well as its ability to change and evolve, is fundamental to SD. Its objectives are as follows:

- To protect and conserve biodiversity; and
- To promote sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.

2.9.7 PS 7: indigenous peoples

This PS recognises that indigenous people, as social groups with identities that are distinct from dominant groups in national societies, are often among the most marginalised and vulnerable segments of the population. The objectives of this PS are as follows:

- To ensure that the development process fosters full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of indigenous people;
- To avoid adverse impacts of the project on communities of indigenous people, or alternatively minimise, mitigate and compensate for such impacts, and to provide opportunities for development benefits, in a culturally appropriate manner;
- To establish and maintain an on-going relationship with the indigenous people affected by the project throughout the life of the project;
- To foster good faith negotiation with and informed participation of indigenous people when projects are to be located on traditional or customary lands under the use by indigenous people; and
- To respect and preserve the culture, knowledge and practices of indigenous people.

2.9.8 PS 8: cultural heritage

This PS recognizes the importance of cultural heritage for current and future generations, and its objectives are as follows:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation; and
- To promote the equitable sharing of benefits from the use of cultural heritage in business activities.

Although the above PS are internationally recognised and in most cases applied, numerous other organisations and associations have developed their own best practice guidelines. One such example is the IAIA, which is a global network on best practice in the use of impact assessment for decision-making regarding policies, programmes, plans and projects (www.iaia.org). Through worldwide interaction with impact assessment practitioners, researchers, and other users of impact assessments, the IAIA developed a number of core values and fundamental principles for development. The principles specific to SIA practice are provided in Figure 3. Although these do not seem to carry as much weight in the field of impact assessment and among impact assessment practitioners as the PS (R. Nawn, personal communication, October 2, 2010; J. J. Perold, personal communication, October 2, 2010), they are relevant in so far as they have been developed by professionals who have been exposed to the PS and other guidelines, and have recognised either gaps or inadequacies in such documentation.



Figure 3: Principles specific to SIA practice

2.10 Problems confronting SIAs

As discussed previously, SIAs are conducted almost exclusively for practical purposes, that is, for the purpose of identifying possible social impacts prior to its occurrence. Nevertheless, the process ought to remain methodologically rigorous. As discussed in Section 2.9, numerous organisations are devoted to the implementation of best practice and provide the relevant guidelines and principles for this reason.

Due to the combined practical and methodological approaches, various problems arise. Burdge and Vanclay (1995) divide these problems into the following four categories:

- Difficulties in applying the social sciences in SIA;
- Difficulties with the SIA process itself;
- Problems with the procedures applying to SIA; and
- A prevailing ‘asocietal mentality’.

Exhaustively considering all the challenges faced by SIA practitioners lies outside the scope of this study. What is of interest are the problems identified under the category of procedures applying to SIA. The relevant issues are discussed below, each of which implicitly suggests the need for the present study:

- A large proportion of literature on SIA is grey literature that is not published in peer-reviewed academic journals or in the public domain. Instead, this literature resides in, amongst other forms, specialist reports, project progress reports and minutes of meetings, that are circulated informally among members of the SIA community, but do not necessarily percolate through to all members of that community (J.J. Perold, personal communication, October 15, 2007). As such, while acknowledging that there is a lot of accessible and published literature pertaining to SIA, a large proportion of relevant literature is inaccessible. In addition, where reports have been published, they often lack the detail necessary to evaluate the validity of the claims made. This is primarily due to the fact that the intended audience for which the reports are written (the client or proponent) are not so much concerned with the methodology as they are with the results of the impact assessment.
- Baines and Taylor (2002) state that SIAs are regarded as subordinate to EIAs and that there is an overemphasis on the biophysical dimension of impact assessment reports. This is an established attitude also noted by Burdge and Vanclay (1995), who add that the status of SIAs is undermined, the reports often go unheeded and mitigation measures are seldom taken seriously.
- Burdge et al. (1995) posit that statements regarding impacts are often used to determine whether a development should be executed or not and if approval is granted, it is granted conditionally, for example on condition that certain mitigating measures are in place or certain compensations are made. SIA reports are thus used in a black and white manner as an approval mechanism, as well as to determine the level or form of compensation. This results in some projects proceeding, with compensation paid, even though the project and compensation itself may create considerable social impacts that suitable mitigating plans could have prevented. Conversely, approval may be denied to projects that could potentially be acceptable given certain mitigation strategies.
- Along the same thread as the notion mentioned above that SIAs are used as in a black and white manner, failure to embrace SIAs as the initial step in an on-going process to manage the social environment by means of mitigation measures limits the usefulness of SIAs. In the words of Burdge and Vanclay (1995, p.68): 'the potential for the development and implementation of effective and on-going mitigation strategies is limited by the failure to

see SIA as a process'. According to Joyce and MacFarlane (2001), the above failure results in poorly understood objective outcomes of mitigation measures, resulting in poor monitoring in terms of how to evaluate the resulting information.

- Finally, and perhaps most importantly, Burdge and Vanclay (1995) state that there exists little evaluation or audit of SIA reports, and clients seldom seek to determine the validity and reliability of the predictions made in a SIA report. This is also a long-standing problem still experienced by SIA practitioners today (J. J. Perold, personal communication, September 13, 2007; Rolfe, Ivanova, & Lockie, 2006).

The above concerns revolve around three central issues; firstly, the validity and reliability of the impacts predicted in SIAs are generally unknown. That is, the general truthfulness and trustworthiness of the claims made in the reports regarding specific communities can be brought into question. This is not to imply that practitioners aim to deliberately deceive the reader of the SIA report, but rather that adequate time and budget is often not available to conduct a comprehensive SIA and as such some social issues may be overlooked or are not adequately investigated. Within a specialised field, the lack of such evidence results in a lack of stature of such information. Secondly, the improper use of SIAs (using it as an approval mechanism) ignores the assigned significance of impacts. This lack of attention to detail contributes to the loss of importance of SIA reports. Both the above culminate in the final issue; SIA reports and mitigation suggestions are often not taken seriously or considered to be of much value within the context of an overall EIA report.

2.11 The importance of post hoc assessments of SIAs

The problems confronting SIAs largely stem from the practical concern that due diligence investigations on the outcomes of SIAs are few and far between (Joyce & MacFarlane, 2001). This concern is shared by Duthie (2007), who states that little attention is paid to the implementation and enforcement of recommendations made in impact assessment reports (see Section 1.2), as well as Lockie et al. (2009), who state that 'few impact assessment studies are followed up post-development to test their accuracy, adjust mitigation strategies, or inform the assessment of other proposals' (p. 330). To preserve and augment the field of SIAs, it is necessary to emphasise what Joyce and MacFarlane (2001) call the "full life cycle" approach, which includes the retrospective assessment of the accuracy of the predictions made in SIA reports. This, in turn, allows for the revision of the assumptions on which we base predictions of social impacts resulting from projects and developments, all culminating in more accurate and reliable future SIAs. This "full life cycle" approach is graphically presented in Figure 4 below. The figure suggests that instead of just predicting and rating impacts and designing mitigation measures (as is the norm), the SIA

practitioner should follow up on whether a specific project was approved, conduct an post hoc assessment on his/her predicted impacts and based on the outcome of the post hoc assessment, revisit his/her assumptions on which the predictions were based, culminating in a more comprehensive increase of the practitioner’s knowledge of and experience in the field.

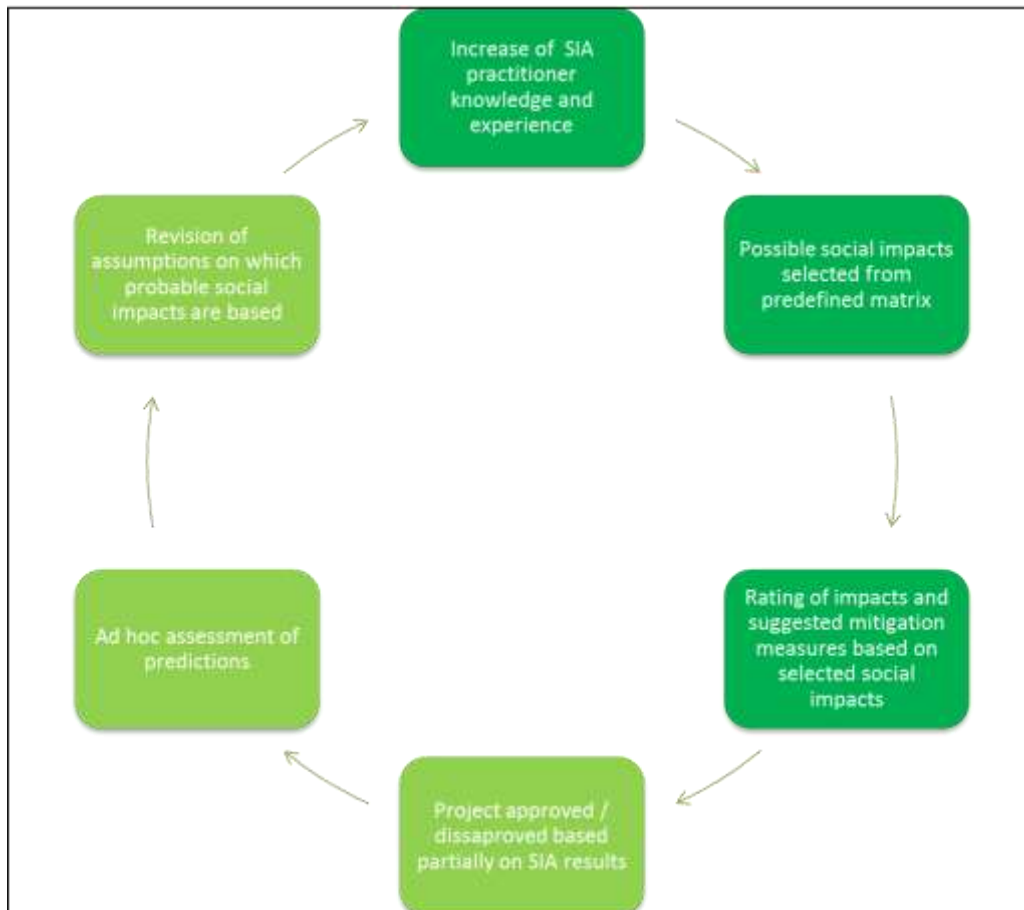


Figure 4: The current and suggested SIA “full life cycle” (Joyce & MacFarlane, 2001)

2.12 Conclusion

This chapter provided background information about the field of SIA necessary for comprehending the current research. The field was defined and its process explained, which allowed the reader to understand how predictions regarding psycho-socio-economic impacts are made. The chapter culminated in an explanation of the main problems facing SIA, with specific focus on the procedures involved in the process of SIA, and offered a recommendation to improve on these procedures, namely by employing a “full life cycle” approach when conducting SIAs.

The following chapter introduces the theoretical approach adopted to perform the current research; the usefulness of a systemic approach to the current research is explained, as are the main tenets of the theoretical approach relevant to this research and the field of SIA in general.

Chapter 3: Systems theoretical approach

3.1 Introduction

The purpose of this chapter is to set out the theoretical basis from which the author approached the current research and according to which she understands and reasons about the subject matter. The reasons for choosing the systems theoretical approach is explained, followed by a brief history of systemic thinking. The fundamental principles and basic concepts of the approach relevant to the current research are discussed, as is ecological systems theory. Next, the use of metaphors in systems thinking is explored, as is its role in advancing science. The field of SIA is conceptualised according to the chosen theoretical approach. The implications of adopting this theoretical approach for the current research are discussed, followed by a brief consideration of the relationship between the observer and the observed system.

3.2 Justification for using the systems theoretical approach

As alluded to in Section 1.4, the field of SIA is primarily concerned with the manner in which a social system or community (which consists of numerous interlinked variables and networks of cause-and-effect) is influenced or changed by the introduction of a project (which may likewise be conceptualised as a complex, multi-faceted system). In order to make accurate predictions about these changes or impacts, as well as to understand why certain impacts may have been incorrectly predicted, a thorough understanding of both systems (the community affected by a project, as well as the project itself), together forming a supra-system, is required.

As is the case with most topics concerned with individuals or the human environment, a social system is complex and dynamic by virtue of the elements that comprise that system (people) (Bateson, 1979). Furthermore, the nature and significance of social impacts are complicated, interrelated and dependent on a large number of factors. The nature and significance of impacts resulting from identical projects in similar communities may be fundamentally different, depending on the characteristics of each community.

As such, making sense of a social system requires a theoretical perspective that is able to capture its dynamic complexity while being sufficiently established or developed to explain the core processes that take place within the system. As will be shown in the remainder of this chapter, a systems theoretical approach meets both the abovementioned criteria and is arguably the best suited approach to meeting the research aims and objectives.

3.3 The origins and development of systemic thinking and theory

In its essence, systems thinking is a response to the limitations faced by the theoretical approach of reductionism, which posits that a complex system is nothing but the sum of its parts, and that that this complex system can be understood by understanding its individual components in isolation (Sperry, 1983). Bateson (1972) notes that tension between the two approaches can be traced back to ‘the Pythagoreans versus their predecessors’ (p. 449), who disagreed about whether the substance or the pattern of a topic of interest should be studied. The Pythagoreans opted for the study of patterns. Despite its long history, however, the emphasis of pattern rather than substance failed to achieve a dominant position through most of the history of science and philosophy. It would not be until the first half of the 20th century that this manner of study would become popular.

Before the noteworthy re-emergence of systemic thinking in the early 1930s, the dominant manner in which phenomena were understood and studied was by breaking it into the smallest possible parts and studying these parts: chemists studied simple substances, physicists studied atoms, biologists cells, and psychologists instincts, drives and motives (Blanchard & Fabrycky, 1990). Inherent in this approach are the following two assumptions:

- A phenomenon is best understood when its parts are studied in isolation (Vallacher & Nowak, 1994); and
- Once a phenomenon has been reduced into parts, ‘the parts themselves cannot be analysed any further, except by reducing them to still smaller parts’ (Capra, 1996, p. 29).

The belief was that the more one knows about the individual parts of a phenomenon, the better one will understand the phenomenon as a whole. The partial explanations of the various parts were aggregated into an explanation of the whole (Vallacher & Nowak, 1994). From the reductionists’ perspective then, the whole is nothing more than the sum of its parts.

From roughly the 1930s onwards, more and more scientists and thinkers began to realise that phenomena cannot be fully understood using the reductionist approach as the properties of individual parts of a system or phenomena must be viewed in the context of the larger system (Capra, 1996). This notion was formalised by Austrian biologist Ludwig von Bertalanffy who noted that complex systems, regardless of the field of study in which it occurs, share similarities and called for a discipline that enables the study of these similarities (Capra, 1996). He continued to lay the foundations of such a discipline, which he called general systems theory (Capra, 1996). This theory began to consider the characteristics of whole systems, focusing, *inter alia*, on the interconnectedness of the various parts of a system.

Around the same time, similar thinking to Von Bertalanffy's emerged independently from a number of people in different disciplines: mathematicians Nobert Wiener and John von Neumann, anthropologists Gregory Bateson and Margaret Mead, and psychiatrist William Ross Ashby, amongst others, began formalising their thinking in the same manner Von Bertalanffy did. These aforementioned thinkers contributed to the notions of dynamic patterns, feedback loops and purposeful behaviour by a system (Capra, 1996). Wiener (1949) coined the term 'cybernetics' to describe the newly-founded discipline that studies such ideas. While systems theory is concerned with the manner in which systems are structured, cybernetics is more concerned with the manner in which systems function (Capra, 1996). However, 'cybernetics and systems theory study essentially the same problem' (Heylighen, Joslyn, & Turchin, 1999, p. 1).

3.4 Basic principles of systems theory

As mentioned in Section 3.3, systems theory grew simultaneously from a number of disciplines and is meant to be applicable to any complex system or phenomena, regardless of the discipline in which it occurs. This section explores some of the fundamental principles and concepts of systems theory relevant to this study.

3.4.1 Fundamental assumptions

Applying a theoretical approach to research implies that the researcher has made certain assumptions about how the world works. When adopting a systemic approach to research, the researcher assumes the following:

- That a system is anything that can be described in terms of a number of interacting or interdependent variables. Thus, human societies, ecosystems, individuals and mechanical devices that contain at least one feedback loop (this concept is discussed in Section 3.4.3) can be referred to as a system. Virtually any aspect of the universe we choose to study can be regarded as a system.
- Regardless of how complex a phenomenon or system is, there is always some form of organisation in that system, which is different from its physical structure (Capra, 1996). Capra (1996) defines this organisational pattern as 'a configuration of relationships characteristic of a particular system' (p. 80), and continues to say that the study of these patterns is crucial for the understanding of systems as the properties of a system arise from a configuration of ordered relationships.
- Contrary to the reductionist approach and in light of the concept of organisational patterns described above, the whole is always greater than the sum of its parts. As Capra (1996)

states, when systems are dissected into smaller parts (as reductionism does), its pattern or configuration of relationships is destroyed. When a system is studied as a whole, however, the connections and interactions between different parts of a system give rise to a new dimension of a system that cannot be accounted for by its individual components.

- Many systems display (or are amenable to description in terms of) hierarchical organisation, meaning that the parts of a system may themselves be regarded as systems in that they also consist of multiple interacting parts; conversely, any system one chooses to study might be just one part of a larger system, or supra-system.
- A systemic approach is a contextual approach; just as parts of a system cannot be isolated from one another when trying to understand a phenomenon, so too can the phenomenon not be isolated from the context in which it occurs (Capra, 1996; Meadows, 2008; Schilling, 2000). A phenomenon has a specific relationship with its environment, thus the context has the ability to influence the phenomenon.
- Many systems – especially systems constituting living organisms or communities of organisms – have the inherent ability to regulate themselves through balancing mechanisms or feedback loops. Such regulation is required for the system to exist in a state of homeostasis, allowing it to maintain itself in a state of dynamic balance (Capra, 1996; Meadows, 2008).

In the context of this research, the above assumptions imply viewing a community as a complex, dynamic and organised entity consisting of a number of parts (households or individuals) that are interrelated and interdependent. These parts, when considered in relation to one another, give the system additional characteristics or emergent properties that are not independently visible or identifiable when considering the individual parts in isolation. Furthermore, an understanding of the broader context in which the system is embedded is crucial for understanding the behaviour of a system, which is aimed at maintaining its existence.

3.4.2 Open and closed systems

A closed system is defined as a system that is not influenced by its environment: it does not transfer energy to its environment and energy from the environment does not influence the functioning of the system (Capra, 1996). In the field of social sciences, the concept of a closed system is purely theoretical: no social system can exist without exchanging energy with its surrounding environment.

In contrast, an open system is defined as a system that is influenced by its environment (it receives input from the environment) and, in turn, has the ability to influence its environment (it provides outputs) (Capra, 1996; Meadows, 2008). An open system maintains itself in a state far from

equilibrium but manages this steady state by continual flow and change (of energy and information), both within itself and its own subsystems, as well as between the system and its environment (Capra, 1996). All living systems are open systems (Von Bertalanffy, 1976), reemphasising the importance of having an understanding of the context in which a phenomenon occurs in order to understand the functioning of that phenomenon.

3.4.3 Feedback loops

In Section 3.4.1, it was noted that one of the fundamental assumptions associated with systemic thinking is that systems are self-regulating and in Section 3.4.2 it was noted that the self-regulation of a system is characterised by continual flow and change. In order for “flow and change” to translate into “self-regulation”, a communication mechanism is required. Feedback loops provide such a mechanism.

As mentioned above, in systems where change can occur, there are inputs resulting from the environment’s impact on a system, as well as outputs which is how the system impacts the environment. In feedback loops, input (both from the environment and from other subsystems) provides certain information about a particular action, and the system in question might respond to that information by either accelerating the action (positive feedback loop), which implies exponential growth; or the input can shift the action in the opposite direction, thus limiting the action (negative feedback loop), which serves to stabilise the system and maintain equilibrium. Positive feedback loops are necessary for many aspects of system functioning (for example, biological growth is based on cell division, in which an increase in the number of cells increases the rate at which cells proliferate and vice versa). If left indefinitely, however, positive feedback loops will destroy the system and must be balanced with negative feedback loops so that the system can sustain itself over time: for example, a cancer tumour is precisely a group of cells in which the mechanism for checking runaway growth has gone awry. Thus, negative feedback loops are adaptive and purposive (Capra, 1996; Meadows, 2008).

An example of a positive feedback loop at a social level may be gleaned from the researcher’s first-hand experience, who witnessed a community’s reaction towards a proposed project over a period of a couple of weeks; in response to the news of a proposed nuclear power station at Thyspunt in the Western Cape, a small group of individuals mobilised against the project. In an attempt to gain support, this initial group distributed posters advocating why the proposed project should not be authorised, popularised slogans such as “No Nukes” and even formed alliance groups. Through their actions, more and more people started to mobilise against the proposed project, strengthening the social opposition against it and increased the opposition group’s ability to recruit more members.

A community's response to an influx of job-seekers as a result of a project is a good example of a negative feedback loop; the community sees that the job-seekers are placing pressure on available resources and that they have to compete for job opportunities with the migrant job-seekers. As a result, the community becomes antagonistic towards the migrants and thereby discourages other job-seekers from coming into the area, decreasing the rate of influx into the community. As the community realises the decreased rate of influx, they reduce their antagonism. As the potential migrants realise the reduced antagonism, they deem it save to migrate to the community, thus increasing the pressure on local resources and competition for employment again, which causes the local antagonism to increase again.

3.4.4 Requisite flexibility

In order for a system to remain in a steady or stable state, each of the system's variables must be able to change as is required by the system as a whole. Each of the individual variables within a system has a requisite range of flexibility, which is the spectrum of alternative states that it must be able to adopt to ensure the survival of the system as a whole (Bateson, 1972). Each variable has both an upper and lower threshold of tolerance and if forced or pushed beyond that tolerance, will experience discomfort or pathology and eventually death (Bateson, 1972). If a system's variables do not have requisite flexibility, the system's ability to respond to environmental changes or inputs is decreased, placing the entire system at risk.

Bateson (1972) uses the example of a tightrope walker to explain the concept of requisite variety: a tightrope walker is able to balance himself by changing his posture in a number of different ways. If the walker feels that he is leaning too much to the one side, he shifts his centre of gravity to the other side by, amongst other actions, moving his arms. If he feels that he is leaning too much to the other side, he moves his arms in the opposite direction to correct his posture, and so on (these actions constitute a negative feedback loop). Should the tightrope walker's arms be restricted, the flexibility of one of the variables that allow the walker to maintain his balance is reduced, disrupting the function of the feedback loop and likely resulting in the walker falling from the rope.

All systems have a limited supply of flexibility at any given time, and have a way of expending flexibility where it is required and reducing flexibility where it is not required. In order to do this, differentiated subsystems develop within a system, each with varying degrees of flexibility (Bateson, 1972, Meadows, 2008). Continually successful responses by subsystems become "hardwired" into that subsystem, freeing up some of the entire system's finite flexibility and allowing other subsystems more flexibility as required, placing the system in a better position to respond appropriately and thus survive the impacts caused by an external change (Bateson, 1972).

3.4.5 Equifinality and multifinality in open systems

Simply stated, equifinality is the principle that any particular end state can be achieved by a variety of means or trajectories (Von Bertalanffy, 1976). Thus, the state of systems with different initial conditions can converge, through a variety of different behaviours and processes, to eventually reach the same or a similar end state.

Conversely, multifinality is the principle that the same initial condition, component or cause can result in a number of different outcomes as it functions or behaves differently in different systems, environments and contexts (Von Bertalanffy, 1976). Given that multifinality refers to multiple possible outcomes, it is associated with divergence of systems' states.

These principles are important for the SIA practitioner as it draws his/her attention to the fact that two communities, even if on a superficial level they appear to be very similar, might not be affected in the same way by the same project (multifinality, in which very small initial differences between the two communities may become amplified over time). Conversely, it implies that the impact of a project may (under certain conditions) cause two communities to become more and more alike over time, even if initially they appeared to be very different (equifinality).

3.5 Ecological systems theory

One of the discipline-specific theories that emanated from general systems theory and the systemic approach is developmental psychologist Urie Bronfenbrenner's ecological systems theory. The model of human development proposed by Bronfenbrenner (1979) is widely adopted in various fields within the social sciences, and despite being a developmental model, is very useful to the current research as it illustrates the intricate relationship amongst the various social impact variables (as set out in section 2.6) as well as their associated consequences.

The central tenet of ecological systems theory is that human development occurs within and is influenced by a number of interlinked environmental or ecological systems. Bronfenbrenner (1979) uses the Russian nesting doll metaphor to illustrate these levels; each doll, when opened, reveals a smaller one inside, until the smallest doll appears. This metaphor calls our attention to how the smallest doll exists within layers of bigger dolls, just as individuals exist in layers of social relationships. Existing in such layers implies that the individual is influenced by, and influences the other layers, making the various levels of our environment interdependent. Furthermore, the theory postulates that one cannot comprehensively understand human behaviour if it is not viewed in the social and cultural milieu in which it takes place (Bronfenbrenner, 1979).

Bronfenbrenner (1979) conceptualised the human ecosystem to consist of four sets of concentric subsystems, as follows:

- **Microsystems:** this system is ‘a pattern of activities, roles, and interpersonal relations experienced by the developing person in a given setting with particular physical and material characteristics’ (Bronfenbrenner, 1979, p. 22), and includes, for example, peer groups, immediate family and one’s workplace.
- **Mesosystems:** this system contains the relations or links between the various microsystems and can be said to determine the rules of interaction between various microsystems. Examples of mesosystems include the interaction between one’s family and work colleagues, or one’s family and peers.
- **Exosystems:** these systems are those that indirectly affect an individual at a microsystem level. Individuals who are part of the same microsystem do not necessarily share all their microsystems. The microsystems that an individual does not have in common with the members of his/her microsystems constitute his/her ecosystem. For example, one’s colleague’s family is part of one’s exosystem.
- **Macrosystems:** this system denotes the social and cultural context in which an individual and the other systems are embedded. Members of the same macrosystem typically share values, norms and customs that dictate behaviour and regulate interaction within and between mesosystems.

These four ecological subsystems are graphically depicted in Figure 5.

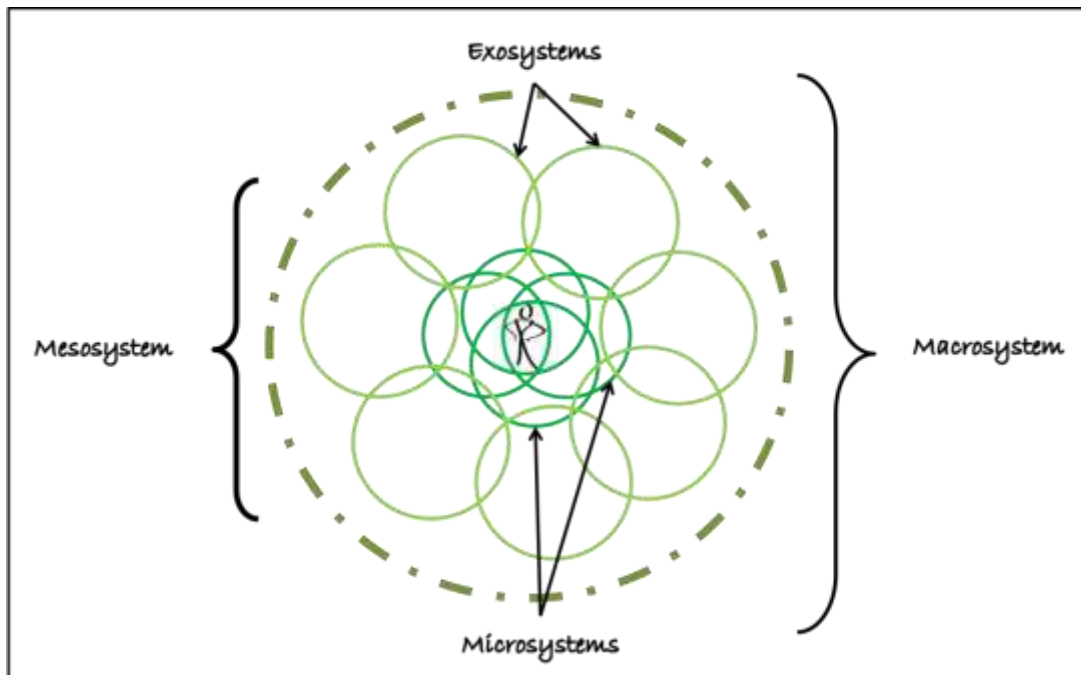


Figure 5: Bronfenbrenner's (1979) ecological model of concentric systems

Psycho-socio-economic impacts resulting from mining and infrastructure projects occur and are experienced on different ecological levels (for example, on an individual, household or community-wide level). Knowledge of Bronfenbrenner's theory not only sheds light on the complex and interdependent nature of these impacts, but encourages a comprehensive and holistic approach to the identification and investigation thereof.

3.6 The use of metaphors in systemic thinking

As a systems thinker, Bronfenbrenner appropriately uses the Russian nesting doll metaphor to describe the position of an individual within various ecological levels. The use of metaphors by systems thinkers is common as systems thinking recognises the importance and encourages the use of appropriate metaphors in scientific description and analysis. As Bateson (1994) states:

Metaphors are what thought is all about. We use metaphors consciously or unconsciously, all the time, so it is a matter of mental hygiene to take responsibility for these metaphors, to look at them carefully, to see how meanings slide from one to the other. Any metaphor is double-sided ... offering both new insight and new confusion. The solution is to take responsibility for the choice of metaphors, to savor them and ponder their suggestions [and] above all to live with many and take no one metaphor as absolute. A metaphor goes on generating ideas and questions, so that a metaphorical approach to the world is endlessly fertile and involves constant learning. A good metaphor continues to instruct. (p. 133)

Due to the importance of metaphors in systems thinking, many systems thinkers, notably Bateson (1972), warns against the inappropriate use of metaphors – for instance, metaphors that create the illusion of similarity between different phenomena or fields of enquiry that are actually fundamentally different. He points out that a particular danger for the social and behavioural sciences in this regard is the use of physical metaphors (those involving the concepts of energy, force and impact, for example) to describe systems that are actually governed by information exchange, feedback loops and requisite flexibility amongst others. Bateson (1972) argues, for instance, that psychoanalytic theory is fundamentally flawed because it has fallen into precisely this trap: it conceptualises psychological processes as “forces” or “energy” when in fact they are instances of information processing. Energy and information are two very different entities: whereas energy cannot be created or destroyed, only concentrated, dissipated or converted into different forms, information can easily be created and destroyed. However, the use of the energy metaphor tricks one into thinking that the currency or basic “stuff” of psychological processes must be similarly indestructible – which, in turn, leads to notions such as “suppressed psychic energy” (as energy cannot be destroyed) that “builds up pressure” and manifests as neuroses, which is one of the ways to relieve the aforementioned pressure. Bateson (1972) is of the opinion that if one builds an entire theoretical edifice on the notion that something like “psychic energy” exists, one is bound to make fundamental errors in one’s understanding of how the human psyche, and by implication, a society or community, works.

3.7 Metaphors, raw data and fundamental knowledge

In pursuing his argument about the inappropriate use of energy metaphors in the social and behavioural sciences, Bateson (1972) also introduced a novel conception of the nature of scientific progress and explanation. He argues that science works with three broad categories of information - these are schematically depicted in Figure 6. The left-most column of the diagram depicts the “raw data” that scientists work with, such as observations and experimental results (although Bateson acknowledges that there is now such thing as truly “raw” data, as data are necessarily subjected to editing or transformation ‘by man or his equipment’ (p. 15)). The right-most column depicts what Bateson (1972) calls “fundamental knowledge”, which includes both the truistical propositions (e.g. that $5 + 7 = 12$ if numbers and the operation of addition are appropriately defined) and “laws” that are generally true (for example, Newton’s Laws and the laws of thermodynamics). For Bateson, the ultimate goal of science is to increase this body of fundamental knowledge. With the exception of mathematics (which deals with truistical propositions in a closed body of axioms and theorems), this quest can never be divorced from raw data. Scientific explanation may therefore be defined as the

process of “mapping” the scientist’s data onto fundamental principles – in other words, bridging the gap between the first and the third column in the diagram.

The middle column in the diagram represents the means by which this bridge is achieved. It contains “heuristic concepts” that scientists formulate to explain those aspects of their data that cannot be immediately linked to fundamental principles. Heuristic concepts that are familiar to social and behavioural scientists are terms such as “instinct,” “ego,” “self,” and “intelligence”. Because they cannot (yet) claim universal validity, they cannot be listed among the fundamentals, but they are also more general and abstract than any body of raw data.

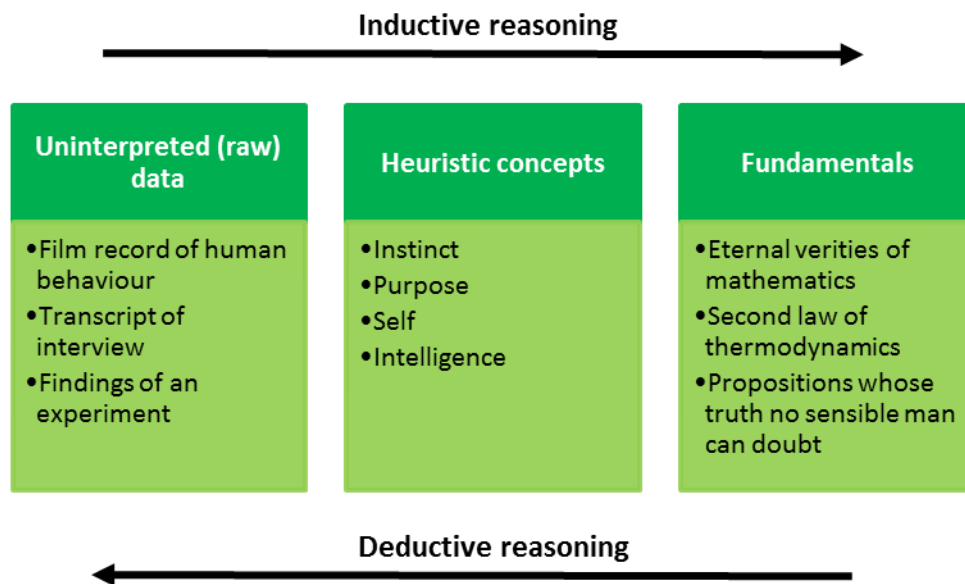


Figure 6: Bateson’s (1972) diagram to explain the purpose of the scientist

Science often proceeds inductively, by working from data through heuristic concepts to the fundamentals. Thus, as Bateson (1972) states:

[p]rogress is made by study of the “raw” data, leading to new heuristic concepts. The heuristic concepts are then to be regarded as “working hypotheses” and tested against more data. Gradually, it is hoped, the heuristic concepts will be corrected and improved until at last they are worthy of a place in the list of fundamentals. (p. 15)

However, Bateson cautions that a purely inductive approach can sometimes lead to a conceptual cul-de-sac. He cites the behavioural sciences (as these existed before the advent of systems thinking) as an example. He accuses the behavioural scientists of his day of dealing with heuristic concepts that ‘are so loosely derived and so mutually irrelevant that they mix together to make a sort of conceptual fog which does much to delay the progress of science’ (Bateson, 1972, p. 15) and he

describes the end result as follows: '[a]bout fifty years of work in which thousands of clever men have had their share have, in fact, produced a rich crop of several hundred heuristic concepts, but, alas, scarcely a single principle worthy of a place in the list of fundamentals' (p. 16).

As an antidote to such an impasse, Bateson (1972) recommends a combination of inductive and deductive reasoning:

[i]n scientific research you start from two beginnings, each of which has its own kind of authority: the observations cannot be denied, and the fundamentals must be fitted. You must achieve a sort of pincers manoeuvre. If you are surveying a piece of land, or mapping the stars, you have two bodies of knowledge, neither of which can be ignored. There are your own empirical measurements on the one hand and there is Euclidean geometry on the other. If these two cannot be made to fit together, then either the data are wrong or you have argued wrongly from them or you have made a major discovery leading to a revision of the whole of geometry'. (p. 16)

Bateson's diagram (Figure 6) offers an elegant explanation of the propensity, mentioned above, of social and behavioural scientists to indulge in inappropriate energy-based metaphors. According to him, the pioneers of behavioural science (such as Freud) correctly identified the need to bridge the gap between the raw data and the fundamentals by working from both ends. However, they were in error in their assumption that this bridge would best be built to the fundamentals of physics and chemistry – most notably, the laws of thermodynamics.

Bateson (1972) further clarifies this thought:

[m]y critical comments ... about the metaphoric use of "energy" in the behavioural sciences add up to a rather simple accusation of many of my colleagues, that they have tried to build the bridge to the wrong half of the ancient dichotomy between form and substance. The conservative laws for energy and matter concern substance rather than form. But mental process, ideas, communication, organization, differentiation, pattern, and so on, are matters of form rather than substance. (p. 19)

According to Bateson (1972), the revolution brought about in the social and behavioural sciences through the advent of systems thinking resides in the fact that it offers a new starting point among the fundamentals from which to build the bridge to the raw data. This new starting point consists of ideas that have been developed in disciplines such as information theory and cybernetics – disciplines that are primarily concerned with form rather than substance – and include concepts such as feedback loops, requisite flexibility, equifinality and multifinality, which were discussed earlier in this chapter.

3.8 Systems theory and SIA

Bateson's (1972) notion of the nature of scientific progress and the role played by metaphors in scientific thinking, which was presented above, is central to two of the main arguments to be presented in the closing chapter of this mini-dissertation. First, the process of building a bridge between fundamental principles and raw data will be used to develop a system for categorising the types of information required to make accurate predictions of social impacts – and hence, for categorising the types of errors that might lead to inaccurate predictions of such impacts. Second, the researcher will argue that SIA practitioners often make inaccurate predictions of social impacts because they tend to err on a more fundamental level: like Freud and his cohorts, they have fallen into the trap of using energy-based metaphors to describe phenomena that in essence are matters of form, communication, organization, differentiation, pattern and the like.

For the present, however, the researcher will restrict herself to offering a systemically-based definition of SIA. The field of SIA was defined in Section 2.2 as a field that analyses, monitors and manages social impacts that arise from, inter alia, mining and infrastructure projects. Elaborating on this definition using the systemic approach, SIA can be understood as a process that involves the following:

- Analysing the attributes and workings of a particular social system (the community or communities that will be affected by a project), with the understanding that:
 - The system is embedded in a larger economic, political and cultural system that in itself comprises a number of subsystems such as social groups, which in turn consist of smaller subsystems, such as households or individuals;
 - The system involves a number of negative feedback loops, such as economic relations, that maintain its stability; and
 - The system's resilience depends on the amount of requisite variety or flexibility it has at its disposal to make adjustments in response to external changes, such as the introduction of a project, so as to preserve its stability and integrity.
- Applying the same method of analysis that was used to understand the receiving community to understand the project, which in itself constitutes multiple interacting variables, and then predicting the characteristics of the supra-system that is formed when these two systems start to interact.
- Identifying actions that can be taken to either reduce the magnitude of the perturbation caused by a project, or to enhance the system's resilience to withstand the negative effects of the perturbation. In the context of SIAs, these actions are called mitigation measures.

3.9 Implications of a systemic approach on the research process

When a researcher makes his/her epistemology known, it provides the reader insight into the perspective taken and reasoning employed by the researcher, encouraging a more comprehensive understanding of the research. Revealing one's epistemology is particularly important as no two people view the world through the same lens (or have the same ontology), which is why the accounts of exactly the same incident can vary greatly from observer to observer.

A systemic epistemology emphasises the process by which we come to know, or as Capra (1996) states, it is the 'understanding of the process of knowing' (p. 39). It is the author's view that assuming this epistemology has three major implications for the research process; firstly, the researcher must adequately describe and justify his/her methodology and reasoning in order to make transparent the way he/she came to his/her conclusions. At the same time, the researcher must be open to alternative interpretations to his/her data and thus also to different conclusions based on the data. As such, the researcher should not conduct research in isolation, but seek and encourage conversation about the subject matter, data and preliminary findings in order to gain alternative perspectives on it. Once the researcher has exposed him/herself to such dialogue, he/she should reconsider the original interpretation of the data and make the necessary revisions. Research conducted with a systemic approach is thus dynamic and interactive.

The second implication for the research process concerns the researcher's thought processes. In the author's experience, holistic thought is not encouraged as much as deductive reasoning; school comprehension tests focus on detail and facts, the importance of excelling at mathematics is paramount and success at undergraduate level is largely determined by one's ability to memorise facts. The researcher does not mean to imply that the aforementioned is not important, but simply means to emphasise that systemic thought is generally not required in common situations. As such, the researcher must constantly guard against the reductionist tendency to dissect the subject matter and try to make sense of it in such a way.

Finally, just as phenomena are embedded in a context, so too is research. That is to say that the researcher's context, beliefs, opinions, knowledge and perspectives form part of the milieu in which research is conducted (Capra, 1996). As alluded to above, multiple realities exist and the researcher views the subject matter through his/her own lens. Instead of the researcher trying to ignore his/her context in order to produce so-called objective research, the researcher ought to accept and embrace his/her context and use it appropriately to enhance the research. This implication is of particular importance to the current study, as the author herself works in the SIA field and has had extensive exposure to a variety of projects, conducted many SIAs and has witnessed the impacts

brought about by mining and infrastructure projects. The researcher thus inevitably brings her own experience to bear on the data used in this study. This notion is explored further in Section 3.10 below.

3.10 The relationship between the observer and the observed

It was mentioned above that the researcher's own experience in the field of SIA has inevitably influenced the current research. In the terms used by second-order cyberneticists, the "observer" has influenced the "observed" and vice versa.

The field of second-order cybernetics focuses on the construction of knowledge about cybernetic systems (Von Foerster, 1992). In other words, it is concerned with the role of the observer when observing a system. It argues that the observer and observed system should be regarded as a supra-system in which either part influences the other: on the one hand, the observed system influences the observer (Von Foerster, 1992). Most fundamentally, this influence involves the expansion of the observer's knowledge base. However, more significant influences can also take place, resulting in a change in the way the observer views and thinks about the world (representing a change in epistemology). On the other hand, the observer influences the observed system, particularly if that system comprises people (as is the case in the current research).

The crux of second-order cybernetics (the reciprocal relationship between the observer and that which is being observed) is not an uncommon notion in the field of qualitative research: it is generally acknowledged that people change their behaviour when they realise they are being observed and researchers are encouraged to "become part" of their research (Gilgun, 2008; Jootun, McGhee, & Marland, 2009). For example, the Hawthorne effect, a form of reactivity that can occur in both quantitative and qualitative research studies, has been described since the 1950s. The central idea behind this phenomenon is that the special social situation research participants find themselves in may result in changes in these participants' behaviour (Gale, 2004). The notion that the observer influences the observed is captured in the phenomenon of reflexivity, which is associated with qualitative research (discussed in Section 4.2). Recognising one's role in one's research encourages a critical approach to one's thought processes about the subject matter, enhancing the soundness of a qualitative study (this is further explored in Section 4.7.2).

3.11 Conclusion

The purpose of this chapter was to present the researcher's epistemology in order for the reader to understand the chosen methodology (presented in the next chapter), as well as the reasoning behind the findings of the research. Justification for adopting this theoretical approach was stated as

being necessitated by the complex and dynamic nature of the subject matter. A brief history of systemic thought was also presented. Basic assumptions when adopting this approach were listed, and the concepts of open and closed systems, feedback loops, requisite variety, and equifinality and multifinality were discussed as knowledge of these are required for understanding social systems. The use of Bronfenbrenner's ecological systems theory for the current researcher was considered, as well as the use of metaphors and the importance of fundamental knowledge in the progression of science. The SIA process was described using systemic principles and finally, the implications the systems theoretical approach had for the research process were presented.

In the next chapter, the methodology employed to answer the research question and meet its aims and objectives is presented. As will be made clear, the researcher's systems theoretical approach to research greatly influenced the design of this study.

Chapter 4: Methodology

4.1 Introduction

This chapter is dedicated to describing all the methodological aspects of the current research. In the first section below, the chosen research design is discussed, as is its applicability to the current research. The term “research design” in the context of this dissertation is intended to denote the basic distinction between quantitative and qualitative paradigms. This section is followed by a description of the research method, the term “research method” being understood as denoting the various ways a researcher can choose to collect data. Together, the research design and method provide an overall indication of the research approach employed for the current research. The sampling methods and determination of the sample size are discussed, followed by an exposition of how the researcher’s experience in the field of SIA has influenced the current research. Next, the data capturing method and the chosen data analysis method – thematic analysis – are discussed, including the decisions the researcher had to make prior to commencing with the data analysis process. The manner in which the researcher judged the accuracy of predicted psycho-socio-economic impacts is explained, as is the manner in which she achieved the secondary aim of the research. The chapter concludes with a discussion about the soundness of the research, as well as the ethical considerations relevant for the research.

4.2 Research design

The decision to adopt a quantitative or qualitative research design is largely determined by the research question (Frankel & Devers, 2000) (including its aims and objectives) and the researcher’s epistemology (Mertens & McLaughlin, 2004). Although the current research question could have been answered employing a quantitative paradigm, fulfilling the specified aims and objectives of the research requires a comprehensive and holistic understanding of the subject matter that can only be obtained by employing qualitative methodologies. Additionally, research investigating the current research question is limited (as mentioned in Section 1.2.1). As such, there is no standard methodology to address the research question, nor is there enough data to develop a quantitative instrument with which the accuracy of predicted impacts can be determined. In order to meet the aims and objectives of the study, the researcher required qualitative data, which Miles and Huberman (1994) describe as ‘a source of well-grounded, rich descriptions and explanations of processes in identifiable local contexts’ (p. 1). This allowed the researcher to explore the subject matter with more freedom than what would have been allowed by a quantitative research design.

With regards to epistemology, Gwyter and Possamai-Inesedy (2009) note that ‘[t]he epistemological dog wags the methodological tail, and epistemologies are always grounded within larger social practices’ (p. 104). This means that the methodology to be employed to answer the current research question must be consistent with the fundamentals of a systems theoretical approach as set out in Chapter 3. These fundamentals encourage a qualitative research design; it was mentioned in Section 3.9 that research conducted from a systemic perspective is dynamic and interactive, holistic and that the researcher forms an integral part of the research process and its findings. These are all characteristic of qualitative research, as explained below:

- Conducting research in a dynamic and interactive manner (constantly moving between the approach and implementation thereof, as well as seeking external input) is a prerequisite for an acceptable level of soundness of qualitative research (Tobin & Begley, 2004);
- As qualitative research is concerned with providing “thick descriptions”, a holistic approach to understanding a phenomenon is required (Mertens & McLaughlin, 2004); and
- Embracing the qualitative notion that the researcher is not a “detached outsider” but an “integrated insider” allows the researcher the opportunity to put certain mechanisms in place to ensure the soundness of the research (Tobin & Begley, 2004).

Regarding social practices, just as Marxism guided the views of psychology during the 1920s in the former Soviet Union (Valsiner, 2006), so does the researcher’s social context – characterised by professionals and academics who encourage the contextual understanding of the complexity and interrelatedness of phenomena – influence her approach to research.

The researcher has adopted Schwandt’s (2001) description of qualitative research as an approach that makes use of methodologies designed to provide a rich, contextualised picture of a phenomenon. Mertens and McLaughlin (2004) note that there is no one correct method for conducting qualitative research provided that the rigour or soundness of the chosen method (or the legitimacy of the research process) can be demonstrated (Holloway & Todres, 2003; Tobin & Begley, 2004). As such, it is important for the qualitative researcher to describe his/her methodology in a transparent and detailed manner (Bogdan & Biklen, 1998), as the remainder of this chapter does.

Regardless of the methodology used, qualitative research generally has the following characteristics in common (Mertens & McLaughlin, 2004):

- Its goal is to elicit understanding and meaning;
- The researcher is the primary instrument of data collection and analysis;
- Analysis is typically done inductively and holistically; and
- Research findings are richly descriptive.

Each of the abovementioned commonalities in qualitative research is important for the current research, due to the following reasons:

- One of the aims of the research is to determine possible reasons for inaccurate predictions of psycho-socio-economic impacts (refer to Section 1.3.2). As these impacts take place in a complex and dynamic social system, a holistic understanding of the impacts, the process through which they are predicted (the SIA process) and the social system is required in order to start speculating about why predictions could be inaccurate.
- As mentioned in Section 3.10, the researcher herself works in the field of SIA and thus had an understanding of the subject matter prior to the commencement of the current research. As such, the knowledge and experience of the researcher greatly influenced the identification of secondary data sources used for data collection, the analysis of that data, as well as the study as a whole. The researcher had an idea of what data will be available for her study and she had preconceived ideas about how best to analyse the data in order to answer her research question (the role of the researcher's own experience is further discussed in Section 4.5 below).
- As discussed in Section 4.7, the data analysis methods employed (thematic analysis) is both inductive and holistic.
- The findings based on the data analysis method, as well as the discussion about these findings, are very descriptive, comprehensive and interrelated. The methodological freedom to have such richly descriptive findings and discussions are pivotal to fulfilling the aim of the study (as set out in Section 1.3.2).

The notion of reflexivity during qualitative research was implicitly raised twice during the foregoing discussion: first by recognising that the researcher is an "integrated insider" of the phenomenon or social system being studied, and secondly by stating that, primarily as a result of the researcher's experience in the field of SIA, the researcher influenced the current study as a whole. Reflexivity, much like second-order cybernetics (discussed in Section 3.10), simply refers to the process through

which the observer affects the situation or phenomenon being observed (the researcher influences the research process), and how this, in turn, influences the observer (the influence the research process has on the researcher) (Gilgun, 2008). This reciprocal, self-amplifying process is an example of a positive feedback loop (as described in Section 3.4.3).

As stated in Section 3.10 above, one of the purposes of adopting a reflexive approach during qualitative research is to enhance the rigour or soundness of the research process (discussed further in Section 4.8) (Jootun, et al., 2009; Tobin & Begley, 2004). The researcher's reflexivity plays an important role in this study, as is illustrated by the reflexive discussion of the research findings as presented in Chapter 6.

4.3 Research method

The document review (or document study) research method employed for the purposes of this research is one of the three main methods commonly used in conjunction with a qualitative research design (Mertens & McLaughlin, 2004). The other two common methods are observation and conducting interviews (Mertens & McLaughlin, 2004).

In order to answer the research question, the researcher required existing information on the psycho-socio-economic impacts that are predicted, as well as those that have occurred in settings where mining and infrastructure projects take place. Information on the former are contained in SIA reports (as discussed in Chapter 2), while data on the latter are available from an array of sources, including reports by non-governmental organisations (NGOs), environmental activist groups and annual reports by mining houses or government departments, to name a few. Neither SIAs nor documents containing information about actual psycho-socio-economic impacts are written with the intention of being used for research. However, when these documents are reviewed and analysed for the purposes of scientific research, 'the method of document study as a data collection method becomes operative' (Strydom & Delport, 2002, p. 322). Employing this method allows for a systematic manner to identify, analyse and derive relevant and useful data from existing documents (Strydom & Delport, 2002).

Neuman (2006) identifies two main types of sources used during a document study, namely primary and secondary sources. Primary sources are the original written material of the author's own experiences and observations, while secondary sources are material derived from primary sources (Neuman, 2006). It is preferable to make use of primary sources as they are more reliable, since secondary sources are by definition someone's interpretation of a primary source (Whiston & Phillips, 2009). All of the SIA reports and most of the reports detailing actual impacts used as part of

the study are primary sources. Those reports detailing actual impacts that are secondary sources (for example, reports summarising the occurrence of actual impacts based on a number of other primary sources) were carefully scrutinised prior to inclusion in the study to ensure that the reports are reliable and of a high standard (this is further discussed in Section 4.4).

Strydom and Delport (2002) list four sources of documents that are typically used in a document study. These are personal documents (such as diaries, letters, autobiographies and memoirs), official documents (such as minutes of meetings, inter-office memos, and financial records), archival material (documents and data preserved in archives for research purposes) and mass media (Strydom & Delport, 2002). The documents used for the purposes of this study fall in the last-mentioned category, which includes all information that is freely available to the public and include newspapers, journals, books and reports (as is discussed in Section 4.4, one of the criteria for inclusion of a report in this study is that it is available in the public domain).

A document study holds a number of advantages for the research process, all of which contributed to the decision to employ such a methodology. The relevant advantages are as follows (Strydom & Delport, 2002):

- It is a cost-efficient manner to collect large volumes of valuable data.
- As the authors of the documents used as part of this study did not anticipate that the reports will be used for research purposes, the contents of the documents were not affected by the researcher or the research process. It was mentioned in Section 3.10 that people change their behaviour when they realise they are being observed or researched. Employing this research method pre-empts such reactivity.
- It is an unobtrusive method of conducting research. The researcher did not interfere with the lives of any of the communities exposed to mining or infrastructure projects, the SIA practitioners or any of the authors of the documents used as part of this study.
- Related to the above, through employing this method the researcher was able to “access” inaccessible communities. By reviewing documents, the researcher was able to include mining and infrastructure projects throughout Africa, which is where many of the aforementioned projects take place. By including such a large geographical extent in the sample of documents reviewed, the trustworthiness of the research is enhanced (this is further discussed in Section 4.7.2).

The chosen research method also holds some disadvantages, some of which could negatively influence the soundness of the research. Relevant disadvantages are as follows (Strydom & Delpont, 2002):

- Some documents may be biased as the intended purpose for compiling the documents was not for future research, but some other objective. This disadvantage is of particular importance to the current study as some of the reports detailing actual impacts were compiled by NGOs and environmental activist groups with the purpose of publicising the wrongdoings and shortcomings of mining houses or other proponents. Although the contents of such documents are still useful, the researcher had to guard against falling victim to the sensationalism of the documents by being very critical of the contents.
- Some documents may not be available to the researcher conducting a document review. In the case of the current study, some SIA reports and reports detailing actual impacts that could have provided very valuable data for the current research were not available at the time of data collection as these reports were still being finalised. The researcher bears knowledge of these documents due to her profession. This does not, however, impact on the soundness of the current research as the researcher felt that redundancy or theoretical saturation was reached with the sample that was used (this is elaborated on in Section 4.4).
- There is often a lack of a standard format of documents used as part of the document study. This is especially true of the documents used that report on actual psycho-socio-economic impacts as these were written from a number of different perspectives and for a variety of reasons. SIA reports have more or less the same structure and all the reports contain a section in which impacts are predicted; this is not the case with reports detailing actual impacts. In order to prevent this from negatively influencing on the soundness of the research, the researcher had to be meticulous when capturing and coding the data (this is further discussed in Sections 4.6 and 4.7).
- Identifying and analysing documents is a very time-consuming and intensive process. The current researcher, rightly or wrongly, spent more than year part-time collecting, coding and categorising data.

4.4 Sampling method

The researcher used two non-probability sampling methods to select the documents used as part of this study. Firstly, purposive sampling was employed, followed by sequential sampling.

Purposive sampling, which is virtually synonymous with qualitative research (Strydom & Delpont, 2002), signifies that the researcher views sampling as a series of strategic choices about with whom, where and how research should be conducted. This view implies two things, as follows (Strydom & Delpont, 2002; Whitley, 2001):

- The manner in which the researcher samples is tied to the research objectives for which sampling is employed; and
- The “best” sampling method is dependent on the context in which the research is being conducted and the nature of the research objectives.

The specific kind of purposive sampling employed is criterion sampling, defined as the sampling method during which the researcher searches for cases that meet specific criteria (Patton, 2002). The following criteria were set for the purposes of identifying suitable SIA reports and reports detailing actual impacts to be included in this study:

- The impacts considered in the reports must be as a result of a mining or infrastructure project, as opposed to other kinds of developments such as residential developments;
- The project under consideration in the reports must be situated in a rural area, as opposed to a town or city, regardless of the country in which the project is to be, or has been implemented;
- The document had to be written in English. As mentioned previously, many mining and infrastructure projects take place in developing countries, characteristic of most of Africa. The official language of many of the African countries is either French or Portuguese, thus if a document is prepared for those countries’ governments as opposed to an external funding agency like the WB, the final documents are published in that country’s official language. Such reports were omitted from this study.
- The document had to be available in the public domain. Oftentimes, it may take years before a SIA report for a specific project becomes available to the public, mainly because many projects do not commence immediately upon the completion of the EIA study due to unresolved issues such as financing, design changes or other political agendas. Usually, EIAs become public knowledge just prior to the commencement of a project (which is a legal requirement in most countries (Holder, 2004)).
- The documents had to be official and final. In other words, it had to be released by the project proponent, funding agency or organisation as the final version of the document. Holding documents to this criterion improves the trustworthiness of the current research.

The quality of the SIA reports used as part of this study was not a determining factor of whether to include it in the study or not, as this would defeat the purpose of the research; if the SIA report adhered to the abovementioned criteria, it was deemed fit for inclusion and the statements made in the report were assumed to be true and correct. If the researcher only used the SIA reports she deemed of an acceptable standard, many of the SIA reports would not have been included which would have led to the misrepresentation of predicted impacts.

The quality of reports detailing actual impacts, however, was considered prior to inclusion in the current study. In addition to the abovementioned criteria, the following was considered when evaluating the documents reporting on actual impacts, particularly those classified as secondary sources (as discussed in Section 4.3):

- The source or author of the report had to be credible; only clearly branded documents from recognised institutions or companies were used; and
- Reports the researcher deemed overly sensational were excluded from the study. That is, reports that the current researcher thought to have been written with the main purpose of slandering mining houses or other proponents, were excluded.

As in the case of SIA reports, if reports detailing actual impacts adhered to the abovementioned criteria, the contents of the report was assumed to be true and correct. The researcher was not selective about what information contained in each report to include in the current research, regardless of whether justification for such information was presented in the report. This decision was made for practical purposes, as verifying the truthfulness of information contained in such reports lies outside the scope of this study.

Following the purposive criterion sampling method, the researcher employed sequential sampling. Neuman (2006) describes this non-probability sampling method as one where the researcher identifies as many relevant cases as possible until such a time that the data becomes saturated. That is to say, until such a time that additional data sources do not yield any new information or insights, and the data becomes repetitive and redundant.

As per the definition of sequential sampling (and as is often the case when employing purposive sampling), the sample size for this study was determined by the level of saturation of the data. Saturation regarding predicted impacts was reached after reviewing a total of 17 SIA reports, while saturation regarding actual impacts was reached after reviewing 24 documents (further details on these reports are provided at the outset of Chapter 5). Possible reasons for why the saturation point

regarding actual impacts was not reached as quickly as that for predicted impacts include the following:

- Unlike SIA reports, reports detailing actual impacts do not have a standard format or structure, and the authors are not obliged to follow a standardised methodology;
- The motives behind or purposes of reports detailing actual impacts vary greatly; and
- Authors of reports detailing actual impacts have access to more data than the authors of SIA reports, as the aforementioned authors collect their data after impacts have started to occur. As such, reports containing information on actual impacts yielded information pertaining to a larger range of impacts, and a greater variety of information pertaining to each impact.

Limitations of the data used as part of this study are presented in Section 6.6.

4.5 The researcher's own experience in the field of SIA

In the chapters that follow, the researcher makes repeated reference to her own experience, both in terms of a source of information on the impacts that actually tend to occur in mining an infrastructure projects, and as a benchmark for judging the accuracy with which impacts are predicted (as described in Section 4.7.2). This experience may be regarded as a legitimate source of data (Hodder, 2003) that was drawn upon to supplement and enrich the data gleaned from literature. As mentioned in previously (in Section 4.2), such an approach is consistent with the reflexive nature of both systems theoretical- and qualitative research, in which the observer is recognised as an unalienable part of the system being observed.

The first subsection below provides a brief overview of the nature of the researcher's experience in the field of SIA. This is followed by an account of the manner in which this experience was considered or incorporated in the process of data analysis.

4.5.1 The nature of the researcher's experience

The researcher started working in the field of SIA during 2007 when she was contracted by the Social Sciences Department of a consulting engineering firm. One of her first tasks was to analyse quantitative data obtained by means of a household survey by using descriptive statistics, and to report on the results of the analysis. The report described the socio-economic status of households in a rural area of Central African Republic (CAR), where a then French proponent planned the establishment of a uranium mine. The researcher was intrigued by the nature of the information she analysed and reported on, and soon became familiar with the studies (and the processes of

each) required prior to the establishment of mines and other infrastructure such as roads. She was fortunate enough to complete her internship in the same field, and has been pursuing a career therein ever since.

As stated in Section 3.9, the researcher has completed many SIAs since her first appointment as a social researcher, has conducted resettlement planning, as well as other aspects of social research within the context of the mining and infrastructure sectors. Many of these activities require site visits (frequently more than once for each project), which are conducted in order to aid the SIA practitioner to understand the context, social dynamics and environment in which a project takes place. Often, on-site primary data collection is also required, most commonly by means of focus group discussions, interviews and household questionnaires. As such, the researcher has worked in more than a dozen African countries, including CAR, Malawi, Mozambique, Liberia, Sierra Leone and Tanzania.

Given that the SIA practitioner is often required to visit the same site more than once (sometimes with a year or more lapsing between visits) and considering that the services of social scientists are required at different stages of project planning and implementation, the researcher has been exposed to three valuable contexts relevant to this research, as follows:

- She has been exposed to many rural African communities prior to the introduction of a mining or infrastructure project into their environment. She has thus gained an understanding of the dynamics and nature of communities in the absence of such projects, representing baseline conditions of communities.
- She has been exposed to the same communities more than once during different stages of project planning and implementation. The researcher could thus compare the two instances of her personal experiences of the people and the community, and thereby gain an understanding of the manner in which communities have changed since the introduction of a mining or infrastructure project into their environment.
- Finally, she has visited communities in which a mining or infrastructure project has already been introduced into the environment (that is, while in its construction or operational phases), allowing her to notice the differences in community organisation and characteristics, as well as individuals' behaviour compared to communities where such projects have not been introduced.

The researcher's range of exposure to social research in the context of mining and infrastructure projects, as well as to communities in which such projects commonly take place, have resulted in the researcher having insight into the subject matter considered in this mini-dissertation.

4.5.2 Incorporation of the researcher's experience in this study

The researcher's experience outlined above has in many cases been documented in SIA reports, memoranda and the like (including those studies discussed in Section 1.2.1). These documents could potentially have been included in the body of literature reviewed during this study. However, this would have introduced an element of "circular logic" that may be described as follows: in many cases, the reports documenting the researcher's experience contain conclusions or inferences regarding the accuracy with which social impacts are predicted in SIA literature. In fact, the researcher's observations in this regard constituted one of the reasons for choosing this topic for her dissertation. Including the researcher's writings in the thematic analysis of literature would thus have pre-empted the conclusions drawn at the end of this study, since those conclusions would already have been evident in the literature reviewed. An alternative approach was therefore adopted: the researcher's own experience was used in a reflexive sense to evaluate or comment on the adequacy of literature dealing with actual and predicted social impacts, as well as to add examples of how such impacts tend to play out in various contexts.

This use of personal experience to enrich data from literature does not fundamentally influence the data analysis process described in Section 4.7 below. Where it did influence the data analysis, this influence occurred on two levels, as follows:

- On one level, the researcher's experience may be regarded as "unwritten texts" that were selectively used to supplement the body of literature reviewed, incorporating the researcher's direct observations of actual social impacts but deferring any conclusions regarding the accuracy with which such impacts are predicted to the concluding sections of this mini-dissertation; and
- On a deeper level, the researcher's experience informed the selection of themes for structuring the analysis. This influence was unavoidable, as experience in the field of SIA lends a degree of insight into when impacts should be regarded as fundamentally different, and when two descriptions should actually be regarded as two different perspectives on the same type of impact.

4.6 Data capturing

When conducting a document study, the researcher is exposed to vast quantities of data. The data have to be captured and summarised in a systematic and organised manner that will allow for inductive and logical analysis, or more specifically in the case of the current research, coding and theme development (Fereday & Muir-Cochrane, 2006). Given the lack of previous research addressing the research question at the scope defined for this study (discussed in Section 1.2.1), the specific nature of the research objectives (presented in Section 1.3.3), as well as the researcher's familiarity with the field of SIA (discussed in Sections 3.10 and 4.2), she opted to devise her own method of and template for capturing the relevant data obtained from the documents reviewed, while keeping her data analysis method (thematic analysis) in mind.

The current researcher opted to capture and summarise the data from the SIA reports and reports detailing actual impacts using MS Excel. She created a database to capture the following information:

- The title of the data source (report name);
- A unique code assigned to each of the data sources;
- Whether the information pertains to predicted or actual impacts;
- Information chunks regarding the predicted or actual impact;
- A descriptive note for each predicted and actual impact captured.

The process the researcher followed to capture the data, after each report was evaluated according to the criteria set out in Section 4.4, is as follows:

- The title of the document was recorded in the database, and a unique code was assigned to the document. SIA reports were sequentially labelled as P1, P2, etc. – the letter “P” denoting “predicted”. Reports detailing actual impacts were labelled as A1, A2, etc. – the letter “A” denoting “actual”. The reasoning behind assigning these labels to each of the reports was to simplify the data analysis process and the subsequent reporting of findings.
- The researcher read the entire document to gain a broad understanding of the contents of the document.
- During the second read-through of the document, the researcher identified each predicted or actual impact reported on in the document, and captured the relevant information for each impact in a single MS Excel cell. For example, instead of just recording that a project will result in employment opportunities for the affected communities, additional information relating to these employment opportunities, such as the numbers and types of

opportunities, was also entered into the same cell. Collectively, the information contained in each cell is henceforth referred to as a “data item”, while the bits of information making up the data item is henceforth called a “data extract” (Braun & Clarke, 2006).

- Once all the predicted or actual impacts contained in one report were captured, the researcher assigned a descriptive note to each predicted or actual impact. Using the example mentioned above, the note “employment for locals” was made. The purpose for assigning this preliminary category was to simplify the subsequent data analysis, as well as to provide an initial indication of the level of saturation of the data.

As qualitative data analysis is a cyclical and reiterative process (Neuman, 2006; Strydom & Delport, 2002), the data capturing and initial analysis (becoming familiar with the data and assigning initial codes – refer to Section 4.7.1.2) took place concurrently and the analysis of earlier documents was revisited and revised several times during the analysis of later documents. By capturing and analysing data concurrently, the researcher was able to easily recognise once data saturation has been reached.

4.7 Data analysis

As will become evident in this section, the current study’s aims and objectives called for more than one data analysis method to be employed during the course of this research. Both the aims and objectives are progressive in nature and have been listed sequentially in Sections 1.3.2 and 1.3.3, as well as in Figure 7. As this figure shows, the first two research objectives were fulfilled by means of conducting a thematic analysis (first-order analysis). On the basis of the findings of this analysis, a categorisation system (second-order analysis) was developed in order to fulfil the third-mentioned objective. Finally, with the outcomes of the above in mind, the researcher adopted Bateson’s (1972) approach to distinguish between “raw” data and “fundamental knowledge” in order to fulfil the last two objectives of the research (third-order analysis). Each order of analysis is discussed in the following subsections.

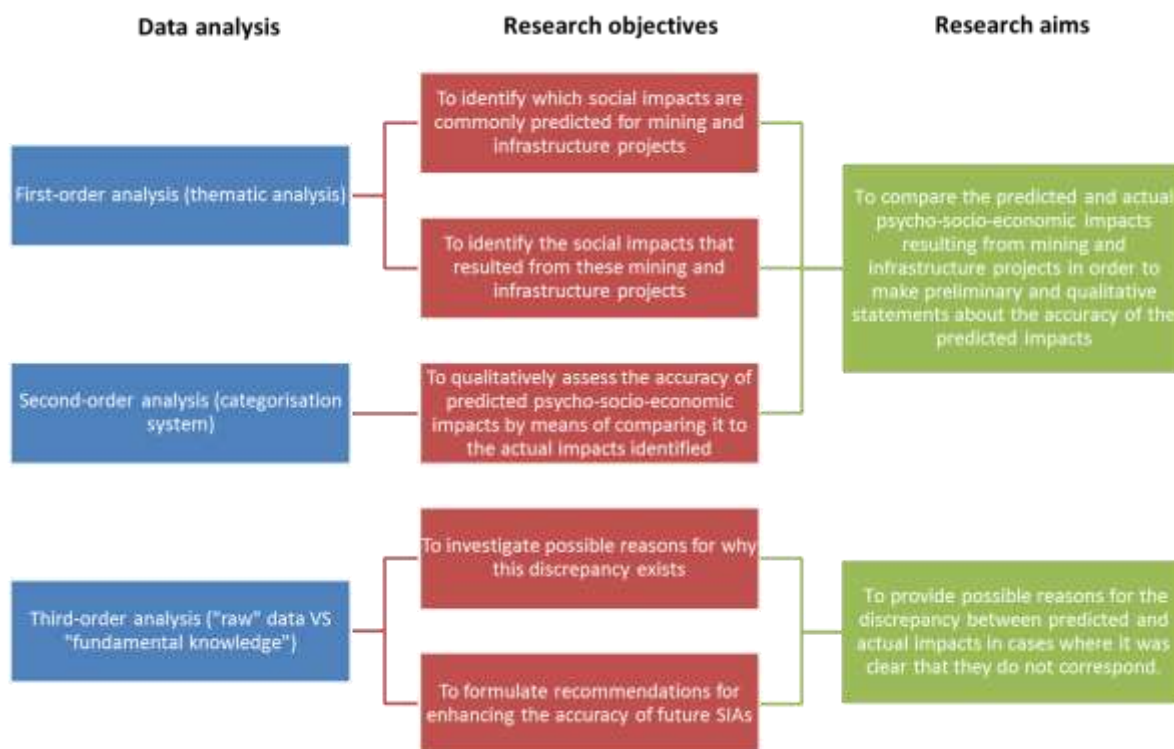


Figure 7: The three orders of data analysis adopted to fulfil the research aims and objectives

4.7.1 First-order analysis: thematic data analysis

As a first step to answering the research question and fulfilling the aims and objectives of the current research, the researcher opted to conduct thematic analysis on the collected data. Thematic analysis can quite simply be defined as a method for identifying, analysing, and reporting on patterns or themes within data (Braun & Clarke, 2006). This method of data analysis was selected for two main reasons:

- It is not exclusively associated with any particular theoretical framework or epistemology (Roulston, 2001) and can thus be used by an array of qualitative researchers. As the systems theoretical approach emphasises understanding phenomenon in context and encourages the researcher to recognise the interconnected and interdependent nature of various aspects of a phenomenon, the current researcher thought thematic analysis to be a good fit with the theoretical approach.
- It is a flexible tool that enables rich, detailed and sufficiently complex accounts of data (Braun & Clarke, 2006). Similar to one of the reasons for selecting systems theory as a theoretical perspective (it enables the understanding of the dynamic complexity of social

systems – see Section 3.2), the data analysis method had to allow for a holistic analysis of the data and not force the reduction of data into incoherent bits lacking context.

4.7.1.1 Decisions to be made prior to conducting a thematic analysis

As postulated by Braun and Clarke (2006), there are a number of decisions a researcher has to make prior to commencing with the thematic data analysis process. These decisions are based on the questions provided in the subsequent subsections. After discussing the nature of each decision, the researcher makes explicit her choice in relation to each.

What counts as a theme?

In order to answer the question “what counts as a theme?”, the researcher must consider how much data on a specific theme is required for that theme to “count”, as well as how important that theme is to answer the research question (Braun & Clarke, 2006). Modifying the former part of the question to make it applicable to the current research, the researcher had to decide how many times an impact had to be predicted, or how much evidence of an impact actually occurring is required in order for that impact (or group of related impacts) to be considered “true”. Braun and Clarke (2006) emphasise that the importance of a theme is not necessarily determined by quantifiable measures (the number of times it appears in the data set or how much attention it is paid in each of the data sources), but rather whether it captures something important in relation to the overall research question. Due to the relatively small sample size (despite its saturation), every predicted and reported actual impact, even if reported in just one data source, was considered sufficient to constitute a theme or subtheme. If the researcher continued collecting data after the saturation point, every predicted and actual impact would likely have been reported in the additional data sources. However, this does not mean that the researcher reported on every possible theme or impact, as this would have resulted in a very lengthy affair. Instead, the researcher was guided by one of the other decisions a qualitative researcher must make, namely whether to report on the entire data set, or just on specific elements thereof (this is further discussed below).

Rich description of the dataset VS a detailed account of particular aspects

Does the researcher want to provide a rich description of the data set or a more detailed account of particular aspects thereof? Due the vast amount of data collected for this study, as well as the diverse nature thereof, the researcher opted to provide a detailed account of the most prevalent themes or impacts, as opposed to presenting an overview of all the impacts predicted and all the impacts reported to have occurred as a result of mining and infrastructure projects. On the one hand, this decision is in line with the chosen theoretical perspective as it allows for an in-depth, conceptual understanding of the subject matter, but on the other hand, it contradicts the theoretical

perspective which emphasises a holistic approach to a phenomenon. Reporting on the most prevalent impacts only resulted in a somewhat incomplete picture of the manner in which a social system changes as a result of a project, although the interconnectedness of these changes could still be demonstrated to an extent.

Inductive VS theoretical thematic analysis

Will the thematic analysis be done inductively or theoretically? Braun and Clarke (2006) state that themes can be identified either inductively (the “bottom-up” approach) or theoretically (the “top-down” approach). When analysing inductively, a research question usually evolves from the coding process and the identified themes are strongly linked to the data; the coding process is thus done without trying to fit the data into a pre-existing coding frame (Braun & Clarke, 2006). The analysis can be said to be data driven. Theoretical analysis on the other hand, is driven by the researcher’s theoretical or analytic interest in the subject matter, and results in a less rich description of the overall dataset but a more detailed analysis of some aspects of the dataset (Braun & Clarke, 2006). The coding process is guided by the research question (Braun & Clarke, 2006). As the current researcher identified her research question at the outset of the research and collected data that will enable her to answer the research question, she decided to employ the theoretical approach to thematic analysis.

Semantic VS latent themes

Will semantic or latent themes be identified? Themes can be identified on one of two levels: at a semantic or explicit level, or at a latent or interpretative level (Braun & Clarke, 2006). Using a semantic approach, themes are identified using the explicit or surface meanings of the data, and the researcher does not look for anything beyond these explicit meanings (Braun & Clarke, 2006). Conducting a thematic analysis at the latent level, however, requires the researcher to identify underlying ideas, assumptions and conceptualisations that are thought to influence the semantic content of the data (Braun & Clarke, 2006). The researcher opted to conduct the data analysis at a semantic level.

Essentialist or realist VS constructionist approach to thematic analysis

Will the thematic analysis be done from an essentialist or realist paradigm, or from a constructionist paradigm? Braun and Clarke (2006) state that the paradigm from which one conducts the thematic analysis determines what one is able to say about one’s data, and influences the manner in which one theorises about the data in order to derive meaning from it. As such, thematic analysis done from an essentialist paradigm “allows” one to theorise motivations, experience and meaning in a straightforward manner because a simple unidirectional relationship is assumed between

experience and language (Braun & Clarke, 2006). On the other hand, if the researcher adopts a constructionist approach, the assumption is that meaning and experience are socially produced and reproduced, thus the focus of the analysis is not on individual expressions, but on the socio-cultural contexts and structural conditions that enable individuals to express their individual meanings and experiences (Braun & Clarke, 2006). The research question and nature of the data is such that an essentialist approach to thematic analysis was required.

4.7.1.2 Procedure for conducting a thematic analysis

The researcher decided to adopt Braun and Clarke's (2006) procedure for conducting a thematic analysis. This procedure consists of six steps, each of which is discussed in the subsections below.

Step 1: Becoming familiar with the data

During the first phase of the data analysis, the researcher is required to become very familiar with the data to be analysed. This is achieved by "actively" reading through the data repeatedly – searching for patterns (Braun & Clarke, 2006). It is important for the researcher to become familiar with all aspects of the data, and not just selective parts thereof. Furthermore, Braun and Clarke recommend making notes about ideas and potential themes during this phase. Although strictly speaking these activities are part of the data analysis phase of the research, the researcher engaged in this step during the data collection process as described in Section 4.5. As such, she had an advantage at the outset of the data analysis phase of the research and upon completion of this step in the data analysis process, was very familiar with all aspects of her data.

Step 2: Generating initial codes

The second stage of analysis involves the production of initial codes for the entire dataset. Coding is quite simply the identification of the most basic elements or features within the dataset that is of analytical interest to the researcher (Braun & Clarke, 2006), and is a manner of organising data into meaningful groups (Tuckett, 2005). The researcher manually coded the data using both the raw data and the descriptive categories assigned during the data collection phase. She coded for as many potential themes or patterns as possible and maintained the context of each data item, as suggested by Braun and Clarke (2006). In cases where a data item contained information relevant to more than one initial code, the data item was copied into another cell, and assigned a different initial code. An example of this step in the data analysis process is shown in Table 4 below.

Table 4: Excerpt of dataset during initial coding

Data item	Descriptive note	Initial code
Loss of land and productive resources, which are NB for sustaining livelihoods. The land is used for cultivation and grazing. This impact, if not mitigated, may result in reduced capacity for household survival, increased pressure on surrounding land and resources and increased potential for conflict over land and resources. The significance of the impact can be reduced by providing alternate land of the same quality at least one year prior to losing land, supplementing food resources and assisting communities to regenerate their productive capacities	Loss of natural resources - grazing, agriculture. Diminish household's ability to survive and increase pressure on other land, intercommunity conflict	Livelihoods: natural resources
Undermining local and traditional authorities - the expropriation of land could undermine the residents' confidence in the traditional and elected authorities, resulting in perceived failure on the part of the authorities to protect the locals' interest. Authority figures represent both status of power of an individuals and represents a stabilising force in local communities, this impact may not only hold consequences for the individual leader, but also challenge the functioning and popularity of the affected institutions. to manage this, the communities must experience expropriation as a participative process otherwise the authorities may appear unable to manage it. The authorities are responsible for the allocation of land and resources. Authorities should be included in the process of expropriation, as well as other NB community structures, in order to make expropriation transparent to all affected	Traditional leadership negatively impacted by project requirements and processes. Community's way of life and structures altered.	Community structures and way of life
Conflict between local residents and project expatriates: the employment of outsiders may cause tension and potential conflict with local residents. To mitigate, the proponent should limit the employment of outsiders and honour decisions taken by means of a participatory process regarding employment policies	Employment of non-locals may result in conflict with locals	Reason for social conflict: employment
Increased incidence of STIs: the project will attract people in search of employment, majority of who will be single males with high disposable income. These conditions are conducive to spread of STIs, especially acquired immune deficiency syndrome (AIDS), placing the health of the current and future generations at risk. To mitigate, accessible and culturally appropriate awareness program focusing on the dangers of SRDs should be conducted	Influx of people (especially single males) will negatively impact health of communities through spreading of STIs	Influx: influence on local communities

Step 3: Searching for themes

This step commences with the generation of a list of all the codes assigned to the entire dataset. The identified codes are organised into potential themes, which marks the start of the analysis of the codes (Braun & Clarke, 2006). The researcher broadens the focus of the analysis and begins to consider how the codes can be categorised to form an overarching theme or subtheme (Braun & Clarke, 2006). At the end of this phase, the researcher has a list of candidate themes and subthemes, as well as all the data extracts relevant to each. Braun and Clarke state that subthemes are useful to

give structure to large or complex themes. An example of this step is presented in Figure 8, which shows some of the themes and subthemes from which the final theme of “Impacts and assumptions relating to an increase in population” was derived. In this figure, the topmost blocks represent themes, second level blocks the subthemes, followed by initial codes that were clustered to form the subthemes.



Figure 8: Example of Step 3 of the data analysis process

Step 4: Reviewing themes

This step involves the refinement of the themes and subthemes identified during the previous stage: some themes may fall away, while others may need to be subdivided while others still may collapse into each other (Braun & Clarke, 2006). Refining of themes take place on two levels, as follows (Braun & Clarke, 2006):

- There needs to be a review at the level of coded data extracts, which involves rereading the data extracts relevant to each theme or subtheme and consider whether the themes and subthemes form a coherent pattern.
- The themes and subthemes have to be considered in relation to the entire dataset. The researcher must ‘consider the validity of individual themes in relation to the data set’ (Braun & Clarke, 2006, p. 98) and consider if the themes and subthemes accurately reflect the meanings evident in the dataset.

During this step, the researcher rearranged the themes and subthemes into a structure that would facilitate the reporting of each theme and subtheme. As mentioned above, Figure 8 illustrates some of the original themes and subthemes identified. These were rearranged in such a way as to arrive at the final themes identified for this study; an example of one such a theme is shown in Figure 9.

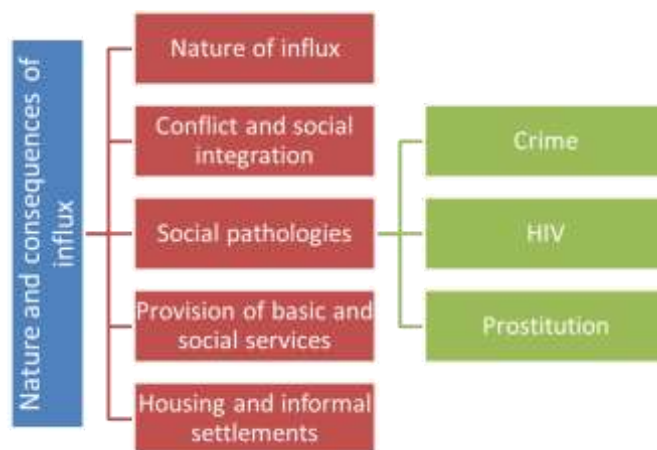


Figure 9: Example of one of the final themes and its subthemes (Step 4 of the data analysis process)

Step 5: Defining and naming themes

This step involves defining and further refining themes and subthemes, and analysing the data relevant to each. Braun and Clarke (2006) state that defining and refining means to establish the essence of each theme and determining what aspect of the data each theme captures. In addition,

the researcher must consider how each theme relates to the research question and to each other. Finally, the working titles of themes and subthemes need to be reconsidered and concise and descriptive names for each that will be presented in the final analysis must be developed. The working titles of the theme and subtheme presented in Figure 9 was finalised during this step, the outcome of which is shown in Figure 10 (changes are underlined for ease of reference).

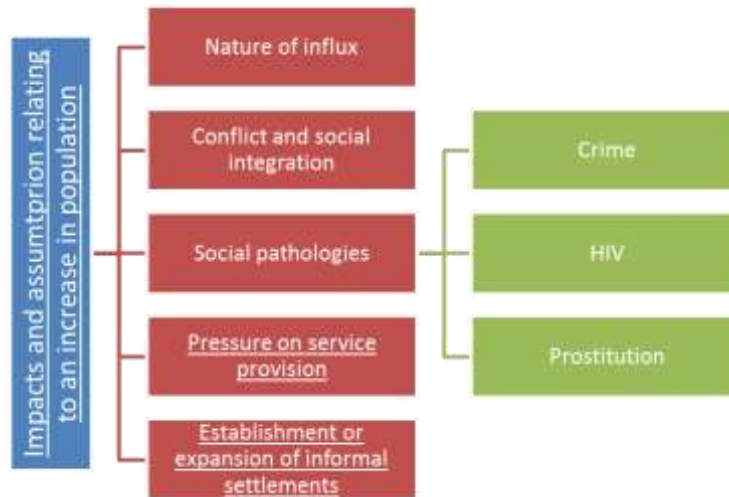


Figure 10: Example of a refined theme

Step 6: Producing the report

This final step involves the final analysis and write-up of the themes and subthemes finalised during the previous step. The purpose of the write-up is to ‘tell the complicated story of your data in a way which convinces the reader of the merit and validity of your analysis’ (Braun & Clarke, 2006, p. 99). The write-up must be concise, coherent, logical, non-repetitive and provide sufficient evidence of the themes from the data. Furthermore, it must be embedded in an analytic narrative and present an argument in relation to the research question (Braun & Clarke, 2006).

4.7.2 Second-order analysis: determining the accuracy of predicted impacts

Subsequent to the data analysis process and the write-up of the research findings as described above (and presented in Chapter 5), the researcher was tasked with determining the accuracy with which specific impacts (presented as subthemes) are predicted (this is done in Chapter 6). In order to do this, a categorisation system was developed, which includes three categories, namely high, medium and low, each representing the accuracy with which impacts are predicted.

A subtheme was given a “high” accuracy rating if:

- The impact contemplated in the subtheme is explicitly acknowledged in both the literature on predicted impacts and that on actual impacts as being a frequent occurrence in mining and infrastructure projects;
- The two bodies of literature agree on the manner in which the impact usually unfolds, as well as on its significance for the receiving social environment; and
- The frequency, nature and significance of the impact as described in literature on predicted impacts is also consistent with the researcher’s own experience regarding the occurrence of this impact on projects.

Conversely, a subtheme was given a “low” accuracy rating if:

- It is frequently discussed in one body of literature (either that dealing with predicted impacts or that dealing with actual impacts) but is conspicuously absent from the other;
- The two bodies of literature offer widely different accounts of the nature or significance of the impact in cases where it does occur; or
- The researcher’s own experience in the SIA field – which has offered numerous opportunities for observing the social impacts that actually occur as a result of mining and infrastructure projects - clearly contradicts predictions made in the literature about the probability, nature and significance of an impact.

The accuracy of an impact would be rated as “medium” if the convergence or agreement between the aforementioned sources of data fell somewhere between these two extremes. The categorisation of impacts according to the categorisation system described above is presented in Section 6.2.

4.7.3 Third-order analysis: understanding inaccurate predictions

The above-mentioned first- and second-order data analyses (thematic analysis and categorisation of impacts according to the accuracy with which they are predicted) fulfil the primary aim of the research (as set out in Section 1.3.2). However, while these processes allowed the researcher to draw certain inferences about the possible reasons for why some impacts are inaccurately predicted (which constitutes the secondary aim of the research), they did not directly enable her to fulfil this objective. A more structured approach was therefore required to reflect on the comparison between predicted and actual impacts that emerged from the thematic analysis so as to identify reasons for any divergence between the two, and thus ultimately to help improve the “science” of SIA.

The approach adopted is based on Bateson's (1972) distinction between "raw" data and "fundamental knowledge" (discussed in Section 3.7) and his argument that the link between the two cannot always be made inductively (that is, by amassing sufficient amounts of data so that patterns eventually emerge and that these can be solidified into fundamental knowledge). The reader will recall that, according to Bateson (1972), it is sometimes necessary to start with the fundamentals and work deductively, back towards the data.

Following this advice, the researcher temporarily set aside the findings of the thematic analysis and posed herself the following fundamental question: what are the basic types of knowledge or information that a SIA practitioner would require in order to make accurate predictions about the social impacts of any given project? Not to anticipate too much of the discussion to be presented in Section 6.3, it will merely be stated here that all the required information was found to sort fairly easily into four broad categories:

- Information about the attributes of the project that is expected to cause the impacts;
- Information about the nature of the receiving environment (that is, the communities and individuals who will experience the impacts, along with their geographical and temporal context);
- Information about the causal processes by which the project will bring about changes in the receiving environment; and
- Information about the value systems according to which communities and individuals in the receiving environment will evaluate the ensuing change processes and judge whether they constitute positive or negative impacts on their lives.

It must be emphasised again that this categorisation of the types of required information did not emerge from the thematic analysis. Instead, it was derived deductively after the thematic analysis was completed, and from the researcher's understanding (bolstered by general consensus in the SIA literature) of what the SIA process actually entails.

In order to build the bridge back to the data, the outcomes of the thematic analysis were then reviewed in light of these fundamental categories of information. The aim of this review was to uncover evidence that certain types of information tend to be overlooked, incorrectly interpreted, used as a basis for drawing invalid inferences or otherwise violated during the SIA process.

4.8 Soundness of the research

The soundness of qualitative research pertains to the rigour of that research, the overarching concept of which is trustworthiness (De Vos, 2002). Lincoln and Guba (1985) propose four constructs that stand as criteria against which the trustworthiness of research can be evaluated, as set out in Table 5. Also shown in this table is how these criteria compare to those traditionally used for quantitative research (Trochim, 2001).

Table 5: Criteria for judging the trustworthiness of qualitative research juxtaposed against criteria used for quantitative research

Traditional criteria for judging quantitative research	Alternative criteria for judging qualitative research
Internal validity	Credibility
External validity	Transferability
Reliability	Dependability
Objectivity	Confirmability

The first of these criteria is credibility, the goal of which is to show that the research was conducted in such a manner as to ensure that the phenomenon being studied is accurately identified and described (De Vos, 2002). The credibility of the current research was achieved by means of the following (De Vos, 2002; Patton, 2002):

- Collecting data from a number of diverse, albeit relevant, sources: SIA reports and reports documenting actual impacts for an array of mining and infrastructure projects and from a number of different consulting and other companies or organisations were used.
- Employing a reflexive approach throughout the research process: the researcher kept a record of ideas about and shortcomings of the data during the data collection and analysis process. Where she realised that she was naturally inclined to focus more on some aspects of the data than others, she noted this bias, primarily as a reminder to herself to focus on all aspects of the data.
- Defining the parameters of the phenomenon being studied, as well as the theoretical perspective from which it is being studied: the researcher clearly described the aims of the research, defined the field of SIA and described the aspects of systems theory particularly relevant to the study, thereby setting the parameters of the study.
- Triangulation by researchers: as noted in Section 3.9, research conducted from a systemic perspective is necessarily dynamic and interactive. The researcher continually discussed her research with other professionals familiar with the phenomenon being researched, thereby

becoming aware of alternative interpretations of the data, enabling the researcher to revise and refine the findings of the research and minimising bias.

The second criterion used to determine the trustworthiness of qualitative research is transferability, which pertains to the extent to which the findings of the current research is applicable to other situations (De Vos, 2002). The detailed description of the sample of data used for the current study (presented in Section 5.2) enables the reader to judge the degree of transferability of the present study (Mertens & McLaughlin, 2004).

By providing a detailed and comprehensive description of the research methodology the researcher aimed to augment the dependability of the findings of the current research (De Vos, 2002). In addition, dependability was enhanced by engaging in constant conversation with other professionals familiar with the subject matter (Patton, 2002), including the researcher's colleagues and other SIA practitioners with a similar academic background to the researcher (that is, within the field of psychology, sociology, anthropology and other human or behavioural sciences). Such conversations centred around the conceptualisation and understanding of impacts resulting from mining and infrastructure projects, the interrelated nature of impacts, factors influencing the significance of impacts and the researcher's interpretation of the findings of the current study.

Confirmability concerns 'whether the findings of the study could be confirmed by another' (De Vos, 2002, p. 352) and are thus not just 'figments of the researcher's imagination' (Mertens & McLaughlin, 2004, p. 215) This criterion for trustworthiness overlaps with the criterion of dependability (De Vos, 2002), thus the practice of discussing the research findings with other professionals also served to ensure the confirmability of the research.

4.9 Ethical considerations

An application for approval for conducting the current research was submitted to the Research Ethics Committee of the Faculty of Humanities at the University of Pretoria during 2008, who granted ethical clearance for the research to be conducted on 28 May 2009. Also, during the course of conducting the research in question and writing this mini-dissertation, the researcher endeavoured to adhere to five basic ethical principles of research, as discussed by Dane (2010). Each of these principles are explained and discussed in the subsections below.

4.9.1 Respect for persons

This ethical principle concerns the notion of not using another human being merely as a means to an end, and to respect and preserve the autonomy of other throughout the research process (Dane,

2010). This principle is implemented by a number of means, as listed below. The manner in and extent to which the current researcher implemented these measures are also presented.

- Obtaining informed consent from research participants: this measure is not relevant in the context of this research, primarily due to the chosen data collection method (information was obtained from documents and not human participants) and the criteria for inclusion of documents in the current study (the documents have to be available in the public domain – see Section 4.4).
- Giving other researchers proper credit: where the work and research of other authors have been used to inform this study, they have been acknowledged by means of the American Psychological Association’s (APA) (6th edition) style of referencing. In addition, this mini-dissertation will be submitted with a “Declaration of originality/Declaration on Plagiarism” signed by the current author and will be subjected to the University of Pretoria’s anti-plagiarism software (Turnitin) to verify that the document does not contain any plagiarism.
- Accurately presenting other researchers’ work: the researcher engaged in a genuine attempt to avoid misrepresenting the ideas and arguments of others, or the contents of the SIA reports and reports detailing actual impacts used as part of this research. In this regard (and as stated in Section 4.6), the researcher attempted to maintain the context of statements made in the latter-mentioned reports so as to minimise the probability of reporting on predicted and actual impacts in the wrong context. Also, each of the data sources are presented in Section 5.2 and Appendix 2 to further enhance adherence to this ethical principle.
- Providing sufficient information about those who stand to benefit from the current research: Section 6.8 in Chapter 6 provides information on the intended dissemination of results from this research, as well as those individuals who may find the research of interest.
- Comprehensively reporting on all available research of interest: the researcher did not deliberately omit any research relevant to the current research question or other aspects of this study, and attempted to identify all those research papers relevant to this study. In this regard, however, it must be mentioned that the available literature on social impacts, community responses to projects and SIAs is both vast and diverse; comprehensively assessing each and every paper written on this subject would have rendered this research near impossible. As such, the research question for the current study was clearly defined, as was its aims and objects. This served to narrow down the relevant literature.

4.9.2 Beneficence

The ethical principle of beneficence pertains both to the obligation to generate new knowledge and the obligation to do so in a manner that promotes public good (Dane, 2010). This is a particularly interesting principle within the context of research that uses document review as its method, as one may argue that such research does not generate new knowledge as it is based on existing knowledge. However, as Dane (2010) notes, a good document review ought to go beyond noting other researchers' findings; it should use such research to illustrate a point or to draw a conclusion that would not have been obvious from reading the data sources independently. The very nature of this study promotes the inference of conclusions that cannot be inferred from the data sources individually. In addition, SIA practitioners have a professional (and perhaps moral) obligation to predict potential psycho-socio-economic impacts as accurately as possible, and to recommend the most feasible and effective mitigation or enhancement measures in order to alleviate or enhance impacts on a community that is not necessarily able to protect its own integrity and well-being. Any contribution promoting the accurate identification of impacts not only assists SIA practitioners to fulfil their obligations, but holds a direct benefit for those communities who will be impacted by mining and infrastructure projects.

4.9.3 Justice

The ethical obligation for justice refers to ensuring that risks and benefits associated with research are distributed equally throughout the population (Dane, 2010). Although this principle is more relevant in the context of reviewing research for the purposes of program evaluation and policy revision, it does have some bearing on the current research, particularly in terms of the dangers inherent in false claims associated with generalising findings. As has been made explicit from the outset of this mini-dissertation, this research is more aimed at a conceptual understanding of general practices when predicting impacts, as opposed to commenting on the accuracy of specific impacts associated with a specific project in a unique context. As such, the findings of this research are not meant to be applied to specific case studies, but instead should be viewed as a tool for SIA practitioners to assess their practices and general understating of the social context and the nature of impacts when predicting impacts in the context of conducting a SIA. To this end, the discussion on the findings of this research makes general conceptual comments about the accuracy of impacts, and the possible reasons for why impacts are sometimes inaccurately predicted. Furthermore, the author has employed a careful writing style by using diction such as "generally" and "sometimes" to remind the reader that statements made about the accuracy of predicted impacts are not definitive and absolute.

4.9.4 Trust

To a large degree, this ethical principle is self-explanatory: researchers have the ethical obligation to be trustworthy and honest throughout the research process, and the researcher must have a sufficient level of competency to conduct research (Dane, 2010). The current research relies on this ethical principle, as mentioned in Section 4.4, as it is assumed that the claims made in the data sources are true and correct. In applying this principle to the current research, the author clearly sets out the methodology used for the purpose of this research, and she is of the opinion that the findings and discussion of the findings follow logically from the methodology described, minimising any scepticism regarding whether or not the procedure described to conduct the research was indeed employed. The trustworthiness of the research (as discussed in Section 4.8) also comes into play when considering the ethical principle of trust: just as the use of appropriate metaphors is a matter of “mental hygiene” for systems thinkers, so too is trustworthiness for qualitative researchers. Tobin and Begley (2004) assert that rigour in qualitative research is a manner in which researchers display their integrity and competence, and that it is a matter of ethics to produce research to the highest possible standard of trustworthiness. The researcher engaged in a genuine effort to produce the most trustworthy research she was able to given her level of experience with research methodology, the nature of the current research and the resources and data at her disposal.

Related to the above, the researcher’s ability to conduct the research of interest is also an ethical matter (Bowen, 2005). This pertains to both the researcher’s ability to conduct research according to the chosen design and methodology, as well as to the nature of the subject matter under investigation. The researcher conducted the current research with the guidance and under the supervision of two experienced qualitative researchers, minimising the probability of unethical practices related to this research. In addition, both the researcher and her co-supervisor are knowledgeable in the field of SIA.

4.9.5 Scientific integrity

The ethical principle of scientific integrity pertains to the researcher having respect for the scientific process and acting as a scientist when conducting research (Dane, 2010). This includes conducting good research, displaying intellectual honesty, integrity, fairness, and showing respect for those directly and indirectly involved in the research. In addition, researchers have an obligation to make explicit who and what they are, and to make their biases known. This principle is therefore related to producing trustworthy research (as mentioned above and discussed in Section 4.8). In addition, the researcher has made known her connection to and interest in the topic under consideration in this

mini-dissertation, both by explaining her personal experience within the SIA field, and by emphasising the role this has played in the data collection and analysis processes, and interpretation of findings (see Sections 3.10 and 4.5).

4.10 Conclusion

This chapter presented the methodology according to which this research was conducted. It stipulated that the research was approached in a qualitative manner as the researcher wanted to gain a holistic understanding of the phenomenon being studied, wanted to use her own knowledge of and experience in the field of SIA to complement the study, used inductive reasoning (initially at least), and wanted to present and discuss the research in a descriptive and comprehensive manner that enables an illustration of the interconnectedness of the subject matter.

The researcher provided an overview of the document study research method, purposive and sequential sampling and the data collection process employed during this study. She also stipulated how her own experience influenced the research process, made her decisions about the data analysis process explicit and described the process according to which she analysed the data. Based on this process, the researcher formulated ideas relevant to fulfilling the research aims and objectives and opted for a framework embedded in systemic thinking to present these ideas. The soundness of the research was discussed using the four constructs according to which the trustworthiness of the research could be evaluated. Finally, the researcher briefly noted the ethical considerations relevant for the current study.

The following chapter provides a brief description of the data sources used as part of this study and lists the themes and subthemes identified during the data analysis process. The findings in relation to each are also presented.

Chapter 5: Research findings

5.1 Introduction

The main aim of this chapter is to present the findings of the research by discussing the accuracy with which impacts are predicted, based on a comparison between predicted impacts and impacts that have been reported to actually occur. In the first section below, the data sources are introduced by providing the necessary information on each in order for the reader to understand the context in which impacts have been predicted or reported to have occurred, after which the themes and subthemes identified during the data analysis process are listed. This is followed by the presentation of findings relevant to each identified theme and subtheme.

5.2 Introducing the data sources

As mentioned in Section 4.4, a total of 17 SIA reports and 24 reports documenting actual impacts were used as part of this study. Information on these data sources is provided in this section. Table 6 lists the data sources that contain information about predicted impacts: the report name and the type of infrastructure project for which the report was compiled are mentioned, as is the unique referencing code for each project. All but one of these reports are SIA reports; document P16 investigates which of the predicted impacts for a single specific infrastructure project manifested (and to what extent), and thus includes information on the impacts predicted prior to the commencement of the project. It was considered a valuable data source as it allowed for the comparison of predicted and actual impacts of the same project (opposed to a more general comparison).

Table 7 contains the same information as Table 6, but for the data sources that contain information on actual impacts. As was mentioned previously, these data sources are more diverse in nature and origin.

Additional contextual information on the data sources are provided in Appendix 2, which includes information about the author(s) of the document and the country in which the project will take or has taken place. For data sources containing information about predicted impacts, information regarding the proposed project and the receiving social environment is provided. For data sources containing information about actual impacts, the nature or purpose of the report is explained. As such, it does not contain specific information regarding the project which brought about the impacts, nor does it provide much in the line of baseline information about the receiving environment. This difference between the two tables in Appendix 2 was necessitated by the

fundamentally different natures and formats of the reports containing information about predicted impacts, and those containing information on actual impacts.

Table 6: Data sources used as part of this study: predicted impacts

Code	Name of report	Type of infrastructure project
P1	Socio-economic impact assessment for the proposed Rustenburg Deeps Project	Coal mine
P2	Environmental and social impact assessment: Ahafo South Project	Gold mine
P3	Socio-economic impact assessment: Vele Colliery	Coal mine
P4	Social impact assessment for the proposed nuclear power station ('Nuclear 1') and associated infrastructure	Nuclear power station
P5	Social impact assessment for the proposed Umfolozi - Empangeni 765kV transmission power line	Transmission lines
P6	Social impact assessment for a new coal fired power station and associated infrastructure as well as the associated transmission lines and substation in the Musina area of the Limpopo Province	Power station
P7	Environmental scoping report for Benicon Mining Brakfontein	Coal mine
P8	Social impact assessment for Riebeek PPC Expansion Project	Cement plant
p9	Social impact assessment for the N2 Wild Coast toll road between East London (Eastern Cape) and Durban (KwaZulu-Natal)	Road
P10	Social impact assessment for the Mmamabula Project: proposed 6x765kV power lines	Transmission lines
P11	Socio-economic baseline assessment for the proposed Uranium mining project at Bakouma	Uranium mine
P12	Social impact assessment for the proposed establishment of a new coal-fired power station in the Lephhalale area, Limpopo Province	Power station
P13	Baynes Hydropower environmental, social and health impact assessment: final scoping report	Hydropower
P14	Bujagali Hydropower Project: social and environmental assessment	Hydropower
P15	Mmamabula Energy Amendment Project: Serorome Mine social impact assessment	Coal mine
P16	Verifying the social impacts of the Berg River Dam: an ex-post analysis	Dam
P17	Lesotho Lowlands Bulk Water Supply Scheme: social impact assessment	Water pipeline

Table 7: Data sources used as part of this study: actual impacts

Code	Name of report/ document	Type of infrastructure project
A1	Zambia: Victoria Falls - Katima Mulilo 132 kV Interconnection Project: Project performance evaluation report	Transmission lines and substations
A2	Botswana: Trans-Kgalldi road project: Project performance evaluation report	Road
A3	Lesotho: Mpharane Bela Bela road upgrading project: Project performance evaluation report	Road
A4	Socio-economic effects of road improvements	Road
A5	The environmental and socio-economic impacts of mining on local livelihoods in Tanzania: A case study of Geita District.	Mines
A6	Monitoring the impact of mining on local communities: A Hunter Valley case study	Mines
A7	Economic and social impacts of the Coppabella Mine on the Nebo Shire and the Mackay Region.	Coal mine
A8	Rustenburg Platinum Mine's Rustenburg Section socio-economic assessment report	Coal mine
A9	Ahafo South Project: Independent external social compliance monitoring (5th review)	Gold mine
A10	Ahafo South Project: Independent external social compliance monitoring (7th review)	Gold mine
A11	Fact Sheet: Ahafo Linkages Program	Gold mine
A12	Fact Sheet: Livelihood enhancement and community empowerment programme	Gold mine
A13	Ahafo South Project: Independent external social compliance monitoring (6th review)	Gold mine
A14	The social impacts of a large development project: Lesotho highlands water project	Dams
A15	Anglo Platinum annual report 2006	Mines
A16	Mongolia: A review of environmental and social impacts in the mining sector	Mines
A17	Assessing the social and economic impacts of coal mining on communities in the Bowen Basin	Coal mines
A18	Impacts of activities of Canadian mining companies in Africa	Mines
A19	Post hoc study: social impacts in constructing high voltage transmission power lines	Transmission lines
A20	Social impact assessment for Riebeeck PPC Expansion Project	Cement plant

Code	Name of report/ document	Type of infrastructure project
A21	Olympic Dam expansion: Environmental impact statement	Dam
A22	Gold rush: The impact of gold mining on poor people in Obuasi in Ghana	Gold mines
A23	Verifying the social impacts of the Berg River Dam: an ex-post analysis	Dam
A24	Compliance review report on the Bujagali hydropower and interconnection projects	Hydropower

5.3 Presentation of findings: themes

Through the thematic data analysis process set out in Section 4.7.1.2, a total of four themes and 20 subthemes were identified, as shown in Table 8. As the names of the four themes suggest, each theme investigates a number of assumptions and impacts related to a specific aspect of a mining or infrastructure project: the first theme investigates the assumptions regarding and impacts potentially brought about by the construction workforce. The second theme does the same but focuses on the increase of the local population as a result of influx. The third theme investigates impacts that result from a change in land use, while the fourth theme considers the benefits of mining and infrastructure projects.

Table 8: Themes and subthemes identified by means of a thematic analysis

Theme	Subthemes
Impacts and assumptions relating to the construction workforce	<ul style="list-style-type: none"> - Size and composition - Working conditions - Skills training - Accommodation - Inappropriate and undesirable behaviour - Health concerns - Crime - Traffic-related incidents - Economic opportunities
Impacts and assumptions relating to an increase in population	<ul style="list-style-type: none"> - Nature of influx - Conflict and social integration - Social pathologies - Pressure on service provision - Establishment or expansion of informal settlements
Impacts and assumptions relating to land use changes	<ul style="list-style-type: none"> - Loss of access to natural resources - Daily movement patterns - Displacement and resettlement
Impacts and assumptions relating to benefits for the local population	<ul style="list-style-type: none"> - Employment of locals - Training for project-affected individuals - Benefits unrelated to the project

During the data analysis process (and as expected), it became clear that both SIA practitioners and authors of reports detailing actual impacts have different ways of predicting and reporting on psycho-socio-economic impacts. SIA practitioners tend to cluster and label predicted impacts differently: for example, one SIA practitioner will predict a general increase in social pathologies (such as drug use, prostitution and crime) resulting from influx from of job-seekers and the presence of a construction workforce, while another will shift his/her focus to the source of the impact (the migrant job-seekers or the construction workforce) and cluster possible impacts that may result

from that source. In some cases, the term “social pathologies” include an increase in, for example, human immunodeficiency virus (HIV) and STIs, while in other cases these are included under a heading of “health impacts”.

With regards to reports detailing actual impacts (and as also mentioned in Section 4.3), relevant information is scattered throughout documents and is not necessarily explicitly labelled as an impact. These reports do not follow any standard format and tend to offer a narrative about the receiving social environment since the implementation of a project, or provides “fast facts” about the project it is considering.

Due to the differences within SIA reports, the differences among reports detailing actual impacts, as well as the differences between the sets of data sources to be compared (SIA reports VS reports detailing actual impacts), the researcher had to be vigilant during the coding and theme identification processes to ensure that the final themes will be able to accommodate data from all the data sources. As was mentioned in Section 4.7.1.1, the researcher opted for a theoretical approach to thematic analysis and thus had some degree of flexibility when identifying themes, as opposed to being restricted by the data and having to identify themes closely linked to it. In other words, the researcher was able to “fit” the data into themes she thought to be appropriate.

The most commonly predicted and reported impacts in the data sources used as part of this study fall into one of the four main themes, as listed earlier in this section. Also, all but eight of the 26 social impact variables identified by Burdge (1994) (as presented in Section 2.6) are considered under at least one of the identified themes; a comparison between the impacts considered in this research and the social impact variables mentioned above is presented in Appendix 1. The fact that most of the social impact variables are considered in the current research testifies to the inclusive and comprehensive nature of the identified themes and subthemes, which enabled the researcher to logically and coherently categorise the relevant data in order to investigate and answer the research question. It should be noted, however, that the identified themes and subthemes are not mutually exclusive, and that there is some overlap. This is consistent with the systems theoretical perspective from which the data was interpreted, which emphasises the interconnectedness of the various aspects of a system. The findings of the current research relevant to each of the identified themes are presented below.

5.3.1 Theme 1: Impacts and assumptions relating to the construction workforce

This theme investigates the assumptions and impacts relating to the construction workforce and includes nine subthemes, as shown in Table 8. Any mining or infrastructure project will require some

construction activities and thus a construction workforce. This workforce represents one of the focal points of most SIA reports (including those used for this research), mainly because the construction workforce is complex social system that could have a substantial influence on the nature and extent of so many of the adverse impacts and benefits that arise from a project (Fitzgerald, 2006; Sadler, Verocai & Vanclay, 2000; Taylor, Fitzgerald, & McClintock, 2004), as will be illustrated in the discussions of the various subthemes.

5.3.1.1 Subtheme 1.1: size and composition

The size of the construction workforce is important to know when predicting impacts due to the following two main reasons (Taylor et al., 2004):

- It largely determines the significance of the benefit of employment creation by the project; and
- The larger the construction workforce, the bigger the risk of the workforce having an impact on the communities in the vicinity of the project.

Only six of the SIA reports used as part of this study provide an indication of the size of the construction workforce [P4, P9, P10, P14, P16, P17]. In some of these cases, however, these approximations are somewhat impractical for its intended purposes, as the numbers provided range from, for example 600 to 1 100 workers [P14]. The potential impact arising from the employment of 600 people is likely less significant than what would be the case if 1 100 individuals were employed. In addition, the population size of the communities in which the construction workforce will be employed is not provided in any of the SIA reports, making it difficult to grasp the significance of the impact.

Of the documents detailing actual impacts, only two mention the exact size of the construction workforce [A8, A19], while another two state that the construction workforce was almost double than that which was initially predicted [A21, A23]. This may imply that SIA practitioners sometimes underestimate the extent of positive impacts emanating from local employment (this is further discussed in Section 5.3.4.1).

The composition of the workforce pertains to the demographics of the construction workers, particularly in terms of gender, race, age and relationship status. This information is particularly important when considering the potential impacts the construction workforce may have on the communities in which they live and work (Taylor et al., 2004) (see Sections 5.3.1.5 to 5.3.1.9). The author's personal experience (based on various projects in South Africa and elsewhere on the continent) is that it is generally assumed that the workforce will consist of mostly single Black African

males roughly between the ages of 18 and 40. Only one SIA report mentions the anticipated race and relationship status of the construction workforce; it explicitly states that ‘the majority of construction workers will be males, and many may be single’ (P8, p. 76). None of the documents detailing actual impacts commented on any of the demographics of the construction workforce, although one can infer that the construction workforce is male. For example, one report mentions that the construction workers complained about being without female company, thus implying that the worker is male [A20]. In addition, where women are employed, it is stated explicitly [A2, A3, A19, A21]. For example, when discussing the economic impacts as a result of a project, the following is written in document A19, strengthening the notion that one can assume that the term “construction worker” refers to mainly males:

It is almost exclusively men that are employed as construction workers. According to one contractor representative, although a few women are employed in administrative positions or as engineers, work on site is too physical for women. In addition, he said that accommodation at construction camps is not suitable to women. However, in discussions with other interviewees it was said to be possible to engage women in a variety of activities. Previously women have been employed in bush clearance teams. (p. 36)

5.3.1.2 Subtheme 1.2: working conditions

The construction workforce is commonly viewed as a source of impacts on the socio-economic environment (see, for instance, Sections 5.3.1.5 to 5.3.1.9 below). However, a case may be made for regarding the construction workforce as an entity which experiences impacts itself, especially considering that the workforce is a complex social system. Such a view (although usually not adopted in SIA reports) would be consistent with the most generally accepted definitions of SIAs, as presented in Section 2.2, as these definitions do not specify who should experience an impact in order for it to be considered a legitimate object of study for a SIA.

Predictions and considerations regarding the well-being of the workforce, both positive and negative, are limited in the SIA reports used as part of this study and are mainly concerned with health and safety due to project-specifics, such as the proximity of the construction area to game farms, which may result in workers unknowingly entering the game farms without a guide and thus being exposed to the dangers posed by wild animals [P5, P10, P14]. Payment of less than minimum wage, as well as forced labour was also mentioned in the context of one project [P14].

Reports detailing actual impacts tend to raise a completely different set of issues regarding the well-being of the project workforce, and a small number report abuse and exploitation of the workforce. This is evidenced by the following, most of which SIA reports neglect to consider:

- Employees on a platinum mine in Rustenburg, South Africa have benefitted from perquisites such as medical cover for themselves and their immediate families, including the provision of voluntary counselling and testing (VCT) and antiretroviral (ARV) treatment [A8].⁴
- Shift work is generally not conducive to a balanced lifestyle, as it restricts opportunities for recreational activities [A4, A7, A17]. It also has safety implications for drivers who are fatigued due to irregular sleeping patterns [A7].
- Some employers require employees to work excessive hours while granting insufficient leave. In one case, workers were expected to work 12 hours a day for 6 days of the week, and only got the last weekend of every month off [A19]. Also, in some cases, the workforce's accommodation is not conducive to rest as it is noisy [A20]. One report notes that the workers felt that the proponent did not realise the impact of limited leave; getting home from the construction site took days, as opposed to having the luxury of the senior employees who fly home in a couple of hours [A20].
- Employment conditions had a negative impact on the workers' family life [A6], for a number of reasons. For example, workers are generally not allowed to have their families or partners with them during their employment period. This, coupled with little leave (in one case one long weekend every three months) resulted in members of the workforce finding local partners [A20]. In addition, no provision was made for workers to return to their families in case of emergency or death of a family member [A20].
- Construction workers could not access/did not have transport to social services, including church [A4, A20].
- On one project, employees were exposed to high levels of air pollution, which had a detrimental effect on their health [A4]. Additionally, no or inadequate personal protective equipment (PPE) was provided [A4].
- Ill treatment of the workforce, by neglecting to pay them the agreed wages, or by paying them less than minimum wage [A4].

It is worth mentioning another reason for considering the impact of working conditions on a project's construction workforce in SIAs: workers who feel exploited, stressed and alienated would be much more prone than happy ones to engage in inappropriate behaviour (see Section 5.3.1.5) and come into conflict with locals, as discussed in Section 5.3.2.2.

⁴ The practice of extending health benefits to employees' families is by no means universal. In the Democratic Republic of Congo (DRC), the researcher witnessed a project-owned and managed clinic turn away the wife of an unskilled local employee whose baby was suffering from diarrhoea, resulting in the baby's death two days later. The clinic was intended for employees only, and not their families.

5.3.1.3 Subtheme 1.3: skills training

Skills training of the construction workforce is a common socio-economic benefit usually predicted in SIA reports. The purpose of such training is for the construction workforce to acquire the necessary skills to perform their construction duties. This training is beneficial as it increases the probability of local employment: the researcher's experience and interactions with project proponents and contractors have revealed that one of the major limiting factors to employing locals for un- and semi-skilled jobs is the fact that more often than not, they do not possess the relevant skills (whether it be technical ability or work ethic), rendering themselves unemployable. Despite this, in many instances locals are employed but receive training in order to turn them into a productive workforce.

Six of the SIA reports reviewed for this study predict that on-the-job training and skills development will occur, thereby promoting the employment of locals [P2, P3, P8, P10, P16, P17]. In the case of one mining project, the SIA envisions that the proportion of local workers will increase gradually from the beginning of the construction period, thereby allowing for construction and training to take place simultaneously [P10]. This means that upon commencement of the construction phase, the workforce will consist of mostly outsiders who will systematically be replaced by locals as they complete training. This is a workable solution to ensure that both locals are employed on a project and that the construction progresses according to schedule, but is, however, only feasible on projects with an extended construction period (likely longer than a year). The same principle could be applied to the operational phase of a project, maximising more sustainable local employment. In this regard, two SIA reports (one for a dam and one for a bulk water supply scheme) predict that the majority of skills development will take place during the operational phase of the project, thereby enabling locals to fill long-term employment opportunities [P16, P17].

One SIA report recognises that by providing training, the proponent increases the probability of workers finding alternative employment upon completion of the construction period of the project under consideration [P8], while another SIA report makes the bold statement that training and skills development will benefit the national economy [P17]. Document P17 states that 'unskilled and semi-skilled persons working on the project will acquire some degree of new skills, which will be of future benefit to the national economy' (p. 35-36).

Some SIA reports also recognise, however, that there may be reasons why a project proponent might be unwilling to invest in developing the skills of its workforce. For instance, one SIA report mentions that training locals may be counterproductive for the proponent as HIV infections among the workforce may result in a high mortality rate [P2]. In other words, the report questions whether

it is worth spending the financial and human resources on training locals who are at risk of succumbing to the effects of HIV/AIDS and who are thus not employable in the long run.

Training of the workforce did not receive significant attention in the literature describing actual impacts used as part of this study. Only two reports mention that on-the-job training occurred [A8, A23]. One of the reports mentions that the benefits for the local community resulting from training is unclear [A23]: the report states that ‘construction-related skills training was provided to 484 local people... however, the actual benefits of training and its contribution to community upliftment are unclear’ (p. 12). Another SIA report mentions that the training has improved the skills base of the local community [A8]. This indicates that training in itself (even on-the-job training) is not necessarily an obvious positive socio-economic impact.

5.3.1.4 Subtheme 1.4: accommodation

The nature of many projects necessitates accommodation for the workforce. Accommodation arrangements are almost always a major concern for SIA practitioners as it is assumed to result in at least some negative impacts on the local community, whether the accommodation is located in the project-affected community or not.

The extent to which accommodation facilities for construction workers will have an impact on the workers and surrounding communities will depend on the nature, location and design of accommodation provided, as well as the provision of basic services at the facility, including sanitation. In the case of construction camps, for example, the impact on the surrounding community will be far less if the camp has adequate recreational facilities (such as pool tables, a bar and tuck shop) and is subjected to strict rules (such as local women not being allowed into the camp), than what it would have been if the camp consists only of sleeping barracks and there is no reinforcement of rules. This is because in the first-mentioned scenario, the enforcement of rules cultivates discipline among the workforce, and the needs and requirements of the workforce are largely met, minimising their motives to leave the camp in order to meet their needs. In contrast, the latter-mentioned scenario creates both the opportunity and the motive for the workforce to leave the facilities in order to meet their basic human and social needs.

Regarding the type of accommodation facilities for construction workers, documents on predicted and actual impacts report that while accommodation for construction workers is usually in the form of a construction camp, other arrangements are also sometimes employed. These can include rented rooms in community members’ houses, or low-cost housing built specifically for housing construction workers [P1, P2, P3, P5, P8, P10, P12, P16, A19, A20, A23]. Reports detailing actual

impacts indicate that construction workers originally housed in a construction camp may at some stage leave the camp to take up more attractive accommodation in rented rooms [A19, A20].

The location of the accommodation facilities is of pivotal importance when making predictions regarding the impact the facilities will have. Two of the SIA reports used as part of this study considered this: one report mentioned that the facilities will be located adjacent a water storage facility, thus increasing the risk of malaria among construction workers [P2], while the other recognised that housing non-local workers in rented rooms in the local community may result in conflict between the locals and newcomers [P12]. The location of the accommodation facilities featured in three of the reports detailing actual impacts; in one case the facility had to be moved as it was originally situated adjacent a school, this location being regarded as a safety risk by the local community who was concerned about their children's safety [A19]. In the other two cases, the facilities were located outside the local community, as per the community's requests, thereby minimising the risk of social conflict between the workforce and local community [A20, A23].

Only one SIA report used as part of this study provided any details regarding the design of accommodation facilities. Report P8 states that the construction camp will include sleeping quarters, a canteen, tuck shop, entertainment areas and facilities, sports facilities, bars, television rooms and bathrooms.

With regards to the provision of basic services, on one project the supply of water and electricity to the accommodation facility was unreliable, due to the fact that it was sourced from the land owner who had limited supply, and the fact that the facility was accommodating more workers than anticipated, placing strain on the services [A19]. In addition, the water quality was such that the workers were advised not to consume more than four litres per person per day [A19].

Regarding sanitation, despite client requirements, one construction camp did not have showers, due to the fact that the facilities were not used at the previous camp the workers stayed (the project was linear in nature, and the workforce moved camps as construction progressed) [A19]. Instead, workers washed with buckets in their barracks, and haphazardly discarded of the water anywhere around camp, posing a health risk.

Workers on one project felt that their health and well-being was being compromised as a result of the accommodation facilities: two workers shared a room without a divider, increasing the possibility of spreading disease. In addition, the relationship between the workers deteriorated, especially in cases where two workers with different value systems and attitudes towards alcohol

use, sexual relations and cleanliness for example, shared a room: document A20 states the following:

One of the workers interviewed indicated that sharing rooms was awkward, noting that sharing of rooms was a problem - “as not everyone is the same, some people are neat, others not, some smoke and drink, while others don’t”. Based on these findings the study noted that the policy of two single men sharing a room had negative implications for health and social well-being (p. 70).

5.3.1.5 Subtheme 1.5: inappropriate and undesirable behaviour

Inappropriate or undesirable behaviour by the construction workforce is divided into two subsections; firstly behaviour that takes place as part of construction activities (on-the-job behaviour) and secondly behaviour that takes place at the construction camp or accommodation facilities, or afterhours.

Regarding on-the-job behaviour, three SIA reports predict that undesirable behaviour may take place during construction activities [P3, P5, P15]. This behaviour includes the following;

- Damage to private property belonging to affected landowners, including cutting fences, breaking locks, and stealing gates [P5, P15];
- Disregarding the status quo on private property, by leaving gates open that are meant to be closed, locking gates that are not meant to be locked, and not following access roads [P5]. This behaviour may have significant implications for the landowner, including safety risks [P5] and the crossbreeding of cattle (resulting in a significant financial impact) [P5, P15];
- Irresponsible or negligent behaviour when executing construction activities, possibly resulting in fires on private property [P3]; and
- Other unethical behaviour, specifically trading necessary maintenance work (for example, on damaged power lines or transformers) for benefits, including sex, from the local community [P5].

All of the above predicted behaviours by construction workers were confirmed in one report detailing actual impacts, the most significant impacts being the perceived jeopardised safety and security of the land owners (as they feel they have lost control over who enters their property), and the loss of game or livestock through either poaching or theft [A19]. The implications of these impacts are related to the notion of the loss of autonomy among project-affected communities, and are thus much more severe than the consequences of mere damage to private property.

Predicted inappropriate or undesirable behaviour taking place outside of the work context concern the following:

- Unhygienic practices around the construction camp or accommodation facilities;
- Alcohol and drug use; and
- Engaging in sexual relations with local women.

Unhygienic practices were predicted by one SIA report used as part of this study. Specifically, littering in and around the construction camp was predicted, which may pose both a health and safety risk to the workers and surrounding communities, as it could result in the uncontrollable spread of fire [P5]. None of the reports detailing actual impacts mentions littering as an impact in or around construction camps. However, regarding sanitation, one report reveals that due to inadequate bathroom facilities, construction workers washed with buckets in their barracks and haphazardly discarded of the water around the camp, although it did not lead to any significant health impact on either the construction workforce or the surrounding communities [A19].

Predicted impacts related to the use of alcohol and drugs are similar. Three reports predicted the abuse of these substances among the construction workforce [P5, P8, P10], and provide the following main reasons for the behaviour [P8]:

- Workers have a disposable income and are thus financially able to purchase these substances;
- Workers are removed from their home environment where they have domestic responsibilities and where their behaviour may have been inhibited by prevailing norms; and
- Workers may experience an increased need for recreational activities as they are away from home and are working hard.

The perceived significance of alcohol and drug use is increased due to the fact that such behaviour may spill over to the local community, particularly the youth [P8]. Neither this nor any of the reasons thought to lead to alcohol and drug abuse as listed above are confirmed in any of the reports detailing actual impacts.

Alcohol abuse is assumed to be common, particularly after workers receive their wages, and is associated with an increase in violent behaviour, particularly towards locals if the construction worker is non-local [P5]. This is confirmed by one report detailing actual impacts [A19]. The difference in the two groups' value systems is mentioned as a mediating variable; the larger the difference, the more likely it is for violent behaviour to manifest. A secondary predicted impact resulting from alcohol use among the construction workforce is that it may result in the establishment of illegal shebeens to meet the increased demand for alcohol [P8]. None of the reports detailing actual impacts confirm this.

With regards to drug use, it is assumed that construction workers have better access to drugs, and that they will make it available to the local population [P10]. In addition, it is predicted that the presence of a construction workforce may lure drug dealers into the project area, making drugs more readily available and thereby increasing the probability of locals using drugs [P8]. Drug use was not considered by any of the reports detailing actual impacts.

Four of the SIA reports used as part of this study predict that members of the construction workforce will engage in sexual relations with local women [P3, P5, P8, P10]. This is confirmed by three reports detailing actual impacts [A8, A19, A20], as well as the author's personal experience: in the rural town of Bakouma in CAR, a migrant worker from South Africa engaged in sexual relations with a local woman, resulting in him being deported by the Gendarmerie (the local police force) after they received complaints from the local villagers.

It is believed that because many construction workers are away from their families and wives, that finding a local sexual partner is common [P5]. In the case of one project, construction workers confirmed the aforementioned [A20]: these workers were not allowed to have their families with them during the construction period, and most were only able to return home every three months. They explicitly stated that they are not able to go without female company for that period of time. On another project the construction camp manager had empathy for his workers' situation (being away from their wives) and thus allowed sexual relations to take place within the camp [A20].

Two main impacts are predicted to arise from this behaviour, as follows:

- Because construction takes place for a limited period of time only, it is likely that the "relationship" will be terminated upon completion of the construction phase of a project. Depending on the nature of the relationship, the local woman may have been supported by the worker. Thus when he leaves, she will become dependent on others for both financial and emotional support [P10]. Perhaps a more significant impact is that the local woman may have fallen pregnant with the worker, likely resulting in her being a single parent [P5]. The latter is confirmed by one report which indicates that the prevalence of teen pregnancies increased significantly since the introduction of the construction workforce [A19].
- If the local woman is in an existing relationship, having sexual relations with a construction worker may result in violence, including stabbings, shootings or even murder [P8]. Such a situation did not feature in the literature regarding actual impacts.

A secondary impact that may arise from the inappropriate behaviour described above is that it may destroy family structures and social networks [P8], rendering individuals more vulnerable after the introduction of a project than what they were before. This is not confirmed in any of the reports detailing actual impacts, although a different secondary impact came to light. One report indicated that construction workers spent a lot of money on local women, inevitably implying that less money is available for the construction workers' families, having implications for their quality of life not only because of the absence of a family member (likely the head of the household), but also because of decreased income [A20].

*5.3.1.6 Subtheme 1.6: health concerns*⁵

Six of the SIA reports used as part of this study predicted that the presence of a construction workforce may negatively impact on the health of the local community, particularly through the spread of tuberculosis, STIs, HIV/AIDS, and Hepatitis B and C [P3, P4, P8, P13, P14, P17]. An additional health concern is that the construction workforce may have intestinal worms, which, if sanitation is inadequate or if it is not used, may spread to people and livestock in the local communities [P5].

Three reports detailing actual impacts consider the health impacts emanating from the presence of a construction workforce [A3, A8, A19], although only STIs and HIV/AIDS are mentioned in these reports. Interestingly, only one report confirms that the workforce had a negative health impact on the local community, evidenced by a large number of new HIV infections since the arrival of the workforce [A8]. The report states the following in this regard:

A large percentage of [the project's] workforce still comprises migrant labour. These employees often have girlfriends and second wives in Rustenburg that increase the risk of contracting sexual transmitted diseases, including HIV/AIDS. Furthermore, prostitution also occurs in the communities surrounding [the project] further increasing the risk of HIV/AIDS being spread (p. 16).

In contrast, two reports detailing actual impacts indicate that the presence of the workforce did not result in the increased prevalence of STIs or HIV [A3, A19]. In fact, one report reveals that the project under investigation had a positive impact on the prevalence of HIV among the local population, as the project provided access to condoms, VCT and ARVs which never would have happened if not for the project [A3]. This shows that mining and infrastructure projects do not necessarily have to have a negative impact on the prevalence of HIV/AIDS.

⁵ As stated in Section 4.4, if a SIA report or a report detailing actual impacts met the criteria specified for the purposes of the sampling procedure, the contents of such a report was assumed to be true and correct. As such, the current researcher assumes that the authors of the data sources had scientific evidence on which they based their claims regarding health impacts.

Variables thought to mediate health-related impacts include the size, source and health status of the construction workforce [P13]. This is confirmed in one report detailing actual impacts of projects [A3].

*5.3.1.7 Subtheme 1.7: crime*⁶

Four of the SIA reports predict that crime will increase as a result of the presence of a construction workforce [P3, P4, P6, P8], although only one specifies the nature of such crime [P8], as follows:

- The lower income portion of the population is concerned about sexual assault and rape, physical assault, murder and other violent crimes; and
- The higher income portion of the population is concerned about opportunistic crime, such as housebreaking when construction workers travel to and from town.

One report mentions that the presence of the construction workforce may provide opportunities for non-construction workers to commit crimes by posing as construction workers [P3]. Two of the four reports seem to imply that it is not so much the actual incidence of crime that is the predicted impact, but the perception that the presence of the workforce will result in increased crime, affecting the local community's sense of safety and security, resulting in them feeling at risk [P3, P6].

Four of the reports detailing actual impacts addressed the issue of crime. One report, detailing impacts emanating from the construction of a dam just outside Franschhoek in the Western Cape, reports that the presence of a construction workforce did not alter the incidence rate or patterns of crime in the local community [A20]. On the other hand, however, in two instances crime did increase as a result of the presence of a construction workforce [A7, A21], as did the prevalence of the perception of being at risk [A7, A19]. Local stakeholders feel that their safety and security are jeopardised. In the case of private landowners, this is mainly because they have to allow "strangers" (referring to the construction workers) onto their property. This, in conjunction with the frequency with which violent crimes are committed towards farmers in South Africa, results in farmers feeling unsafe [A19]. In addition, landowners feel that they have no control over the strangers who enter their property, thus some may actually be non-construction workers scouting the property [A19].

5.3.1.8 Subtheme 1.8: traffic-related incidents

It is common sense that construction activities for mining and infrastructure projects will necessitate the use of heavy motor vehicles (HMTVs), and that these HMTVs will be operated by the construction workforce. More often than not, projects make use of public roads (as opposed to constructing their

⁶ As is the case with subtheme 1.6, the current researcher assumes that the claims made in data sources regarding crime are based on scientific evidence.

own private roads for the purpose of the project), thereby inevitably having an impact on local communities, ranging from being a mere nuisance to generating dust and noise impacts or posing a significant risk to these communities.

Eight of the SIA reports used as part of this study acknowledge that construction activities will result in increased traffic (particularly an increase in HVM traffic) in the project area [P1, P3, P4, P5, P8, P10, P13, P15], thereby changing the nature of traffic in the areas [P3]. This is predicted to hold both direct and secondary implications for the safety of the surrounding communities, as follows:

- The direct impacts emanate from the mere presence of vehicles [P1, P4, P8, P10, P13] and speeding (particularly in densely populated areas) [P1, P8], both posing safety risks for mainly local drivers and pedestrians. The significance of these direct impacts is assumed to be mediated by the communities' level of understanding of road safety (implicitly referring to the degree they are used to traffic and particularly HVM traffic) [P3, P13].
- The secondary impacts result from the effect the increase in HVM traffic has on the roads, specifically the general deterioration thereof [P1, P5, P8]. The extent of these secondary impacts is mediated by the pre-construction quality of roads, including whether the roads are able to handle HVM traffic [P5], and will likely exacerbate the direct impacts. Another secondary impact concerns the local community's relationship with the proponent, which may deteriorate if a construction vehicle is involved in an accident with a community member [P8].

With regard to the direct impacts, none of the reports detailing actual impacts reported any speeding by the construction workforce, or any fatal or serious traffic-related accidents. Nevertheless, three reports did mention that project-affected individuals experience perceived increase risk to their safety as a result of construction traffic [A2, A7, A17]. This seems to stem from the belief that construction workers are a danger on the road due to fatigue as a result of shift work, which commonly implies irregular sleeping patterns and long hours [A7].

Only one report detailing actual impacts addressed the predicted secondary impacts resulting from construction traffic: a landowner reported his private road damaged by construction traffic, and indicated that it had not been repaired satisfactorily upon completion of the construction activities [A19]. This does not mean, however, that these secondary impacts do not materialise: in South Africa there is ample proof of deterioration of roads due to HVMs, especially in the vicinity of mines.

One SIA report acknowledges that different groups of people will be affected differently by the direct and secondary impacts mentioned above [P3]. For example, the general population may

merely experience it as a nuisance (in the absence of being a serious safety risk), whereas business people transporting goods and farmers transporting produce may lose business if they are not able to transport their goods or produce as before due to deteriorating roads. Tourist destinations may lose patronage if accessing the destinations becomes dangerous due to heavy traffic. None of the reports detailing actual impacts offer a comparison of the manner in which different groups are affected by the direct and secondary impacts listed above.

5.3.1.9 Subtheme 1.9: economic opportunities

The presence of a construction workforce is frequently predicted to act as a catalyst for local economic opportunities in the following ways:

- The accommodation facility acts as a pseudo community, and where there are people, there are business opportunities. Informal markets and businesses may thus be established in close proximity to the facilities [P3, P10, P12];
- Related to the above is the notion that construction workers may make use of locally situated enterprises (such as shebeens and shops), increasing the expenditure in the area [P5, P8]; and
- The accommodation facility itself may be a source of formal and informal employment [P4, P5]. With the regard to the latter, washing of clothes, cooking, prostitution and the supply of food and alcohol was mentioned.

Two reports detailing actual impacts confirm that informal businesses were established close to the construction workforce [A3, A19]. Such businesses rendered services such as washing clothes and selling food and beverages. Importantly, the viability of such businesses seems to be limited to the construction camps and not the construction site. Document A19 states the following in this regard: ‘women from a community that is situated right next to the line (far from any construction camp) indicated that construction workers brought their own food to site. They said that construction did not bring any benefits to them’ (p. 39).

The benefit arising from construction workers making use of locally situated enterprises seems to be less significant than what is portrayed in most SIA reports. Only one report detailing actual impacts confirms that this was indeed the case (although also limited to the area surrounding the construction camp, and not the construction site) [A19], compared to three reports indicating the contrary [A5, A17, A20]. These last-mentioned reports indicate that construction workers did not significantly contribute to the local economy, as they only do their essential shopping in the area and made limited use of the local recreational facilities, such as shebeens. Interestingly, these reports

reveal a marked difference in the degree of expenditure in the local area between local and non-local construction workers, the latter spending much less [A5, A20]. One manner in which construction workers do contribute to the local economy (albeit rarely recognised by SIA reports) is by renting accommodation (mostly in the form of a room) from local households [A19, A20].

Only one report detailing actual impacts considered formal local employment at the construction camp or accommodation facility [A19]. This employment was limited to cleaners and security personnel who were employed by the camp manager for the duration of the project's construction phase. The predicted informal opportunities at the camp are reported in two of the reports detailing actual impacts [A19, A20]. However, whereas SIA reports assume that these opportunities will result in economic gain for the locals, the reports detailing actual impacts reveal that most of these potentially income-generating activities (including washing clothes, "prostitution" and cooking) are performed by construction workers' "wives" [A19]. These "wives" are local women who have entered into a relationship with a construction worker, and thus perform the routine duties traditionally associated with being a wife.

5.3.2 Theme 2: Impacts and assumptions relating to an increase in population

This theme investigates the most common assumptions and predictions relating to an increase in population in this vicinity of the project, and includes five subthemes. Mining and infrastructure projects represent a significant and scarce opportunity for employment and income for individuals in the direct project area, often characterised by unemployment and low income levels (see Table 1 in Appendix 2). This statement also holds true for the wider environment and can be modified to include neighbouring towns and cities, and if projects are large enough, neighbouring countries. As such, common sense dictates that where there is a project, there will be an influx of people in search of job opportunities.

The reality is, however, that most of the migrant job-seekers will not be successful in securing employment with the project [P4, P8]. It is worthwhile to distinguish between the impacts resulting from the employed and unemployed migrant population: the impacts pertaining to the former were discussed in Theme 1. Although those impacts are significant, the impacts emanating from the unemployed portion of the migrant population (discussed in this theme) can be more significant, as they will likely have no income, accommodation or employment to keep them occupied [P4, P8].

Influx of migrant workers and job-seekers is almost always predicted in SIA reports, and poses a major concern for SIA practitioners, evidenced by the author's personal experience and the fact that 14 of the 17 SIA reports used as part of this study predicted it. Some SIA reports acknowledge that it

is immensely difficult to discourage influx and that any such attempts will likely be unsuccessful [P3]. This theme explores the nature of influx as well as changes that take place as a result of population increase, including those related to conflict and social integration, social pathologies, pressure on service provision and the development of informal settlements.

5.3.2.1 Subtheme 2.1: nature of influx

Most SIA reports used as part of this study (14 of the 17 reports) predict that the proposed project will result in influx of people (both nationals and foreigners) to the project area [P1, P2, P3, P4, P5, P6, P8, P9, P10, P11, P12, P13, P15, P16]. This is confirmed by four of the reports detailing actual impacts [A2, A5, A7, A8], while one report indicates that migration into the project area at the time of the project was as a result of the general migration trends experienced in the area [A23].

The extent of influx is presumed to be influenced by the level of unemployment in the surrounding communities (mostly, in South African terms, provincially) [P1, P3]. One SIA report predicts that the rate of influx will increase as the proposed project's construction phase progresses [P11]. Neither of these predictions is confirmed in any of the reports detailing actual impacts.

Many of the migrants are predicted to stay in the project area even though they are not successful at securing employment with the project under investigation, partly because some of them are thought to have left existing jobs in their hometowns in the hope of earning better wages with the proposed project [P4, P5, P13]. Although this notion seems perfectly reasonable, it was not confirmed by any of the reports detailing actual impacts. To the contrary, one report states that unsuccessful migrants moved out of the project area about a week after construction commenced, presumably in search of other work opportunities [A19]. Personal experience in this regard is different: in the case of one mining project in Limpopo Province, migrant job-seekers stayed in the project area even after it became clear that they will not be employed on the project in question, eventually leading to the development of the Smash Block informal settlement. Similarly, in the case of the Saldanha Steel Project in the Western Cape, the township of Middelpos was established as a result of unemployed migrants who remained in the project area in the hope of one day securing employment. The data in the reports suggest that although it is likely that migrant job-seekers will remain in the project area even though they have not secured employment, this is not necessarily the case.

5.3.2.2 Subtheme 2.2: conflict and social integration

Introducing a new group of people into an existing community may potentially result in conflict between the two groups (Esses, Jackson, & Armstrong, 1998; Van Oudenhoven, Ward, & Masgoret,

2006). This belief is evidenced by a number of SIA reports used as part of this study [P1, P2, P3, P4, P5, P8, P9, P10, P11, P12, P13, P16]. These reports provide the following possible explanations for why conflict will arise:

- Local residents may feel that they are in competition for scarce job opportunities (both formal and informal) with the migrant job-seekers, or that the migrants are taking away such opportunities from them, resulting in economic pressure on the local population;
- In the event that migrant workers are employed in higher income jobs, the discrepancy between the locals' and migrants' income;
- Local women may mingle with the migrant population, disturbing existing social networks and appealing to the innate tendency to protect one's own;
- If migrants are housed in the local community, resulting in unavoidable and frequent contact with locals, as well as increasing the population dependent on limited natural resources (such as water, firewood, bush meat, and charcoal) and services available in the community; and
- If migrants do not respect local traditions or engage in activities unfamiliar to the local population, resulting in problems with social integration. Or conversely, if the local population are intolerant towards the cultural practices of the migrant or expatriate population.

Two reports detailing actual impacts contain data on conflict between the migrant and local populations due to the abovementioned factors: one report details a single occurrence of conflict, although the incident was preceded by excessive alcohol use [A19], while the other reports tension rising between the two groups as the local population (even those who were employed on the project) felt that the migrants are taking opportunities away from them [A20]. The report continues to state that the tension almost exclusively arose in bars and shebeens [A20].

The explanations listed above for why conflict may occur suggest that conflict is thought to arise due to the lack of social integration between the migrant and incumbent populations [P6]. Specific obstacles assumed to hinder integration include the following:

- The social well-being and cohesion of the local population may be threatened by the migrant population, due to the migrant's different social practices and values, social standards and religions [P2, P6];

- The disruption of social networks established by the local chieftaincy system. Migrants who do not respect this local tradition can cause severe social tension, which acts as a barrier to integration with the local population [P13]; and
- The perceived negative impact socio-cultural heterogeneity (brought about by the migrant population) may have on the local population, resulting in, *inter alia*, intermarriages between tribes or races [P13].

Due to these obstacles, the local population is thought to be less inclined to accept the migrant population, hindering social integration and thus maximising the possibility of social conflict.

The actual level of social conflict resulting from influx is much lower than predicted, evidenced by the fact few of the reports detailing actual impacts make mention of it, as well as the statement in one of the reports saying that the relationship between the migrant population and local communities was good [A19]. In fact, only one report detailing actual impacts confirms any of the above-mentioned obstacles: a community in which a mining project is being undertaken feel that an influx of people will change their environment and community for the worse [A7].

In the case of another mining project, however, the project itself resulted in social disarray as it caused a social divide between mining and non-mining families [A6], resulting in the disintegration of a once united (and completely local) community.

5.3.2.3 Subtheme 2.3: social pathologies

One of the commonly predicted impacts related to an influx of people into a project area, is an increase in social pathologies, including an increase in the prevalence of crime, HIV and prostitution [P1, P2, P3, P4, P6, P8, P10, P11, P12, P13, P15, P16, P14]. Seven of the reports detailing actual impacts confirm that influx as a result of the project under investigation resulted in an increase of one or more social pathologies [A2, A4, A5, A7, A8, A14, A21], while two reports indicate that it did not increase social pathologies in the project-affected area [A3, A20]. For ease of presentation, each of the mentioned social pathologies (crime, HIV and prostitution) is explored separately below.

Crime

Eleven SIA reports predicted that crime will increase as a result of job-seeking migrants [P1, P2, P3, P8, P10, P11, P12, P13, P16, P5, P4], particularly theft (including stock theft, theft of farm equipment and theft of project infrastructure such as cables), poaching and trespassing [P3, P8, P12, P5] (Section 5.3.1.7 considers crime in relation to the construction workforce, as opposed to crime in relation to unemployed migrants). One report predicted that the local community will assume that

crime will increase as a result of influx, resulting in a perceived safety risk [P6]. These predictions are based on the following assumptions:

- That the living circumstances (likely informal settlements) of those who are not able to secure employment are conducive to committing crimes [P1, P8, P11]. It is assumed that crime will be committed as a means of survival.
- That certain behaviour (such as prostitution) will result in criminal activity, such as assault and drug trafficking [P8].
- That influx will overwhelm the local population, leading to the dilution, alteration and ultimate weakening of local cultures, resulting in changes in lifestyles, behavioural changes and the loss of personal dignity, promoting, inter alia, criminal behaviour [P13].

Some of the assumed consequences of increased criminal activity in the project area include the following:

- Loss of tourism appeal of the area due to the changes ambience and character of the area (if there was appeal prior to the implementation of the project under investigation) [P16]; and
- In the case that criminal activity involves project infrastructure, injuries or death [P5].

Five of the reports detailing actual impacts confirm that crime increased as a result of an influx of job-seekers [A2, A5, A7, A8, A21]. Specifically, the incidence of housebreaking, other theft (including crop theft) and vandalism of road signs increased [A2, A3, A5]. The only consequence mentioned in these reports is the safety risk resulting from vandalism of road signs [A3].

HIV

Nine SIA reports predict that the incidence of HIV infections will increase as a result of sexual interactions between the local and job-seeking migrant populations, both in exchange for money (prostitution) and in the context of a relationship [P2, P4, P5, P6, P9, P10, P11, P13, P14]. This is partially based on the assumption that the majority of migrants will be single males with high disposable incomes [P9]. As is the case with crime, the weakening of local cultural values is thought to contribute to the spread of HIV, as locals are thought to become more prone to promiscuous and irresponsible sexual behaviour as a result of an influx of non-local individuals. Mediating variables influencing the severity of the impact include the prevalence of HIV among the migrant population [P2, P13], and the number of sex workers in the project area [P10].

Four reports detailing actual impacts confirm that the project under investigation resulted in new HIV infections [A4, A5, A8, A14], mainly due to increased prostitution [A5, A14], and the fact that

migrants often have second wives or girlfriends in the project area [A8]. The implications of this impact not considered by SIA reports is that the local population will have a lower life expectancy, higher infant mortality rate, higher death rate and lower population growth rate [A14]. These factors are not conducive to a sustainable and economically viable population, ultimately resulting in the continuation of the cycle of poverty.

Prostitution

Nine of the SIA reports used as part of this study predict that prostitution will increase as a result of influx into the project area, particularly around shebeens [P1, P2, P4, P5, P8, P10, P11, P13, P17]. Also, one report predicts that the incidence of casual sex will increase, which does not necessarily involve the exchange of sex for money or commodities [P10]. The groups thought most vulnerable to the aforementioned are women and teenagers who may engage in such sexual activity due to peer pressure or for the sake of experimentation. The assumed implications of an increase in prostitution are as follows:

- An increase in the incidence of HIV as discussed above;
- Conflict between spouses, resulting in the breakdown of marriages and families, as well as the deterioration of community values [P2, P11, P5];
- Negative impact on local women's mental health [P5]; and
- Stigmatisation and victimisation of local women involved in prostitution, particularly in the event of unplanned pregnancies [P8, P5].

Six of the reports detailing actual impacts confirm that prostitution has increased as a result of influx into the project area [A2, A4, A5, A8, A14, A19]. Two reports confirmed the link between an increase in prostitution and the prevalence of HIV [A4, A14], while another confirmed that sexual relations took place in exchange for commodities and not money [A19].

Reports detailing actual impacts shed light on the nature of prostitution in the project area. The default assumption is that women flock to the project area with the intention of prostituting themselves. However, one report detailing actual impacts indicates that many of the sex workers were initially in search of formal employment with the project under investigation, but when they failed they turned to prostitution as a means to earn an income [A5].

Reports detailing actual impacts used as part of this study do not sufficiently consider the implications of an increase in prostitution in the study area, making it difficult to comment on the accuracy of predicted impacts. However, the implications of prostitution, particularly regarding the

breakdown of family structures and the resultant impact on children, should receive more attention than what it does in the reports used as part of this study.

5.3.2.4 Subtheme 2.4: pressure on service provision

It is commonplace (and mostly justified) to assume that the provision of basic and social services in South Africa, as well as in the majority of countries where mining and infrastructure projects take place, leaves much to be desired; local authorities experience significant backlogs leaving thousands of households without basic services, existing basic services are not maintained, hospitals are understaffed and without the right equipment and medicines, and schools have a teacher to pupil ratio that render quality basic education near impossible. Evidence of such pressure on services is found in almost all local or district government level publications regarding social and community development, both in South Africa and Africa as a whole (see, for example, Saldanha Bay Local Municipality, 2011; Victor Khanye Local Municipality, 2011).

As such, it is understandable that SIA reports predict an adverse impact on the provision of basic and social services as a result of influx into a project area [P2, P3, P4, P5 P8, P11, P12]. Such services include basic services such as water and electricity supply and adequate sanitation, in addition to schools, the police and health facilities.

Only one of the reports detailing actual impacts confirm this increased pressure on services due to influx [A8]. To the contrary, two reports indicated that the impact on services have been insignificant (if any impact is experienced at all) since the commencement of the projects' construction phases [A19, A20].

SIA practitioners predict an impact on services without differentiating the types of services, or having a clear understanding of the changes involved that brings about the change in service provision. For example, SIA practitioners assume that migrants will remain in the project area even though they have not secured employment; an assumption shown not to be necessarily accurate (see Section 5.3.2.1). Having a comprehensive understanding of the quality and extent or capacity of services is a prerequisite to accurately predicting impacts on those services. SIA practitioners often do not have the knowledge required to make such predictions.

Although this data indicates that influx *per se* does not have a significant impact on the provision of services, and that SIA practitioners seem to predict this impact to be worse than what it usually is, it does not imply that the projects under investigation do not lead to significant changes in the provision of services: the project itself (by virtue of its activities) impacts on the provision of services as it too requires large quantities of water and electricity.

5.3.2.5 Subtheme 2.5: establishment or expansion of information settlements

Due to the associated negative consequences of informal settlements (crime, visual appeal, hygiene, etc.), the development of such settlements warrants careful consideration at the time of conducting a SIA. The development of informal settlements is generally associated with the population of a lower socio-economic status, such as most unemployed migrants.

Seven of the SIA reports used as part of this study predict the expansion of informal settlements as a result of influx due to the project under investigation [P1, P3, P4, P5, P8, P10, P16]. Mediating variables mentioned in this regard are the degree of poverty in the project area (the higher the level of poverty, the more likely informal settlements are to expand) [P1] and the presence of a construction camp, which may contribute to the expansion of informal settlements [P10]. Problems associated with informal settlements include an increase in social pathologies, noise pollution and health risks for the residents in the informal settlements [P1]. A significant implication resulting from expanding informal settlements (at least in the South African context), is that local municipalities may have to revisit its development plans (also known as its Integrated Development Plan (IDP)), which has cost implications for the municipality [P12, P5, P4].

Only two of the reports detailing actual impacts confirm that the project under investigation resulted in the expansion of informal settlements [A3, A8], one of which confirms that this is due to unemployed migrants [A8]. Two problems associated with this are health risks (as predicted) as these settlements do not have access to clean water [A8], and the fact that the settlements expanded into the project's servitude, posing significant problems for the proponent [A3]. The author's experience also confirms that influx resulting from a proposed project can culminate in the establishment or expansion of informal settlements: the settlement *Middelpos* in the Western Cape near Saldanha, now consisting of nearly 5 000 individuals and having been declared a formal township by the municipality, originated around the same time the Saldanha Steel project was commissioned in the area. *Middelpos* was originally inhabited by migrant workers seeking employment with the Saldanha Steel project.

5.3.3 Theme 3: Impacts and assumptions relating to land use changes

This theme investigates the most common assumptions and predictions relating to a change in land use as a result of a mining or infrastructure project, and includes three subthemes. With the introduction of a mining or infrastructure project comes an inevitable change in land use in the project area, often resulting in the physical or economic displacement of individuals or businesses, as well as other impacts.

This change in land use is brought about by project requirements: mining projects require large footprints in the vicinity of the deposit to be mined, and dams eradicate whatever land uses there were in the dam footprint. Even upgrades of existing infrastructure, although not requiring the establishment of a new project footprint, may require modification of behaviour in the vicinity of the upgraded infrastructure. For example, if a secondary road is upgraded to a tar main road, a road servitude will likely be imposed, limiting the land uses directly adjacent the road. Construction activities for mining and infrastructure projects also alter the manner in which the affected communities make use of their land.

5.3.3.1 Subtheme 3.1: loss of access to natural resources

Natural resources, such as grazing, agricultural land, thatching grass, fire wood, medicinal plants and bush meat, are frequently sources of livelihood for communities affected by mining and infrastructure projects. These resources are used to construct shelter, generate an income, provide household energy in the absence of electricity and are a source of food. A change in land use patterns, as well as land-take as required by the projects under investigation, impacts on communities' access to these resources, oftentimes resulting in hardship.

Seven of the SIA reports used as part of this study predict that the project under investigation will affect the local communities' use of natural resources, whether it be by limiting their access to it, removing it to make way for project infrastructure, or because of influx resulting in competition for such resources [P3, P5, P6, P9, P11, P13, P17]. Specifically, hunters, fishermen, bee-keepers, traditional healers and timber collectors are predicted to be adversely impacted, and the availability of firewood, charcoal, grazing and agricultural land is predicted to decline. The main reasons provided for this change in access to natural resources are as follows:

- An influx of people into the project area, as well as developments associated with this influx [P3, P11, P13];
- Land-take for project purposes [P13]; and
- In one case, a new road will cause a divide between the community and the source of their natural resources [P9].

Four of the reports detailing actual impacts confirm that the projects under investigation resulted in a loss of, or access to, natural resources, including traditional healers who lost access to medicinal plants [A4, A5, A14, A16]. This applies to all the natural resources mentioned in SIA reports, in addition to trees, thatching grass, bamboo reeds, sand, soil, springs and winter shelter. One report stipulates that the proponent did attempt to replant medicinal plants, although this was largely

unsuccessful, and where it was successful, healers were expected to pay for the plants [A14]. The report states the following:

These [medicinal plants] were supplied free by nature in the river valleys to everyone rich and poor and now we will be forced to buy them. Our traditional medical practices will decline and eventually disappear. It is a sad thing to us and to the people we used to help [A14, p. 37].

Significant implications of this loss of access to natural resources are as follows:

- As mentioned above, these natural resources are used to construct traditional housing, which became problematic when the supply thereof was limited [A14];
- It exacerbates other impacts caused by the project under investigation. In the case of a dam project for example, communities are exposed to colder conditions than what they are used to due to the presence of the large body of water, which is worsened by the fact that the dam significantly reduced their access to firewood, leaving them unable to combat the cold [A14];
- While communities had access to grazing they kept livestock, which was used for trading purposes. In the absence of sufficient grazing, households lost their livestock, and thereby also their currency for trade [A14]; and
- Traditional healers are incapacitated due to the lack of medicinal plants, resulting in financial implications for the healer, as well as health implications for the community who are not used to receiving treatment from clinics [A14].

An additional impact not explicitly considered by SIA reports, is that the loss of natural resources implies a disruption to the natural habitat of wildlife. In the case of one project, the wildlife is considered a significant part of the community's environment (for reasons other than those concerning livelihoods) [A14]. The report states that 'some villagers sadly said that their wildlife had disappeared and maintained that those birds, animals and the like were part of their environment that made their bustling world habitable and alive' [A14, p. 40].

The resultant impacts emanating from the change process discussed in this subsection seem to be more significant than what SIA practitioners portray in SIA reports. It impacts on the affected communities' livelihoods, economic position and sense of place or way of life.

5.3.3.2 Subtheme 3.2: daily movement patterns

One of the defining characteristics of communities is the movement patterns that take place within that community (Vanclay, 2002). Movement patterns in the context of this subtheme simply refer to the manner in which individuals move during their daily lives while going about their usual activities.

In major cities, these patterns are easily observable by studying vehicular traffic just prior and just after normal office hours: certain roads are busier than others, and the direction of the heaviest traffic is different in the mornings than the evenings as people make their way towards work or home. Similarly, although somewhat less obvious, movement patterns can be observed in communities typically affected by mining and infrastructure projects. For example, individuals often walk from their homesteads to their agricultural fields in the mornings, and return home in the evening. Just as road works along main routes disrupt traffic in major cities, so does a project and its activities have the potential to disrupt the movement patterns of individuals affected by the projects under consideration. This disruption may or may not result in significant psycho-socio-economic impacts.

Eleven of the SIA reports used as part of this study predict that the projects under consideration will impact on the daily movement patterns of project-affected communities, thus resulting in an impact on those communities [P1, P3, P4, P5, P6, P9, P10, P11, P12, P15, P17]. The main predicted causes of the disruptions are as follows:

- Construction, operation and decommissioning activities, including an increase in traffic resulting in both speeding through residential areas and damaging roads used by the affected community [P1, P3, P6, P12, P15, P17, P5, P4];
- Land-take for project purposes, resulting in limited or no access to the land-take area, as well as physical relocation [P1, P10];
- Closure of tertiary or smaller road networks for project purposes [P10]; and
- The erection of infrastructure aimed at deterring movement in the area, for example, by fencing a road thereby preventing movement [P9].

The implications of disrupting daily movement patterns are thought to have both social and economic impacts, as follows:

- It results in the fragmentation of communities, altering their patterns of interactions and decreasing their security, especially food security [P9, P10, P5];
- It contributes to the change in communities' sense of place [P10, P4];
- In some instances, communities lose (easy) access to services (such health care facilities or shops), other residential areas or bigger roads [P9, P10]; and
- It may prevent individuals from reaching their agricultural fields or grazing areas, or make the journey impractically far [P9, P11]. The grazing patterns of livestock may also be affected, forcing households to change their livestock's grazing regime.

Only one of the SIA reports [P3] recognises that the significance of the impacts resulting from a disruption of movement patterns will vary for different groups of people. For some, it may be a mere inconvenience, while it may leave others without a livelihood source.

The impacts resulting from a project's influence on a community's movement patterns is discussed in five of the reports detailing actual impacts, four of which confirm that a change in movement patterns has resulted in adverse impacts [A2, A4, A10, A14] while one implies that the community was not adversely affected in this manner by stating that no complaints were lodged by the community during the construction period of the project in question [A23].

The predicted social impacts resulting from a change in movement patterns are confirmed by the reports detailing actual impacts, except for its contribution to the change in a community's sense of place. With regards to the fragmentation of communities, one report states that the interdependence between two communities is impeded, effectively making households more vulnerable to hardships [A14]. In addition, family members are no longer able to visit one another [A14]. Regarding its financial impact, households are reported to have lost access to their sources of livelihood, that is their agricultural field or areas where natural resources are collected.

A factor exacerbating the impact, not predictable at the time of conducting a SIA, is that mitigation measures intended to ameliorate the impacts induced by a change in movement patterns are not always implemented. In the case of one water scheme, the proponent was meant to construct bridges and provide ferries for the affected communities, which they allegedly did not do [A14]. This resulted in a significant increase in travelling distance to cross a river (from an average of 2 km to an average of 12 km), as well as locals making use of home-made ferries to cross the dam. These ferries reportedly capsize frequently and have resulted in a number of fatalities [A14].

In the case of two projects, however, movement patterns have been optimised as a result of improved infrastructure such as road networks [A2, A4]. Such an optimisation has its own implications, including an increase in intermarriages between tribes, and exposure to new technology.

5.3.3.3 Subtheme 3.3: displacement and resettlement

As mentioned previously, land-take is often required as part of mining or infrastructure projects. If communities are located on the required land-take area, they have to be resettled. The impacts emanating from relocation depend on a large number of diverse factors, including the scale of resettlement, the location of the resettlement village (where the affected people are moved to), the

manner in which resettlement is executed and the demographic and socio-economic information of the resettlement-affected communities.

Twelve of the SIAs used as part of this study predict that displacement will take place [P1, P2, P5, P8, P9, P10, P11, P12, P13, P14, P15, P17]. The anticipated impacts associated with this are as follows:

- An alteration in the communities' daily movement patterns and way of life [P1, P10, P13];
- Health and safety risks for the resettlement-affected population [P1];
- The loss of agricultural and grazing land, impacting on the communities' ability to sustain their livelihood practices [P2, P8, P10, P11, P13, P17];
- Reduced well-being among the resettlement-affected population due to the stress associated with resettlement [P2];
- Disruption of social networks and support systems, making households vulnerable to hardship [P10, P13];and
- Improved housing at the resettlement location [P2].

Thirteen of the reports detailing actual impacts include impacts related to resettlement. Three of the impacts listed above, namely an alteration in movement patterns and way of life, decreased ability to sustain livelihood practices and a disruption of social networks and support systems, are confirmed to be accurate predictions. The following are specific examples of changes that culminated in these impacts:

- Belief in the continued earthly presence of ancestral spirits, and their influence on the day-to-day existence of the living, is still strong in many rural communities in the developing world. These spirits are usually believed to be bound to a particular place, usually their burial sites. When a community is relocated, its members may therefore believe that their new home is occupied by 'foreign' ancestral spirits. They may also believe that their moving into the area has angered these spirits, and that this will incur negative consequences for them and their families [A14];
- The agricultural fields provided at the resettlement site are not conducive to the cultivation of the variety of crop the households used to cultivate at their original location, the quality of grazing land is not as good, and the location did not allow for the same livelihood activities as what the households had previously [A5, A9, A24];
- The location of the resettlement site is far from main roads, resulting in limited access to such roads [A24]; and

- The resettlement site resembles that of an urban lifestyle, and not a rural one that the resettlement-affected households are used to [A9].

The data show that there are two significant mediating variables not considered by SIA reports that influence the significance of resettlement-related impacts, namely logistical planning and compensation practices employed by the proponent. With regard to logistical planning, poor planning resulted in a delay in the registration of title deeds and the relocation of households prior to the completion of the resettlement village. Consequently, the resettlement-affected households experienced additional impacts, making the resettlement process more stressful and disruptive than initially anticipated [A10, A14, A24].

Bad compensation practices reported in literature detailing actual impacts include a delay in payments, payments in cash which are spent irresponsibly resulting in hardship, difficulty with opening bank accounts for locals due to a lack of identification and broken promises regarding the amount of compensation to be received [A4, A10, A12, A14, A24]. These factors resulted in additional stress that could have been avoided, increasing the significance of the impacts related resettlement.

5.3.4 Theme 4: Impacts and assumptions relating to benefits for the local population

This theme investigates the most common assumptions and predictions relating to benefits for the local population that emanate from the presence of mining and infrastructure projects, and includes three subthemes. As mining and infrastructure projects hold a number of adverse impacts for the communities in which they occur, SIA practitioners predict and recommend certain actions to be taken by the project proponent or its contractor in order to offset these negative impacts to some extent. These actions are intended to create conditions where the adversely affected individuals can benefit from the presence of the project.

5.3.4.1 Subtheme 4.1: employment of locals

The creation of employment opportunities is a given with any mining or infrastructure project. Employment can generally be divided into skilled, semi-skilled and unskilled positions. While it is accepted that skilled positions on a project will be filled by people external to the project-affected community, it is generally assumed that semi- and unskilled labour can, and should, be sourced from the local labour pool, as local employment is one of the most significant socio-economic benefits that can result from a project (Sadler et al., 2000).

All the SIA reports used as part of this study recognise the importance of employing locals and predicted employment creation as a socio-economic benefit to the local or project-affected communities [P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17]. More emphasis is placed on the construction phase of the projects, with some exceptions [P6, P7, P9, P12], suggesting that the benefits from most employment opportunities are not sustainable as it is mostly limited to the relatively short-lived construction period.⁷

Many of the reports detailing actual impacts confirm that locals were employed with the project under consideration, to varying extents: some reports mention that the project was/ is a major employer within the local community [A7, A8, A17, A23], while in other cases local employment materialised more or less as predicted [A2, A3, A4, A10, A14, A19, A20]. Here too emphasis was on the construction phase of the project in question.⁸ On the other hand, however, there are a number of cases where insufficient local employment and excessive employment of non-locals are reported [A4, A6, A8, A9, A10, A16, A19]. The main reasons cited for this are as follows:

- Contractors tend to have their own permanent workforce [A19] or particularly in the case of the Chinese and Russians, tend to recruit their workforce from the urban centres of their native countries [A16]. Both these reasons allegedly makes construction management easier as it stifles the emergence of local job-seekers, ensures simpler discipline and better work ethic.
- Some South African proponents are bound by strict legislative requirements, such as the Occupational Health and Safety (OHS) Act, employment equity and unemployment insurance requirements [A19]. These requirements restrict the contractor's choices in terms of whom to employ, making recruitment of locals difficult.
- Certain construction jobs require skilled and semi-skilled labour [A19]. Employing locals who do not have the necessary skills has time and resource implications for the project (because of the time and cost involved in training these locals before they are able to perform their construction duties), rendering it impractical and unfeasible [A20].

Regarding the last bullet point above, SIA reports qualify their predictions regarding local employment by stating it will materialise only to the extent to which the necessary skills are

⁷ Depending on the size of the project and the nature of employment opportunities, locals can be employed for anything from a week to three years or longer. Nevertheless, it is unlikely that the benefits of employment will last for years after termination of employment.

⁸ This is likely due to the nature of the projects included in this study. With the exception of mining, these projects require proportionally minimal operational input from un- or semiskilled individuals. For the local population, impacts and benefits of infrastructure projects, such as road upgrades or the establishment of a new power line, are most pronounced during it construction phase.

available among the project-affected communities [P1, P6, P7, P8, P10, P12]. The first two bullet points, by contrast, were not mentioned in any of the SIA reports reviewed as part of this study, implying that contractors' requirements may not receive adequate attention in SIA reports.

The manner in which SIA reports qualify their statements regarding the extent to which local employment will materialise seems somewhat contradictory, given the common albeit justified assumption that local labour will be used for unskilled or semiskilled work [P1, P6, P8, P12, P17, A10]. The reports state that employment of locals will mostly be limited to unskilled work, but then go on to say that the capacity of locals to take advantage of these employment opportunities is limited. The reports do not explain how local people can be disqualified from employment by a lack of skills, when the jobs for which they may apply do not require skills. An explanation lies perhaps in the intended meaning of the words "required skills" as used in SIA reports to include not only one's technical ability, but also one's ability to function as an efficient worker, particularly in terms of discipline and work ethic. These last-mentioned "skills" are equally important for a contractor to complete a job within budget and the prescribed timeframe.

5.3.4.2 Subtheme 4.2: training for project-affected individuals

Section 5.3.1.3 addressed skills training for the construction workforce, the purpose of which is to enhance the potential socio-economic benefit of local employment. This section addresses training applicable to all members of the affected communities, the purpose of which is to minimise the potential negative impacts that may occur as a result of a proposed project. Interestingly, the latter mentioned features much more prominently in literature detailing actual impacts than what on-the-job training does (two reports versus seven reports respectively).

Project proponents sometimes implement training programmes for project-affected individuals, as such training can teach the affected community new ways to deal with their changing environment. The need for such coping skills derives from the fact that the introduction of a project into a social system will result in changes to that system, requiring a new or altered set of behavioural rules to cope with the new way of life.

Three SIA reports predict that training and capacity building for individuals not employed by the project will take place as part of the project [P1, P2, P14]. Such training and skills development is mentioned in the context of general benefits that the project will bring to the affected communities, without specifying the nature of training that will be provided. One report, however, specifically mentions that affected people will receive financial training in order to assist them to cope with the unfamiliar situation of receiving a cash income, with the intention that training will result in such

incomes being managed wisely [P14]. Given the common context in which mining and infrastructure projects generally occur (that is, primarily subsistence economies with limited circulation of cash), such training is essential to maximise the socio-economic benefits brought about by such projects.

Training and skills development provided for project-affected individuals receives much more attention in documents detailing actual impacts than what it features in SIA reports. Seven of the reports detailing actual impacts indicate that non-construction-related training has been provided to project-affected communities [A6, A7, A9, A10, A12, A13, A14], to various extents and with various degrees of success. Three reports detail successful skills development endeavours, with particularly youths and indigenous people receiving vocational training to improve employment and self-employment opportunities [A7, A12, A13]. Some of the training provided includes home-based care giving, first aid, welding and fabrication, catering and electrical installation. It is noted though, that the economic sustainability of the opportunities arising as a result of training should receive additional attention [A7]. Of the training programs detailed in documents reporting on actual impacts, perhaps the most sustainable and useful training provided is the *Agribusiness Growth Initiative*, implemented as a result of a mining project in Ghana, which focuses on cash crops and the processing of other crops [A9]. This initiative trained 200 farmers and resulted in advanced farming techniques and positive developments in marketing of crops.

Other training programmes were, however, less successful in empowering local communities to secure employment and sustainable livelihoods. Reasons for their failure included insufficient training opportunities, especially for youth and indigenous people [A6], training being poorly managed [A14] and the absence of follow-up after training [A10]. Some project proponents admit that they do not know what training they should provide to the project-affected community [A14], suggesting that an inappropriate or irrelevant curriculum may be an additional reason why some training initiatives fail.

Data from the reports detailing actual impacts indicate that skills development and capacity building is a far more complex matter than just providing training, as receiving training does not necessarily translate into generating an income and thereby improving one's quality of life (which is one of the most desirable outcomes of skills development programmes). The choice and quality of training, the manner in which training is managed, subsequent follow-ups and assistance with transforming a skill into an income-generating activity are all factors that contribute to the eventual success or failure of skills development. SIA reports do not generally consider the aforementioned factors to their required extent, resulting in optimistic predictions about the benefits resulting from skill development.

5.3.4.3 Subtheme 4.3: benefits unrelated to the project

Many project proponents engage in social investment initiatives. It is regarded as something companies 'should do', regardless of the types of impacts the project may cause, and is often not directed solely at the project-affected communities, but rather the larger socio-economic context.

Four of the SIA reports used as part of this study indicate that the proponent of the project under investigation will partake in social investment [P1, P12, P14, P17], although only two provided any further details. Examples of social investment initiatives mentioned in these reports are as follows:

- Donations to charitable causes in the project area [P1];
- Sponsoring sports and community development events and facilities [P1, P14];
- Contributing towards new and existing educational and primary health care facilities [P1, P14];
- Capacity building and SMME development for the wider community [P1];
- Improvement of physical infrastructure in underdeveloped areas [P1];
- Improved marketing of farm produce, resulting in higher incomes for families engaging in agricultural activities as a livelihood [P14]; and
- Improved water supply to the wider communities [P14].

While the stated objective for social investment in the case of one project is to improve opportunities for higher income and a better quality of life for the communities in the wider project area [P14], another SIA report mentions that the proponent will partake in social investment in order to compensate for the negative effects of the project [P 12]. Along the same lines, another SIA report states that the cost of social investment initiatives (such as building schools or clinics) will be lowered by their infrastructure improvements made for the purposes of the project, including improvements of roads and the electricity distribution system [P17].

At least eight of the documents detailing actual impacts indicate that the project under investigation did successfully contribute positively to the wider communities, and that the proponents implemented programmes aimed specifically at improving the quality of life of these individuals [A5, A8, A9, A10, A11, A12, A14, A22]. However, in the case of one project, the report indicated that the degree of success of social programmes fluctuated, and emphasised that social investment should not be considered a once-off activity, but rather an on-going commitment to the communities [A9]. This notion of social investment as an on-going process is also supported by the following occurrences:

- One project implemented mushroom farming to enhance the community's earning potential [A9]. This farming was a success one year, but failed the next as farmers were not able to create suitable conditions for farming;
- Participants of a poultry programme faced a major obstacle when their exotic birds died, as these birds were not resistant to a disease carried by local birds [A9]; and
- Potato farmers supported by the proponent struggled to benefit from the scheme as the selling price of potatoes was lower than initially thought [A14].

In all three cases above, unanticipated factors caused potentially viable programmes to fail at their intended purpose. If these programmes are approached as once-off investments, it is of no use to anyone and the wider community will not benefit. However, should the proponent consider these programmes to be investments that continually require input, the programmes can be adjusted to make it more successful and benefit the wider community.

Two reports indicated that the projects under investigation did not benefit the wider communities at all [A10, A22], despite claims from the proponent that it had [A22]. This resulted in a widespread negative attitude towards the project [A10].

5.4 Conclusion

In this chapter, the findings of the research pertaining to the primary research aim were presented. Firstly, a description of the data sources was provided, after which the four themes and 20 subthemes identified during the data analysis process were listed. Structured according to the identified themes and subthemes, the accuracy of predicted impacts was discussed by comparing these impacts to impacts reported to have occurred. In the following chapter, the accuracy of predicted impacts is qualitatively assessed by means of a categorisation system, after which the researcher offers a possible explanation for why certain impacts are sometimes incorrectly predicted.

Chapter 6: Discussion

6.1 Introduction

This chapter provides a discussion of the research findings presented in Chapter 5, with the primary purpose of answering the research question as set out at the beginning of this study. The discussion is structured according to the research aims as presented in Section 1.3.2; firstly, the accuracy with which psycho-socio-economic impacts are predicted is explored and qualitatively assessed. This is followed by an account of the researcher's interpretation as to why some impacts are inaccurately predicted, and recommendations for enhancing the accuracy of future SIAs are presented. Finally, the limitations of the current research are explored, recommendations for future research are made, and the dissemination of the current research findings is discussed.

6.2 Second-order analysis: determining the accuracy of predicted impacts

The accuracy of predicted impacts (representing the second-order analysis) is discussed using the same structure as that which was presented in Chapter 5; that is, the accuracy of each theme of impacts is discussed separately and in the same order as presented previously. The categorisation system described in Section 4.7.2 was used to qualitatively assess the accuracy of each subtheme by categorising it as having either a high, medium or low level of accuracy.

The reader is reminded that the discussion of research findings (presented in this chapter) is reflexive in nature (refer to Section 4.2). Reflexivity played an integral role in judging the accuracy of predicted impacts using the categorisation system mentioned above, as one of the factors considered when assigning accuracy ratings to impacts is the researcher's own experience with the impact under consideration (as mentioned in Section 4.7.2).

6.2.1 Impacts and assumptions relating to the construction workforce

This theme (Theme 1) was presented in Section 5.3.1 and investigated the most common assumptions and impacts related to the construction workforce. Table 9 lists the subthemes, or aspects thereof, of this theme, offers an accuracy rating for each (which provides an indication of the degree of accuracy with which it is predicted or understood) and presents summative justifications for this rating, as well as salient points for consideration. As this table shows, SIA practitioners seem to have a good understanding about the composition of the average construction workforce, type of accommodation facilities available to the workforce, as well as the nature and consequences of sexual relations between the workforce and local women. Predictions and assumptions relating to skills-training, crime, traffic-related incidents and undesirable behaviour while on-the-job tend to be

less accurate and more complex than commonly portrayed in SIA reports. The impact of skills training, which consists of various levels of impacts, is a good example to illustrate such complexity: the mere acquisition of a skill is a positive impact in itself, as it contributes to the betterment of an individual. A desirable benefit that follows from acquiring a skill, is securing an income which contributes to a better quality of life. However, there are a number of mediating variables influencing the transition from the first level benefit to the second, including the demand for the skill acquired (that is, are there job opportunities that require the skill acquired by an individual), the newly trained individual's attitude towards employment, as well the individual's proximity to employment opportunities to name a few. Comprehensive knowledge about the proposed skills training and the baseline conditions in the vicinity of the project (including attitudes and cultural norms relevant to employment) contribute to accurately predicting the significance of the benefits resulting from skills training.

The most inaccurately predicted impacts and assumptions relating to the construction workforce concern the following (possible reasons for inaccurate predictions are discussed in Section 6.3):

- The size of the workforce;
- Working conditions;
- The location and design of accommodation facilities;
- Aspects relating to hygiene and sanitation at the accommodation facilities, health impacts and the workers' well-being;
- Alcohol use/misuse and drug abuse by workers; and
- Economic opportunities associated with the presence of a construction workforce.

Understanding the workings of the construction workforce as a complex social system is important for accurately predicting impacts, as it influences the manifestation and/or significance of other impacts experienced by the receiving social environment. Understanding all the subthemes presented as part of this theme is equally important as many of them are interdependent, such as the working conditions and the extent of inappropriate behaviour, including sexual relations with local women.

Table 9: The accuracy of assumptions and predictions relating to the construction workforce

Subtheme/aspect of subtheme	Accuracy of assumption/prediction	Comment on accuracy/salient considerations
Size of construction workforce	Low	Limited information available at the time of conducting SIA: although the proponent could provide an indication of the required size of the construction workforce, the actual size may vary greatly
		SIA practitioners may underestimate the benefits of local employment
Composition of construction workforce	High	The assumption that the workforce will be primarily male and very often single is justified
Working conditions	Low	Insufficient consideration in SIA reports
Skills-training for the construction workforce	Medium	SIA practitioners seem to over-estimate the frequency with which skills-training occurs
		Even if skills-training occurs, it is not necessarily translate into a positive impact or benefit for the workforce
Type of accommodation facility	High	SIA practitioners' assumptions regarding the types of accommodation facilities are confirmed in reports detailing actual impacts
Location and design of accommodation facilities	Low	Insufficient consideration in SIA reports, likely due to the fact that the information is not available at the time of conducting the SIA, despite its importance relative to other impacts
Sanitation, health and well-being at accommodation facilities	Low	Insufficient consideration in SIA reports, likely due to the fact that the information is not available at the time of conducting the SIA
Undesirable behaviour on-the-job	Medium	Predicted behaviour was confirmed by only one report detailing actual impacts, which may indicate that the frequency of such behaviour is overestimated
Unhygienic practices at the accommodation facility	Low	Insufficient consideration in SIA reports, likely due to the lack of details regarding the accommodation facility and size of workforce
Alcohol abuse by construction workers	Low	The only prediction relating to alcohol that was confirmed by one report detailing actual impacts is that alcohol use may lead to conflict with the local community. However, there are too many other reasonable explanations to assume that conflict resulted only as a result of alcohol use or abuse
		SIA practitioners may overestimate the prevalence of alcohol abuse among construction workers

Subtheme/aspect of subtheme	Accuracy of assumption/prediction	Comment on accuracy/salient considerations
Drug use by construction workers	Low	Drug use was not mentioned in one of the reports detailing actual impacts, implying that it is not as significant as SIA practitioners believe it to be
Sexual relations between construction workers and local women	High	Reports detailing actual impacts do reveal that sexual relations between the construction workforce and local women occur, and that these relations have known consequences
		The working conditions of the workforce influence the extent to which this aspect materialises
		The impact of such relations in relation to the worker's own family (if he has one) is not considered
Negative health impacts	Medium	The presence of a construction workforce could result in a positive impact for local health through investments and initiatives by the proponent
		Severity of impact is influenced by the size, source and health of the construction workforce, which is likely not known at the time of conducting the SIA
Increase in crime	Medium	Crime rates do not necessarily escalate as a result of the presence of a construction workforce
		The real impact may be that project-affected people feel threatened, as opposed to them actually being victims of crimes
Traffic-related incidents	Medium	SIA practitioners seem to overestimate the probability with which such incidents occur
		As with crime, the impact seems to be more related to a perceived increase in risk, than actually being involved in an accident
		This aspect is influenced by the working conditions of the workforce
Economic opportunities	Low	The economic benefits resulting from the presence of the construction workforce for the local communities is less than generally predicted
		Services rendered to the workforce may be from a local "wife" and thus does not hold economic gain for the local person
		Renting of accommodation is likely one of the biggest economic benefit for local people

6.2.2 Impacts and assumptions relating to an increase in population

Impacts and assumptions relating to an increase in population as a result of influx into a project area were discussed in Section 5.3.2 (Theme 2). As was done for impacts and assumptions relating to the construction workforce (Section 6.2.1 above), Table 10 provides a summary of the accuracy of predicted impacts and assumptions relating to this theme. It shows that SIA practitioners seem to have a relatively good understanding of the impacts associated with an increase of population, particularly those related to social pathologies in general, and prostitution in particular. Less accurate predictions relate to the nature of influx, conflict and social integration, crime, the prevalence of HIV and the establishment or expansion of informal settlements. Pressure on service provision is the least accurately predicted impact associated with this theme.

Understating the manner in which the receiving social environment will change as a result of an increase in its population is important for the accurate prediction of most other psycho-socio-economic impacts related to a project as this environment represents the platform (or at least a part thereof) where many of these impacts will occur. In other words, as the receiving social environment is a major component of the supra-system that is formed when a project is introduced into an existing social system (see Sections 3.2 and 3.8), knowledge and understanding of its state is required for the accurate prediction of most other aspects relating to the mining or infrastructure project.

Table 10: The accuracy of assumptions and predictions relating to an increase in population

Subtheme/aspect of subtheme	Accuracy of assumption/prediction	Comment on accuracy/salient considerations
Nature of influx	Medium	SIA practitioners seem to perceive influx to be a bigger problem than what it is
		General migration trends are not considered in SIA reports
		The impact as a result of influx seems to be either negligible or very significant (such as the establishment of informal settlements)
Conflict and social integration	Medium	Although there is some evidence of social tension, SIA practitioners seem to perceive it as a bigger problem than what it actually is
		The relationship between the migrants and incumbent population can be good, and social conflict can materialise as a result of a project without the presence of migrants
Social pathologies	High	An increase in social pathologies is frequently predicted and reports detailing actual impacts confirm that projects often result in such an increase
Crime	Medium	SIA practitioners seem to be overly pessimistic when predicting the impact of a project on crime levels in an affected community, and the impact is perhaps overanalysed (for example, the weakening of local culture does not seem to play a significant role in an individual's decision to engage in criminal activity)
		The incidence of crime is related to the probability of job-seekers who did not secure employment remaining in the project area
		Vandalism is not sufficiently considered in SIA reports but seem to result in significant negative impacts
HIV	Medium	SIA practitioners seem justified in predicting an increase in the prevalence of HIV as a result of a project
		The significance of this impact is not adequately considered or emphasised in SIA reports
Prostitution	High	An increase in prostitution as a result of influx seems to be a reality

Subtheme/aspect of subtheme	Accuracy of assumption/prediction	Comment on accuracy/salient considerations
		<p>The level of prostitution is influenced by the extent to which women are employed by a project</p> <p>"Prostitution" includes sex in exchange for commodities, not only money</p>
Pressure on service provision	Low	<p>SIA practitioners predict this impact to be worse than what it usually is and do not provide sufficient context or detail when predicting this impact</p> <p>Insufficient detail is provided in SIA reports regarding the type of services, the extent of services required by the project, and municipal capacity to provide these services</p>
Establishment or expansion of informal settlements	Medium	SIA practitioners seem to perceive it to be a bigger problem than what it really is, partially attributable to the sometimes incorrect assumption that unsuccessful job-seekers will remain in the project area

6.2.3 Impacts and assumptions relating to land use changes

This theme, presented in Section 5.3.3 (Theme 3), investigated the most common assumptions and impacts related to a change in land use. Table 11 provides a summary of the accuracy of these assumptions and impacts. It shows that the complex nature of impacts associated with a loss of access to natural resources and changes in daily movement patterns result in predictions concerning these impacts to be relatively inaccurate. Additionally, but by no means due to the SIA practitioner, impacts related to displacement and resettlement cannot be accurately predicted at the time of conducting a SIA due to the fact that too little information is available at that time, and that there are too many uncontrollable and unpredictable variables that influence the success of the relocation process.

Table 11: The accuracy of assumptions and predictions relating to land use changes

Subtheme/ aspect of subtheme	Accuracy of assumption/ prediction	Comment on accuracy/salient considerations
Loss of access to natural resources	Medium	This impact is frequently considered in SIA reports although its significance seems to be underestimated
		The impact not only affects people's livelihoods, but also threatens their way of life and jeopardises their economic standing
Daily movement patterns	Medium	Predictions often correlate with reported actual impacts, although the nature of the impact is sometimes different than predicted and its significance is more severe than anticipated
		Significance of impact is affected by the degree of dependency on natural resources
		The impact on movement patterns is not necessarily negative
Displacement and resettlement	Low	Although many SIA reports predict that displacement and resettlement will occur, too little information regarding the process is available at the time of conducting a SIA, and there are too many unknown variables, to accurately predict the significance of displacement and resettlement

6.2.4 Impacts and assumptions relating to benefits for the local population

This theme, presented in Section 5.3.4 (Theme 4), investigated the most common assumptions and impacts related to benefits of a project for the local population. Table 12 provides a summary of the accuracy of these assumptions and impacts, and shows that SIA practitioners do not always have an accurate understanding or accurately predict the benefits that may arise as a result of a mining and infrastructure project. The employment of locals does not necessarily occur to the extent practitioners predict, perhaps due to a limited understanding of the manner in which contractors operate in terms of securing a workforce (particularly during the construction phase of a project), or

because of misconceptions regarding which “skills” are required for seemingly unskilled and semi-skilled work. Social investment activities are predicted less often than what it occurs, although such initiatives do not necessarily result in benefits for the local population. The least accurately predicted and understood impact relates to skills-training for the general project-affected population, which is not predicted as often as what it seems to occur.

Table 12: The accuracy of assumptions and predictions relating to benefits for the local population

Subtheme/ aspect of subtheme	Accuracy of assumption/ prediction	Comment on accuracy/salient considerations
Employment of locals	Medium	SIA practitioners are sometimes overoptimistic when predicting the extent of local employment, evidenced by the large number of cases in which there was insufficient local employment
		Overoptimistic predictions can stem from SIA practitioners’ limited understanding of how contractors operate, thus not knowing to what extent local employment is feasible, or practitioners do not have a clear understanding of what is required for each of the classified skills levels (skilled, semi-skilled and unskilled)
Training for project- affected individuals	Low	This benefit seems to occur more often than what SIA practitioners predict
		The usefulness of skills-training depends on a complex chain of events and does not necessarily translate into benefits
Benefits unrelated to the project	Medium	This benefit is not commonly predicted, but seems to occur quite frequently albeit to varying degrees of success
		The success of social investment initiatives depends largely on the proponent viewing social investment as an on-going activity as opposed to a once-off investment or activity

6.3 Third-order analysis: reasons for inaccurate predictions

Determining the accuracy with which psycho-socio-economic impacts are predicted is the primary aim of the current research, and was addressed in Section 6.2 above. As a secondary aim (as set out in Section 1.3.2), the researcher endeavoured to explain possible reasons for inaccurate predictions in an attempt to improve the “science” of SIAs, thereby improving the accuracy of future SIAs. The first- and second-order data analysis methods employed for this research (thematic analysis and categorisation of impacts according to the level of accuracy with which they are predicted) do not explicitly allow for fulfilling this aim; thus a different approach was employed. In the following subsections, this approach is explained and discussed, and the outcomes of the third-order data analysis are presented.

6.3.1 Approach to identifying reasons for inaccurate predictions

It is mentioned in the previous section that the researcher had to identify a suitable approach for fulfilling the secondary aim of the current research. As discussed in Section 4.7.3, this approach follows Bateson's (1972) advice that, in order to make headway in the establishment of new knowledge, it is sometimes necessary to start with the fundamentals and work deductively, back towards the data.

Following this advice, the researcher therefore set aside the findings of the thematic analysis once it was complete, and posed herself the following fundamental question: what are the basic types of knowledge or information that a SIA practitioner would require in order to make accurate predictions about the social impacts of any given project? By reasoning deductively from the basic attributes of social impacts and the SIA process (as explicated in Section 2.5 and elsewhere in this mini-dissertation), it is evident that all the required information can be sorted fairly easily into four broad categories, as follows:

- Knowledge or understanding of the proposed **project**, its attributes and associated activities;
- Information about, and adequate understanding of, the **nature of the receiving environment**;
- Knowledge or understanding of the **changes** that would be (directly and indirectly) brought about in the receiving environment by this project and its associated activities; and
- Understanding or having an appreciation for the **values** by which persons or communities judge any perceived changes in their environment and decide whether these changes represent positive or negative impacts, or are irrelevant to their well-being.

Each of these categories is defined in more detail below.

6.3.1.1 Attributes of the project

The impact a project will have on its receiving environment (a social system) depends on the specifics of the project, such as the size of its footprint, whether it will entail the physical or economic displacement of people, the duration of the construction and operational phases, and the proponent's employment practices to name a few. Also included in this category is the mitigation measures that the project proponent intends to implement or enforce to ameliorate or avoid negative social impacts and enhance positive ones. Inaccurate knowledge of these project activities results in a misrepresentation of the project and what it entails, and thereby limiting one's ability to accurately predict how it will influence its receiving environment.

6.3.1.2 The nature of the receiving environment

The receiving environment may be defined as the psycho-socio-economic context within which the proposed project will take place and that may be affected by it. This may include the project site itself, its immediate surroundings, nearby settlements, the local economy and (depending on how far the impacts of the project will extend), its national and international milieu. The prediction of virtually any social impact requires a consideration of both the attributes of the proposed project (discussed above) and those of the receiving environment. For instance, the extent to which a project will create opportunities for the employment of local people will depend on the availability of employable skills in the local community; the extent to which a project will necessitate physical displacement will depend on the degree to which settlement patterns coincide with the proposed project footprint; the numbers of job-seekers that are likely to migrate into the project area will depend firstly on the prevalence of unemployment in surrounding areas, and secondly on how accessible the project area is from those areas that are characterised by high unemployment.

The receiving environment, as it is defined for the purposes of this analysis, also includes other current or planned projects or activities taking place in the vicinity of the proposed project whose likely impacts are being assessed. The relevance of these other projects or activities stem from the fact that they might have their own psycho-socio-economic impacts, and that (consistent with the notion of holism introduced in Chapter 3) the combined effect of their impacts and those of the project under consideration may be different from what it would have been if either had occurred in isolation.

6.3.1.3 Change processes

As was argued in Section 3.8, the receiving psycho-socio-economic environment of a proposed project may be regarded as a complex, dynamic system that:

- Comprises numerous sub-systems (its psychological, social and economic components being the most obvious examples);
- Is hierarchically organised (spanning many levels of organisation, from the individual to the family to the community, possibly with several intermediate layers);
- Is embedded in a larger economic, political and cultural system;
- Involves a number of negative feedback loops, such as economic relations, that maintain its stability; and

- Is dependent for the preservation of its stability and integrity on the amount of requisite variety or flexibility it has at its disposal to make adjustments in response to external changes (such as the introduction of a project).

When the receiving environment is viewed in this manner, it is evident that the “impacts” assessed by SIA practitioners are in fact the end products of long chains of cause-and-effect that begin with the introduction of the project into the system, that may ramify throughout various parts of the system, may branch (a change in one part of the system may cause a change in two or more other parts of the system), and may close in on themselves (persons forming part of the system may perceive a project-induced change in their environment, and may act to counter or reinforce this change).

An example of how a project-induced change may ramify through the social, economic and ecological sub-systems of the receiving environment is provided by the following scenario: when a project is announced, it is usually followed by an influx of people (especially job-seekers) to the area where the project will take place. This influx causes a change in the demographic profile of the receiving environment (for example, the area’s population will increase, and the male-female ratio may become uneven). If these migrants are unsuccessful at securing employment with the project, they are left without an income or means of survival in a new community. They then build informal residential structures from natural materials (such as wood and grass), which may already be under pressure due to excessive use by the local community, resulting in competition and tension between the two communities over scarce resources. In addition, overharvesting may become a problem and the natural habitat of some local animals may be destroyed. Unable to survive in its current setting, animals migrate elsewhere in search of food and shelter. The availability of bush meat for slaughter and sale is thus reduced, forcing an entrepreneur selling bush meat to change his livelihood activity.

6.3.1.4 Value systems

As indicated above, project-induced changes in a psycho-socio-economic system are usually so complex and so numerous that it would preclude any attempt at impact assessment, were it not for the fact that not all such changes constitutes “impacts”. Vanclay (2003) has argued for a distinction between change processes and impacts by pointing out that change processes only translate into impacts when they impinge on people’s value systems. Two communities with different value systems may perceive identical changes in their world, but the one may regard it as a deleterious impact while the other regards it as irrelevant to their well-being.

For example, if a proponent is planning an opencast mine in an indigenous forest, a change in the local community's sense of place is often predicted. In a community that values such a forest (perhaps due to its cultural significance), this may constitute a significant negative impact, even if the community is not dependent on the forest for food or other resources. On the other hand, if the community does not attach any particular value of significance to the forest, and if they are equally independent of it for livelihood resources, they will not regard the loss of the forest with any particular distress. Likewise, if a project brings about the rapid modernisation of previously isolated and traditional community, the question of whether this will be experienced as a positive or negative impact will depend on the value that community attaches to its traditional lifestyle.

It may be argued that the assessment of any social impact requires consideration of the value systems of those who will be affected. In practice, however, such considerations are often superfluous, as the relevant values are more or less universal. For instance, if a project is expected to bring about a loss of agricultural land on which the surrounding community depends for its food supply, it is unnecessary to state that this is regarded as a negative impact because the community's value system compels its members to eat to stay alive. This value pertaining to survival is shared by virtually all human beings.

6.3.2 Bridging the gap: identifying reasons for inaccurate predictions

Having developed a system for categorising the types of information required to make accurate predictions of impacts, the researcher made a further fundamental assumption – namely, that the inaccurate predictions of impacts can always be ascribed to the fact that some information has been overlooked, incorrectly interpreted, used as a basis for drawing invalid inferences or otherwise violated during the SIA process. From these two premises, it follows that each inaccurate prediction is the result of information belonging to one or more of the aforementioned categories being missing or misused.

Armed with this deduced premise, the researcher returned to the findings of the thematic analysis presented in Chapter 5 and summarised in Section 6.2. Focusing specifically on those impacts that had been found to be predicted inaccurately, she re-evaluated the findings of the analysis in the light of the following question: what type(s) of information would have been missing, overlooked or misinterpreted in making this inaccurate prediction? The outcomes of this third-order analysis are presented below, and are structured in terms of the four categories of required information as defined above.

6.3.2.1 Inaccuracies related to information about project attributes

In terms of information about the proposed project, the following was found to be common causes of inaccurate predictions of impacts:

- The size of construction workforce is often underestimated (see Section 5.3.1.1); and
- Mitigation measures are often not implemented as planned or intended. For instance:
 - Mitigation measures intended to ameliorate the impacts induced by a change in movement patterns are not always implemented (see Section 5.3.3.2); and
 - When assessing likely resettlement-related impacts, the significance of such impacts is often assessed on the basis of erroneous assumptions about the adequacy of logistical planning and compensation practices employed by the proponent (see Section 5.3.3.3).

6.3.2.2 Inaccuracies related to information about the receiving environment

Only one instance could be identified where incomplete information about the receiving environment tends to lead to inaccurate prediction of impacts. This instance relates to the fact that restrictive labour legislation and lack of skills in local communities limits the extent to which locals can be employed on a project. Consequently, benefits in terms of local employment are less significant than commonly predicted (see Section 5.3.4.1).

6.3.2.3 Inaccuracies related to the understanding of change processes

As may be expected, several instances were identified in which inaccurate predictions are the result of inadequate consideration of the complex chains of cause-and-effect by which project-induced changes ramify through various parts of the psycho-socio-economic system. Only the most pertinent examples are summarised below:

- The actual benefits of training for the project workforce, in terms of its contribution to community upliftment, are unclear – primarily because there are numerous intermediate links in the causal chain leading from training to tangible benefits in terms of, for example, long-term employment (see Section 5.3.1.3);
- The abuse of alcohol and drugs by construction workers is overestimated (Section 5.3.1.5). This implies that the causal link between expendable income among construction workers, the opportunity to obtain drugs and alcohol, and the subsequent misuse of these commodities by construction workers, is less direct than is often assumed;
- Economic opportunities created for local communities through the presence of a construction workforce are often overestimated. In particular, whereas SIA reports assume

that such opportunities will result in economic gain for the locals, reports detailing actual impacts reveal that most of these potentially income-generating activities (including washing clothes, “prostitution” and cooking) are performed by construction workers’ “wives” without monetary compensation (see Section 5.3.1.9). This implies that the causal link between these two variables (the presence of the construction workforce and economic benefits for locals) is likewise less direct than commonly assumed;

- Secondary impacts of increased HIV prevalence (a lower life expectancy, higher infant mortality rate, higher death rate and lower population growth rate) are not adequately considered in SIAs (see Section 5.3.2.3);
- Impacts of population increase in terms of increased pressure on services may be overestimated (see Section 5.3.2.4); and
- The effect of the loss of natural resources in terms of a disruption to the natural habitat of wildlife is underestimated in SIAs (see Section 5.3.3.1).

6.3.2.4 Inaccuracies related to the understanding of value systems

The review of the thematic analysis revealed that people’s value systems may influence social impacts in two ways. First, as indicated in Section 6.3.1.4, value systems determine whether people regard a particular change in their environment as good, bad or irrelevant. Examples of this effect include the following:

- As discussed in Section 5.3.1.6, members of a construction workforce will sometimes engage in sexual relations with local women. If such behaviour is regarded as an impact in itself (not considering the possible health implications in terms of HIV, etc.), the significance of this impact will depend on the value system of the local community – in particular, their views regarding sexual propriety. In a highly conservative, patriarchal society, such an impact will be experienced much more negatively than in a more liberal, egalitarian society;
- In cases where local women view the presence of a construction workforce as an opportunity for economic gains by means of prostitution (see Section 5.3.2.3), the same consideration applies; and
- In cases where impacts are a direct result of actions by a project proponent or a party acting on behalf of the proponent (for example, a construction contractor), the persons experiencing those impacts are often more intent on the “message about relationship” conveyed by the actions that gave rise to those impacts than on the impacts themselves. In particular, if the party responsible for the impact is viewed as untrustworthy or indifferent to their interests, the impact is viewed far more negatively than would otherwise have been

the case. This suggests that most people attach considerable value to the relationship aspect of human interactions – to trust, mutual respect and the like. Examples of this tendency include the following:

- Workers who feel exploited, stressed and alienated would be much more prone than happy ones to engage in inappropriate behaviour (see Section 5.3.1.2); and
- Among local landowners who experience the impacts arising from the presence of a project-related construction workforce, feelings of loss of autonomy because of the presence of “strangers” in their midst are a significant cause of discontent – sometimes more so than the impacts themselves (see Section 5.3.1.7).

The second way in which people’s value systems may influence social impacts relates to the fact that people’s value systems cause them to respond to events in certain ways, and these actions may be instrumental in giving rise to social impacts. For instance:

- Differences in value systems among workers can be a cause of conflict within the project workforce. Instances have been recorded where construction workers who had different value systems, different attitudes towards alcohol use and sexual relations, and different standards of cleanliness were forced to cohabit, and where this caused significant tensions in the workforce (see Section 5.3.1.4); and
- If a migrant population moves into an area because of (perceived) economic opportunities created by a project, differences between the migrant and incumbent population in terms of social practices, values, social standards and religion may erode the social well-being and cohesion of the local population (see Section 5.3.2.2).

In none of the cases discussed above was explicit information provided in the data sources on whether the impacts in question were accurately predicted or not. This limits the ability of the analysis to draw firm conclusions on the question of whether insufficient consideration of or inaccurate assumptions regarding value systems is a significant source of error in social impact assessment. Nevertheless, these cases provide ample evidence of the potential role of value systems in shaping the manner in which such impacts unfold, and thus validates the inclusion of this fourth category of information.

6.3.2.5 Inaccuracies not related to any of the four categories of information

Finally, the third-order analysis identified one source of inaccuracy in the prediction of psycho-socio-economic impacts that cannot be classified in terms of the fourfold categorisation of required information. In Section 5.3.1.2, several examples were given of negative impacts that may be

experienced by the construction workforce on a project because of poor working conditions and inadequate facilities. It was noted that such impacts are usually not considered in SIA reports because, in such reports, the construction workforce is regarded as a source of impacts rather than a recipient or “impacted party”.

This omission in SIA reports is therefore not due to the fact that information belonging to any of the four fundamental categories (attributes of the project, attributes of the receiving environment, understanding of change processes and understanding of value systems) was overlooked or misinterpreted. Instead, it is due to the manner in which SIA practitioners (or their clients) define the scope of a SIA. Since SIA is primarily concerned with predicting the impacts of a project on the receiving psycho-socio-economic environment, the first step towards defining a SIA’s scope is to draw an imaginary line dividing everything that is regarded as being part of “the project” from everything that is regarded as being part of “the receiving environment”.

The manner in which this imaginary line is drawn will determine whether the workforce is regarded as part of “the project” (hence, a source of impacts only) or part of “the receiving environment” (hence, a potential recipient of impacts). If the former option is chosen, impacts on the workforce will *de facto* be excluded from consideration in the SIA. The subjective nature of decisions regarding the definition of system boundaries represents one of the ways in which an observer can influence the system being observed (Von Foerster, 1992). It therefore constitutes an example of the manner in which insights from second-order cybernetics (see Section 3.10) can be brought to bear on the field of SIA.

6.3.2.6 Conclusions regarding the causes of inaccurate predictions

In closing this discussion, the following conclusions can be drawn about the likely reasons for inaccuracies in the prediction of social impacts:

- Inaccuracies in predictions caused by inadequate information about the project most often relate to (a) the fact that some project information may not be available at the time that the SIA is conducted, and (b) invalid assumptions about the diligence with which mitigation measures will be implemented by the project proponent.
- Very few of the inaccuracies in predictions can be attributed to inadequate information about the receiving environment. This suggests that SIA practitioners’ emphasis on compiling comprehensive baselines is justified, and that it yields good fruit.
- Insufficient understanding of change processes and value systems seem to be the most common cause of inaccurate predictions.

- The fourfold categorisation of information needed to make accurate predictions, which was derived deductively from first principles, was found to be deficient in one respect: it did not take into account the fact that some impacts may be overlooked because of the way in which SIA practitioners (and their clients) define the scope of a SIA. In particular, SIAs are typically defined as an investigation of impacts of a project on surrounding (or “host”) communities and social systems. Construction workers are therefore not considered as a potential recipient of impacts.

6.4 The root of the problem: inaccuracies in the prediction of social impacts

All the major causes of inaccuracies in the prediction of social impacts that are outlined above are, in one way or another, related to the inevitably systemic nature of the entities relevant to SIA. For instance, inaccuracies in predictions caused by inadequate information about the **project** are very often due to the fact that a project is in itself a dynamic, evolving system. Project planning typically begins with a concept design, which forms the basis of various investigations (such as geotechnical studies to determine seismic stability or the distribution of ore bodies). The outcomes of these investigations then inform more detailed designs, which in turn prompt additional, more focused studies. It should therefore come as no surprise that, between the time a SIA is undertaken and the time that the project is implemented, several aspects of the project design would have undergone significant changes. This iterative process is an eloquent example of a feedback loop (as discussed in Section 3.4.3) in which information about the outcomes of an activity is used to refine or modify future instances of that activity.

It was also argued above that very few inaccuracies in predictions can be attributed to inadequate information about the **receiving environment**, but that insufficient understanding of **change processes** in that environment is a common cause of erroneous predictions. Stated in systemic terms, this implies that a good socio-economic baseline (which describes the receiving environment prior to the introduction of the project) is essential for predicting social impacts – but in itself it is insufficient to guarantee that those predictions will be accurate. This is because the baseline is a static picture of the receiving environment. It does not describe the environment’s capacity for change, the causal chains by which impacts will ramify through the system, or the feedback loops by which elements of the system may attempt to re-establish its former state. In other words, a socio-economic baseline does not do sufficient justice to the dynamic nature of the system that constitutes the receiving environment (Dutta & Bandyopadhyay, 2010).

Third, it was posited that insufficient understanding of **value systems** is another common cause of inaccurate predictions. The relationship between values and impacts may also be conceptualised in

systemic terms. On the one hand, value systems act as “filters” at the ends of the causal chains that culminate in impacts; they determine how changes in a psycho-socio-economic system are perceived, which in turn determines whether these changes are regarded in a positive, negative or neutral light. On the other hand, because people’s value systems shape their behaviour, and because that behaviour may be responsible for causing social impacts, values may also be regarded as elements in the causal chains leading up to impacts.

Finally, the fact that the project workforce may be regarded as either part of the project or part of the receiving environment relates to the *role of the observer* in defining the boundaries of the system being observed. The manner in which these boundaries are defined will influence the range of social impacts to be considered in SIA reports.

It may therefore be argued that many of the errors to which the field of SIA is prone relate to the fact that SIA practitioners do not adequately consider the systemic nature of the phenomena they investigate. This notion is not a new one; Boothroyd (1995) stated that impact assessments tend to be too systematic (mechanical and reductionist), and not sufficiently systemic. This raises the question of *why* the systemic nature of their subject is so often underplayed. Part of the answer is undoubtedly to be found in the complexity of systemic phenomena. In the “real world” outside of the laboratory, where it is usually not possible to implement experimental safeguards such as control groups, the verification of even non-systemic, lineal causal relationships can present a formidable challenge. Uncovering the dynamics of a system involving numerous elements linked by circular (or more complex) chains of causation presents a challenge that is orders of magnitude greater (Bateson, 1994).

The researcher would like to argue, however, that there is another factor responsible for the humble status of systemic thinking in SIA. This factor relates to the very term “social *impact*.” As discussed in Section 3.8, systems thinkers such as Bateson (1972) have pointed out that metaphors play an important role in shaping our understanding of the world. Inappropriate metaphors (metaphors that seduce the mind into false analogies, and therefore obfuscate rather than clarify the phenomena to which they are applied) may do much to hinder the progress of science. The use of physical metaphors such as “psychic energy” in Freudian psychology was used as an example.

The term “impact,” as it is used in the field of SIA, is a similar physical metaphor. “Impact” implies that the recipient is an isolated and passive entity that is affected by a force external to itself. It also suggests that the “impact” is a once-off occurrence which is independent of the observer or the context in which it occurs. The practice of labelling project-induced social changes in a given

community as “social impacts” does not encourage one to view the changes as being dependent on the environment in which it occurs, does not recognise that the “impact” is reciprocal (the community may also “impact” on or influence the project), and does not acknowledge that the “impact” is a process of change and that different community members may experience in different ways. Perhaps most fundamentally, it does insufficient justice to the fact that the project, the receiving social environment and their observers (including SIA practitioners and those responsible for documenting actual impacts) are actually parts of a dynamic, evolving supra-system, and that no part of this supra-system can be adequately understood in isolation from the other parts. As Bateson (1972) would argue that psychoanalytic theory has to be rewritten on the basis of information theory, so too does the researcher argue that SIA practitioners need to re-evaluate the manner in which they conceptualise and evaluate the social consequences of mining and infrastructure projects in light of a different, sufficiently systemic conceptualisation of a social system.

6.5 Recommendations for improving the accuracy of future SIAs

Based on the possible reasons for inaccurate predictions regarding psycho-socio-economic impacts provided and discussed in Section 6.3, as well as other realisations attained during the course of the research, a number of recommendations about how to improve the accuracy of future SIAs have been developed. As these recommendations are directly linked to the third-order analysis, they are presented according to the same structure. In addition, and in light of an inadequate systemic conceptualisation of the processes through which social impacts manifest, the “full life cycle” approach (Joyce & MacFarlane, 2001) to SIA is considered.

6.5.1 Attributes of the project

In order to address the possible reasons for inaccurate predictions pertaining to attributes of a project, the following is recommended:

- Due to the ever-evolving nature of a proposed project, SIA practitioners should make recommendations regarding elements of project design that may affect the significance of certain impacts. For example, the SIA could make recommendations regarding the type of barricading to be used by the project proponent in order to secure project infrastructure (palisade fencing versus a brick wall), or recommend that a pedestrian walkway be included in project design should the baseline description of the receiving social environment reveal that the affected communities’ movement patterns will be severely impeded by the project footprint.

- Due to possible uncertainty associated with the timing of project activities (the duration of the construction and operational phases, for example), SIAs should highlight implications of delays and fast-tracking of activities. For example, if the project under consideration will necessitate the physical relocation of businesses, the SIA should highlight the implications associated with commencing construction prior to the relocation of these businesses, which will likely include a significant economic impact for the businesses owners.
- To better understand the potential significance of the presence of a construction workforce, its anticipated size must be presented in relation to the size of the affected communities. The relative uncertainty about the size of the workforce should also be noted and addressed in the SIA.
- SIA practitioners should caution against overestimating the benefits resulting from local employment and training of the project-affected communities. Furthermore, practitioners should not heavily rely on the contractor to enforce rules to govern the behaviour of his/her workforce, in order to mitigate the potentially adverse impacts the presence of the workforce may have on the receiving environment.

6.5.2 The nature of the receiving environment

To address the possible reasons for inaccurate predictions relating the nature of the receiving social environment, it is recommended that SIA practitioners endeavour to obtain a sufficient amount of information regarding other projects that have taken place in, are currently taking place in, or are planned for the receiving environment of the project under consideration in the SIA. This includes information pertaining to local employment, such as the extent of this employment and the benefits reaped from it. Also, practitioners should consider the affected communities' responses to these aforementioned projects, as this will further inform their likely reactions to the project under consideration, thereby improving the accuracy of predictions made.

6.5.3 Change processes

In order to address the possible reasons for inaccurate predictions pertaining to change processes set in motion by a project, the following is recommended:

- Predictions relating to the benefits of training for the project workforce should be more carefully investigated. The baseline socio-economic profile should comment on the available and required skills in the project area, as well as the availability and likelihood of securing alternative employment (not with the project under consideration in the SIA report) once training has been completed.

- SIA practitioners should caution against the common assumption that a construction workforce will abuse alcohol and drugs, and that these substances will become more commonly available among the incumbent population as a result of the presence of a workforce. Unless the baseline socio-economic profile reveals an existing substance abuse problem within the receiving environment, predictions regarding the increase of substance abuse should be adequately motivated.
- Similarly, practitioners should guard the assumption that the presence of a construction workforce will necessarily result in some economic benefits for the local population. In this regard, it is recommended that the SIA practitioner collaborates with an economist (or carefully considers the findings of an economic impact assessment – if it was conducted) in order to gain a better understanding of the likelihood of economic benefits for the local population.
- SIA reports should consider the secondary impacts of an increased HIV prevalence more thoroughly, and recognise its potential long-term detrimental impact on the receiving environment. It is recommended that the SIA practitioner collaborates with an epidemiologist (or considers the findings of a community health impact assessment – if it was conducted) in order to comment meaningfully on this matter.
- SIA practitioners should consult with the relevant local municipal official (or similar authority) in order to establish the capacity of basic and other services (including policing). Knowledge of this capacity will inform predictions pertaining to increased pressure on services.
- The baseline socio-economic profile should comment on the local population's degree of dependency on natural resources (including wildlife, such as bush meat), and the practitioner should investigate the extent of possible loss to these resources (or access thereto). Consideration should be given to how the natural environment may change as a result of the proposed project. In this regard, collaboration with biophysical specialists (such as hydrologists and ecologists) is recommended.

6.5.4 Value systems

In order to address the possible reasons for inaccurate predictions pertaining to value systems of the project-affected communities, the following is recommended:

- SIA practitioners should be more vigilant of the value systems of the receiving environment, should comment on important values held by project-affected communities (that is, those values that are not universal), and explicitly consider these values when predicting impacts.

In addition, the SIA should consider the likelihood of these values changing after a project has been introduced to that community.

- SIA practitioners should guard against the common assumption that sexual relations between the incumbent and migrant populations will necessarily result in a negative psycho-socio-economic impact. Knowledge of the values held by the project-affected communities will inform the likely significance of such relations.
- The relationship between the proponent and affected communities should be investigated and reported on in the SIA. The practitioner should also indicate how a positive or negative relationship with the proponent will change the significance of predicted impacts.
- Similarly, the SIA practitioner should explore the receiving environment's attitudes towards and perceptions of the project and proponent. If these are found to be negative, the practitioner should advise the proponent on how to manage the social risk that emanates from these attitudes and perceptions, as well as how to change them.
- The SIA should contain recommendations regarding the manner in which the proponent should engage with the affected communities and how to minimise the probability of the relationship souring.
- The SIA practitioner should be more aware of the psychological dimension of impacts that are likely to occur on small scale, such as the feeling of a loss of autonomy.

6.5.5 Additional recommendations

SIA practitioners should define the scope of a SIA in order to determine the manner in which they conceptualise the project workforce: either as a source of impacts only, or as both a source of impact and an entity vulnerable to psycho-socio-economic impacts. Should the practitioner adopt the latter-mentioned conceptualisation, the following recommendations apply:

- While it is difficult to accurately anticipate the health, safety and well-being of the construction workforce at the time of conducting a SIA, practitioners should make use of available information (such as the size of the workforce and their planned accommodation facilities), as well as professional experience to consider the impact the project will have on the workforce; and
- The SIA practitioner's assumptions regarding the nature, location and design of accommodation facilities for the construction workforce should be clearly stated and the manner in which alternative facilities may alter the significance of such impacts should be explored.

6.5.6 Life cycle approach to SIA

There appears to be an implicit acknowledgement of the need to adopt a more systemic approach to SIA. This is most clearly reflected in the recommendation (discussion in Section 2.11) that SIA should adopt a “life cycle approach”, in which actual social impacts are monitored and used to revise assumptions on which future SIAs are based. Such an approach is supported by one of the most widely accepted definitions of a SIA, which states that a SIA should include the monitoring and managing of social consequences, not just the identification and analysis thereof. The recommended life cycle approach is nothing other than a negative feedback loop; that is, a chain of cause-and-effect in which the outcomes of a process are “fed back” into the process to steer or correct it.

This approach is not unfamiliar to the field of SIA, as is evident from previous research concerning the evaluation of accurate impacts (as discussed in Section 1.2.1). However, it is the researcher’s professional opinion it is certainly not an approach commonly adopted by SIA practitioners within the consulting industry. Employing this approach will not only yield vast quantities of useful information and data that can be used to revise and refine the assumptions on which psycho-socio-economic impacts are predicted, but can serve as a practical educational tool for SIA practitioners not active within the academic environment.

6.6 Limitations of the research

This research is subject to two main limitations, the first pertaining to the data sources used as part of this study, and the second to both the data analysis process and presentation of findings. With regards to the **data sources**, since the reports containing predicted impacts and those containing information on actual impacts are not for the same projects, the extent to which predicted and actual impacts can be compared is limited. The reason reports for different projects were used is because reports containing sufficient information on actual impacts for a specific project is limited, perhaps partially due to one of the problems confronting SIAs (as discussed in Section 2.10), namely the lack of interest to determine whether predictions contained in SIA actually ring true. The researcher could have adopted a case study approach that would have allowed for a more in-depth analysis of the accuracy of predicted psycho-socio-economic impacts of two or three mining and infrastructure projects, but she opted for a more conceptual and general approach as a first step to determining whether SIA practitioners predict impacts accurately. As such, and in light of the chosen sampling methods (both being non-probability methods), the findings of this study should not be indiscriminately generalised or regarded as absolute and necessarily true in all cases. The notion of transferability was discussed in Section 4.8, where it was noted that the extent of transferability or generalisability of the current research should be judged by the reader who seeks to use the findings

of the research for another purpose, on the basis of information provided by the current researcher regarding the sample used in this research. Similarly, the recommendations made as part of this study should not be interpreted as “hard and fast” rules to produce an accurate SIA report; instead, it should be considered as a contribution towards the body of SIA knowledge. It is the researcher’s hope that both the findings and recommendations will stimulate new lines of thinking and awareness among SIA practitioners.

The chosen ***data analysis method*** and format of the subsequent ***presentation of findings*** also poses a limitation to this study as it does not lend itself to a systemic and holistic representation of psycho-socio-economic impacts to the extent desired. In order to answer the research question, the researcher had to consider and report on impacts in partial isolation. During the data analysis process, some of the context in which impacts were predicted or occurred was lost. The researcher attempted to retain the connection between certain impacts by illustrating how impacts influence one another, but as a result of limited context, the holistic nature of a set of psycho-socio-economic impacts could not be adequately portrayed.

6.7 Recommendations for future research

Through the process of conducting and reporting on the research which is the subject of this mini-dissertation, the researcher identified a number of additional research topics or approaches that could shed light on the accuracy with which psycho-socio-economic impacts resulting from mining and infrastructure projects are predicted, as follows:

- Conducting a quantitative study on the accuracy with which impacts are predicted: quantitative analysis of the same type of data as used for this study (and for the same purpose) will likely refine and enhance the first-order findings of this research presented in Section 6.2. Such an endeavour would require the development of a quantitative measure to assess accuracy of predicted impacts, and the use of a larger sample to improve statistical significance.
- Determining the accuracy of predicted impacts for specific projects: it was mentioned in Section 6.6 that data pertaining to predicted psycho-socio-economic impacts were for different projects than those for which there is data pertaining to actual impacts. Thus, the researcher was not able to determine the accuracy of specific predicted impacts based on information regarding the actual impacts for the same project, as such data was not available. Determining the accuracy of a set of predicted impacts for a specific project (as contained in a single SIA report), by comparing those predictions to what was reported to actually have occurred (as contained in, for example, a series of monitoring reports for the

same project), and repeating this for a number of different projects, could shed additional light on which impacts are typically accurately or inaccurately predicted. Such a study could potentially overcome one of the limitations of the current research, namely the insufficient systemic analysis and presentation of findings: comparing a set of predicted and actual impacts for the same project will allow for a more holistic approach to evaluating the impacts.

- Investigating the effectiveness of and diligence with which recommended enhancement and mitigation measures are implemented: as mentioned previously in this study, enhancement and mitigation measures are recommended in order to enhance the significance of positive impacts and reduce the adverse impacts of negative ones. For the vast majority of SIA practitioners, this exercise is a purely theoretical one within little insight into whether or not the recommended measures are practically feasible, cost efficient or effective in enhancing or mitigating an impact. Furthermore, as indicated in Section 6.3.1.1, the extent to which measures are implemented by proponents is largely unknown. When predicting impacts, the SIA practitioner assumes that recommended measures will be implemented, which is why both pre- and post-mitigation significance ratings are provided (as discussed in Section 2.8), and the post-mitigation rating is considered the relevant rating when reviewing impact assessment reports. If it can be shown that our assumptions regarding mitigation and enhancement measures are incorrect, using a similar methodology than what was employed for the purposes of the current research but focusing on mitigation and enhancement measures (as opposed to impacts), it will shed more light on why there are discrepancies between predicted and actual impacts.
- Qualitatively investigating the relationship between common social impact variables from a systems theoretical perspective: a possible danger associated with a systemic conceptualisation of the processes through which psycho-socio-economic impacts manifest, is the propensity to “see” relationships between variables that may not be as strongly interrelated as what one thinks (as suggested in Section 6.3.2.3). To be practically feasible, systems thinkers have to establish the boundaries of the phenomenon being investigated (Capra, 1996), and have to limited the extent of interrelations between systems and subsystems. Investigating and establishing which of the social impact variables are most frequently and strongly interrelated can assist SIA practitioners in their investigation of these variables.

6.8 Dissemination of research findings

It was mentioned in Section 2.10 that a lot of information pertaining to the accuracy with which psycho-socio-economic impacts are predicted can be considered grey literature and inaccessible to many SIA practitioners. It is the intension of the researcher to ensure that this study does not fall into the same category, but that it is available to any SIA practitioner interested in the topic under consideration.

As such, it is envisioned that the findings and recommendations of this study will be disseminated in the following ways:

- By making it available on the University of Pretoria's Electronic Theses and Dissertations database, which is accessible to all internet users;
- By writing a paper containing the findings, recommendations and other salient points of the study, with the aim of publishing it the IAIA's quarterly journal entitled *Impact Assessment and Project Appraisal*.
- Presenting the abovementioned paper at the IAIA's national annual conference in 2013.

6.9 Conclusion

This chapter provided a discussion of the findings presented in Chapter 5: each of the subthemes were categorised according to their level of accuracy, and salient considerations in relation to each were provided. The discussion revealed that many assumptions regarding change processes or impacts, as well as impacts commonly predicted are less accurate than what SIA practitioners would want them to be. This discussion was followed by a presentation of possible reasons about why the accuracy of certain assumptions and impacts are low: the researcher identified fundamental categories of information necessary for the accurate prediction of psycho-socio-economic impacts and re-evaluated the insights arrived at by means of the second-order analysis in light of these categories of information in order to illustrate its relevance to inaccurate predictions. Based on this re-evaluation, a set of recommendations for improving the accuracy of future SIAs were developed. Finally, limitations of the current research were presented, as were recommendations for future research and the intended dissemination of result of the current research.

The primary aim of this research was to make a preliminary and qualitative statement about the accuracy of predicted psycho-socio-economic impacts resulting from mining and infrastructure projects. This aim was mostly fulfilled by identifying and categorising common impacts and assumptions according to their level of accuracy. Notwithstanding the reasons for inaccuracies and recommendations to improve the accuracy of SIAs, the research suggests that the conceptualisation

of social consequences resulting from mining and infrastructure projects should be reevaluated. As discussed in Chapter 3, the use of metaphors for systemic thinkers is fundamental to thought. Having to predict “social impacts” presupposes that such an impact is a once off occurrence and that the recipient is a passive receiver. Understanding psycho-socio-economic impacts in this manner is not conducive to regarding the receiving social environment and the project as a dynamic supra-system, as discussed previously in this study.

Partially because of the uncertainties that exist at the time of conducting a SIA, and partially because a newly formed supra-system will take some time to approach a state of dynamic balance (representing the ideal state in which a system can continue to exist), the value of adopting a “full life cycle approach” to SIAs, which includes the retrospective assessment of the accuracy of predicted impacts, becomes blatantly obvious. As such, practitioners should strive towards compiling SIA reports that will not only be used as a static tool to make a decision regarding the fate of a proposed project, but instead a component of a tool kit used to continually manage the social consequences, both positive and negative, that so often result from mining and infrastructure projects.

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Appendix 1

Impacts considered in this research VS Burdge's social impact variables

Table 1: Psycho-socio-economic impacts considered in this research VS social impact variables proposed by Burdge (1994)

Burdge's social impact variables		Impacts considered in this research	
Theme	Social Impact Variable	Theme	Subtheme
Population Impacts	Population Change	Impacts and assumptions relating to the construction workforce	Size and composition
		Impacts and assumptions relating to an increase in population	Nature of influx
	Influx or outflow of temporary workers	Impacts and assumptions relating to an increase in population	Size and composition
		Impacts and assumptions relating to an increase in population	Nature of influx
	Presence of seasonal/ leisure residents	Not considered	
	Relocation of individuals/ families	Impacts and assumptions relating to land use changes	Displacement and resettlement
	Dissimilarity in age, gender, racial/ ethnic composition	Impacts and assumptions relating to an increase in population	Conflict and social integration
Community / Institutional Arrangements	Formation of attitudes toward the project	Not considered	
	Interest group activity	Not considered	
	Alteration in size and structure of local government	Not considered	
	Presence of planning and zoning activity	Impacts and assumptions relating to an increase in population	Pressure on service provision
	Industrial diversification	Impacts and assumptions relating to the construction workforce	Economic opportunities
		Impacts and assumptions relating to benefits for the local population	Benefits unrelated to the project
	Enhanced economic inequalities	Impacts and assumptions relating to land use changes	Loss of access to natural resources
	Change in employment equity of minority groups	Impacts and assumptions relating to benefits for the local population	Employment of locals
	Change in occupational opportunities	Impacts and assumptions relating to the construction workforce	Skills training
		Impacts and assumptions relating to benefits for the local population	Training for project-affected individuals Benefits unrelated to the project

Burdge's social impact variables		Impacts considered in this research		
Theme	Social Impact Variable	Theme	Subtheme	
Conflict between local residents and newcomers	Presence of an outside agency	Impacts and assumptions relating to an increase in population	Conflict and social integration	
	Introduction of new social classes	Not considered		
	Change in the commercial/ industrial focus of the community	Not considered		
	Presence of weekend/ recreational residents	Not considered		
Individual and family level impacts	Disruption in daily living and movement patterns	Impacts and assumptions relating to land use changes	Daily movement patterns	
	Dissimilarity in religious practices	Impacts and assumptions relating to an increase in population	Conflict and social integration	
	Alteration in family structure	Impacts and assumptions relating to an increase in population	Social pathologies	
	Disruption in social networks	Impacts and assumptions relating to land use changes	Displacement and resettlement	
			Impacts and assumptions relating to the construction workforce	Inappropriate and undesirable behaviour
			Impacts and assumptions relating to an increase in population	Conflict and social integration
	Perceptions of public health and safety	Impacts and assumptions relating to the construction workforce	Working conditions	
			Accommodation	
			Health concerns	
			Crime	
Traffic-related incidents				
Impacts and assumptions relating to an increase in population	Conflict and social integration			
	Social pathologies			
Establishment or expansion of informal settlements	Social pathologies			
	Establishment or expansion of informal settlements			
Change in leisure opportunities	Not considered			
Community infrastructure needs	Change in community infrastructure	Impacts and assumptions relating to land use changes	Daily movement patterns	
		Impacts and assumptions relating to benefits for the local population	Benefits unrelated to the project	

Burdge's social impact variables		Impacts considered in this research	
Theme	Social Impact Variable	Theme	Subtheme
	Land acquisition and disposal	Impacts and assumptions relating to land use changes	Displacement and resettlement
	Effects on known cultural, historical and archaeological resources	Not considered	

Appendix 2

Contextualising the data sources

Table 1: Contextual information on the data sources used as part of this study: predicted impacts

Code	Name of report	Category of author(s)	Brief description of proposed project and receiving social environment	Country in which the project is located
P1	Socio-economic impact assessment for the proposed Rustenburg Deeps Project	Consultant appointed/ subcontracted by project proponent	The expansion of existing mining operations just outside Rustenburg in North West Province. There are a number of settlements surrounding the mining operations, the closest one being about 250m from the edge of the proposed project's site. Most of these settlements resemble townships, and many of the inhabitants work at one of the mines in the area.	South Africa
P2	Environmental and social impact assessment: Ahafo South Project	Project proponent (assisted by consultants)	The establishment of a gold mine (including open pits) with a project footprint of just less than 2 200ha in an inland area in western Ghana. The life-of-mine is expected to be in the region of 15 years. Farming is the dominant livelihood among the receiving social environment. There are roughly 33 500 people in the study area and just more than 1 700 households will be physically or economically displaced by the project. This project was funded by the IFC, thus the impact assessments had to adhere to international best practice standards.	Ghana
P3	Socio-economic impact assessment: Vele Colliery	Consultant appointed/ subcontracted by project proponent	Development of a new coal mine in Limpopo Province. There are a number of other mines in the local municipal area. The educational level among the project-affected communities is low: two thirds of the population have only had primary education. Half the population is unemployed despite the large number of mines in the area; most of those who are employed work in the agriculture sector.	South Africa
P4	Social impact assessment for the proposed nuclear power station ('Nuclear 1') and associated infrastructure	Consultant appointed/ subcontracted by project proponent	The construction of a nuclear power station and associated infrastructure on one of three potential sites. The sites are surrounded by average middle-class suburbs, and the receiving social environment at each of these sites is more or less average for South Africa in terms of education and income.	South Africa
P5	Social impact assessment for the proposed Umfolozi - Empangeni 765kV transmission power line	Consultant appointed/ subcontracted by project proponent	The construction of a new 765kV transmission power line from the Majuba power station to the Umfolozi substation in Mpumalanga and KwaZulu-Natal provinces. Land uses surrounding the sites include commercial farming and game farms, and there are some dwellings in and close to some sections of the servitudes, necessitating physical relocation.	South Africa

Code	Name of report	Category of author(s)	Brief description of proposed project and receiving social environment	Country in which the project is located
P6	Social impact assessment for a new coal fired power station and associated infrastructure as well as the associated transmission lines and substation in the Musina area of the Limpopo Province	Consultant appointed/ subcontracted by project proponent	The construction and operation of a conventional coal fired power station in Musina in Limpopo Province. There are a number of other similar projects in the area. Educational and income levels of the project-affected population is low (most have only received some secondary education, and about a third of the population do not earn an income). Land uses surrounding the site include residential, commercial farming, mining, industries and tourist attractions.	South Africa
P7	Environmental scoping report for Benicon Mining Brakfontein	Consultant appointed/ subcontracted by project proponent	The establishment of a new coal mine in and associated infrastructure in Mpumalanga Province. There are a number of other mining projects surrounding the proposed project, which is located on relatively vacant farmland. Only 10% of the affected population has completed their secondary education, thus the income levels in the area are low.	South Africa
P8	Social impact assessment for Riebeek PPC Expansion Project	Consultant appointed/ subcontracted by project proponent	The construction and operation of a new cement plant facility in Western Cape Province. The project site is located on vacant farmland roughly 1km outside the closest town. There is a small township just less than 1km from the site, as well as other settlements surrounding the site. Despite very low unemployment levels in the study area (just less than 7% of the economically active population), income levels are generally low (a quarter of the households survive on R3 200 per month). Almost half of the employed population work in the agricultural sector. Only 7% of the population have been educated beyond secondary school.	South Africa
P9	Social impact assessment for the N2 Wild Coast toll road between East London (Eastern Cape) and Durban (KwaZulu-Natal)	Consultant appointed/ subcontracted by project proponent	The upgrade and rehabilitation of roads, as well as the construction of a new section of road. Due to the linear nature of the project (the road stretches along hundreds of kilometres), the socio-economic and other characteristics of the receiving environment differ somewhat. Levels of unemployment range between 20% and 70%, income levels are low and the average age of many of the communities is very low (below 25 years of age).	South Africa
P10	Social impact assessment for the Mmamabula Project: proposed 6x765kV power lines	Consultant appointed/ subcontracted by project	The construction of six transmission power lines from a power station in Botswana to a substation in Limpopo Province. The settlements along the project site are mostly rural, income is very low (almost 70% of households survive on less than R1 000 per month) and unemployment is very high (half the population between the ages of 15 and 64 are	South Africa

Code	Name of report	Category of author(s)	Brief description of proposed project and receiving social environment	Country in which the project is located
		proponent	unemployed). Power generation contributes significantly to the provincial economy, as does mining.	
P11	Socio-economic baseline assessment for the proposed Uranium mining project at Bakouma	Consultant appointed/ subcontracted by project proponent	The establishment and operation of a Uranium mine and associated infrastructure, including open cast pits. The study area includes eight rural villages, comprising roughly 5 500 individuals and 1 400 households. Few individuals are formally employed - most lead a subsistence agricultural lifestyle. Dwellings are constructed of mud bricks, and there is no sanitation system, electricity or waste removal. Educational levels are low; few have received any education beyond primary school. There is no formal infrastructure in the area.	Central African Republic
P12	Social impact assessment for the proposed establishment of a new coal-fired power station in the Lephalale area, Limpopo Province.	Consultant appointed/ subcontracted by project proponent	The construction and operation of a conventional coal fired power station in the Lephalale area in Limpopo Province. There are mines, townships and formal residential areas surrounding the study area, as well as agricultural fields. More than half of the population in the study area is above the age of 35, roughly a quarter of the population above the age of 20 is literate and one out of five economically active individuals are unemployed. Household income levels are very low in the study area (less than R1000 per month).	South Africa
P13	Baynes Hydropower environmental, social and health impact assessment: final scoping report	Consultant appointed/ subcontracted by project proponent	The construction of a hydropower project along the Kunene river, including the construction of a dam, reservoir and power station. The project has a diverse study area covering 340km along the river, and includes three provinces in two countries. Most of the study area consists of low density rural villages with limited infrastructure and opportunities where subsistence farming (agriculture and livestock) is common. Educational and formal employment levels are very low. Those who are formally employed work on mines in both countries.	Angola and Namibia
P14	Bujagali Hydropower Project: social and environmental assessment	Consultant appointed/ subcontracted by project proponent	The construction of a hydropower project including a dam, power station and associated infrastructure (such as transmission lines). The project requires land take of just less than 250ha, and the study area includes a large town as well as a couple of villages. The literacy rate among the project-affected individuals is high (about 75% of individuals above the age of 10) and about 90% of individuals have completed their primary education. Roughly half of the economically active population is engaged in the agricultural sector (mostly subsistence farming). As such, household income is very low (about R2500 per annum).	Uganda

Code	Name of report	Category of author(s)	Brief description of proposed project and receiving social environment	Country in which the project is located
P15	Mmamabula Energy Amendment Project: Serorome Mine social impact assessment.	Consultant appointed/ subcontracted by project proponent	The establishment and operation of a coal mine (including open cast pits) and power plant in Botswana. The project will have an operational period of approximately 30 years and cover an area of 1 850ha. The study area consists of low density and scattered settlements or villages. Subsistence agriculture, livestock farming and small business enterprises are the biggest contributors to the local economy. Due to their rural lifestyle, project-affected individuals rely heavily on one another for survival and thus unlimited access between villages is of the utmost importance to the affected population. Infrastructure is very limited in the study area and the villages do not have access to electricity.	Botswana
P16	Verifying the social impacts of the Berg River Dam: an ex-post analysis	Consultant/ non-academic researcher	The construction of a dam along the Berg River in the Western Cape Province. The study area is located to the west of Franschhoek in a sparsely populated area. No further details regarding the receiving socio-economic environment is provided.	South Africa
P17	Lesotho Lowlands Bulk Water Supply Scheme: social impact assessment.	Consultant appointed/ subcontracted by project proponent	The abstraction of water from four rivers, construction and operation of water treatment facilities, construction and maintenance of reservoirs and the construction of water pipelines distributing water to settlements in the low-lying areas of Lesotho. The Lesotho lowlands consist of mostly rural settlements experiencing extreme poverty and lack of services such as electricity and sewerage. Employment, income and educational levels are low, while the percentage of the population infected with HIV is very high. Subsistence farming (including livestock) is the main source of livelihood among those residing in rural areas.	Lesotho

Table 2: Contextual information on the data sources used as part of this study: actual impacts

Code	Name of report/ document	Category of author(s)	Brief description of document	Country in which impacts have occurred
A1	Zambia: Victoria Falls - Katima Mulilo 132 kV Interconnection Project: Project performance evaluation report	Consultants (on behalf of a funding agency)	The purpose of the project is to supply reliable electricity to border towns in Zambia and Namibia by constructing additional transmission lines and two substations. The beneficiaries are mostly subsistence farmers with an unreliable source of electricity, limiting the economic diversity in the study area. Bank funded projects require a project completion report to evaluate the success with which the project has been implemented (including an investigation into the impacts that resulted from the project), after which a project performance evaluation is conducted to audit the project completion report.	Zambia and Namibia
A2	Botswana: Trans-Kgalldi road project: Project performance evaluation report	Consultants (on behalf of a funding agency)	The purpose of the project is to reduce transport costs in the south-western area of Botswana, and thereby enhancing the social and economic integration of this part with the rest of Botswana and ultimately Namibia. The project consists of the construction of almost 600km of tar road. Due to the linear nature of the project, the receiving socio-economic environment is not homogenous. Many of the project-affected individuals are farmers who sell their produce at local markets. Due to the limited road infrastructure prior to the implementation of the project, economic opportunities in the area were limited. As with A1, a project completion report was published prior to the project performance evaluation took place.	Botswana and Namibia
A3	Lesotho: Mpharane Bela Bela road upgrading project: Project performance evaluation report	Consultants (on behalf of a funding agency)	The purpose of the project is to reduce vehicle operating and road maintenance costs, as well as to improve the quality of road transport services between four areas in the Lesotho lowlands, by maintaining tar roads, upgrading gravel roads to tar roads and constructing new roads. The beneficiaries are mostly subsistence agricultural and livestock farmers who earn a cash income by selling their produce at local markets. Income, educational and formal employment levels are low while the incidence of HIV/AIDS is high. As with A1 and A2, a project completion report was published prior to the project performance evaluation took place.	Lesotho
A4	Socioeconomic effects of road improvements	Funding agency	The document investigates the link between infrastructure development and poverty reduction, and uses roads projects in India as case studies, including toll-road projects, upgrading of roads to national and state highways, as well as the upgrading of rural roads. It	India

Code	Name of report/ document	Category of author(s)	Brief description of document	Country in which impacts have occurred
			identifies the impacts resulting from these projects on low, middle and high income groups of the population.	
A5	The environmental and socio-economic impacts of mining on local livelihoods in Tanzania: A case study of Geita District.	Academic researcher	The journal article presents the findings of a study undertaken to assess the environmental and socio-economic impacts on mining in the Geita district in Tanzania, where mining activities are abundant. Through a number of primary data collection methods, the researcher identifies and explores the socio-economic impacts, positive and negative, evident among mining-affected communities. The researcher focuses on impacts relating to livelihoods, and offers suggestions regarding feasible mitigation measures.	Tanzania
A6	Monitoring the impact of mining on local communities: A Hunter Valley case study	Academic researcher and proponent	The article reports on a research collaboration aimed at enhancing strategies for monitoring and managing the impacts of mining on local communities. The mine in question forms part of a larger project consisting of five mines and two power stations operating in the area, and is an open cast coal mine which began operations in 1983 and is due to close between 2010 and 2015. The mining project employs 48 full-time contractors and almost 230 permanent employees. The document provides information on the socio-economic trends in the study area, and identifies the impacts experienced by the local community members. Additionally, it explores the perceptions of the local communities regarding mining activities in the area.	Australia
A7	Economic and social impacts of the Coppabella Mine on the Nebo Shire and the Mackay Region.	Academic researcher	The paper investigates the economic and social impacts of a mine which has been in operation since 1998 and permanently employs 340 people. There are three large towns in the vicinity of the mine, all of which have experienced economic and social impacts, both positive and negative. The impacts are explored and the necessity for knowing how the towns have been impacted is explained.	Australia
A8	Rustenburg Platinum Mine's Rustenburg Section socio-economic assessment report	Proponent	The report identifies the social and economic impacts resulting from a large mining operation just outside Rustenburg. The project covers about 22 000ha, employs more than 20 000 people and makes use of more than 10 000 contractors. The life-of-mine is expected to continue until roughly 2030. The report provides information on both the positive and negative impacts that have resulted from the mining operations.	South Africa
A9	Ahafo South Project:	Consultants	This document considers the impacts that have occurred as a result of the project described	Ghana

Code	Name of report/ document	Category of author(s)	Brief description of document	Country in which impacts have occurred
	Independent external social compliance monitoring (5th review)		for P2. It investigates the extent to which the proponent has implemented the mitigation measures aimed at ameliorating the negative impacts, considers the most prominent impacts present at the time of writing the report and suggests ways to manage those impacts.	
A10	Ahafo South Project: Independent external social compliance monitoring (7th review)	Consultants	This document is similar to A10, but was compiled a year after A10 was compiled.	Ghana
A11	Fact Sheet: Ahafo Linkages Program	Proponent	This document is also for the project described for P2, but contains detailed information on one of the programmes the proponent has implemented to ameliorate negative impacts and enhance the positive ones. It describes the goal and objectives of the program and lists the programmes achievements, which are actual impacts experienced by the project-affected communities.	Ghana
A12	Fact Sheet: Livelihood enhancement and community empowerment programme	Proponent	This document is similar to A12, but focuses on a different programme.	Ghana
A13	Ahafo South Project: Independent external social compliance monitoring (6th review)	Consultants	This document is similar to A10 and A11, but was compiled six months after A10 was compiled.	Ghana
A14	The social impacts of a large development project: Lesotho highlands water project	Academic researcher	This document investigates the social impacts experienced by residents in the vicinity of the Katse and Kohale dams in Lesotho, which were the two major dams of phase 1 of the Lesotho highlands water project. Through mostly in-depth interviews, the researcher identified and discussed the impacts experienced by the project-affected.	Lesotho
A15	Anglo Platinum annual report 2006	Proponent	This annual report provides information about a number of the proponent's operations, including information pertaining to employment, corporate social investment strategies and other socially relevant occurrences, such as successful negotiations with tribal authorities. It	South Africa

Code	Name of report/ document	Category of author(s)	Brief description of document	Country in which impacts have occurred
			also provides statistics on the workforce of a number of projects.	
A16	Mongolia: A review of environmental and social impacts in the mining sector	Funding agency	This report investigates both the environmental impacts of mining projects in Mongolia, as well as the social impacts of large mining operations, artisanal mining, and small-scale mining in Mongolia. On the basis of the above, it lists short-term priorities to be addressed for mining projects in Mongolia.	Mongolia
A17	Assessing the social and economic impacts of coal mining on communities in the Bowen Basin.	Academic researcher	The report considers the economic and social impacts of a number of coal mining operations (roughly 45 independent mines) in the Bowen Basin. These operations make use of more than 60 000 full-time employees residing in the Bowen Basin. Through economic modelling, stakeholder engagement and workshops, the experienced impacts were identified.	Australia
A18	Impacts of activities of Canadian mining companies in Africa	Environmental organisation	The paper focuses on specific instances where Canadian mining companies operating in Ghana had a very negative impact on the communities affected by the project and individuals employed by the project. It mentions actions taken by the companies, and reveals the consequences of these actions.	Africa in general, Ghana specifically
A19	Post hoc study: social impacts in constructing high voltage transmission power lines	Consultants	This report investigates the actual social impacts that have resulted from power line projects in general, and one specific project in particular. This was accomplished through conducting a desktop study and interviews with consultants who worked on the projects of interest, proponents, as well as other project-affected individuals. The report offers a direct comparison of predicted and actual impacts (including their duration, probability and significance) for one power line project only.	South Africa
A20	Social impact assessment for Riebeek PPC Expansion Project	Consultant	This document is the same one as P8. Similar (but conversely) to P16, a section of the SIA report was dedicated to exploring the actual impacts that have occurred as a result of projects with similar components than the one under consideration.	South Africa
A21	Olympic Dam expansion: Environmental impact statement	Proponent	A section of this document is dedicated to presenting the socio-economic impacts that have resulted from other dam projects in order to substantiate the predictions made in the SIA report for the same project. Limited information on each of the actual impacts are provided, but in the section of the document presents a good summary of which impacts one can realistically expect to materialise as a result of a project.	Various

Code	Name of report/ document	Category of author(s)	Brief description of document	Country in which impacts have occurred
A22	Gold rush: The impact of gold mining on poor people in Obuasi in Ghana	NGO	This document investigates the impacts that have resulted from mining operations by two mining houses, and focuses on eight affected villages. Data was collected by means of semi-structured interviews, and water samples taken from streams close to the eight villages under investigation were tested. It investigates, inter alia, impacts associated with decreased water quality (impacts on crops, health, etc.) and the relationship between the proponents and the affected villages.	Ghana
A23	Verifying the social impacts of the Berg River Dam: an ex-post analysis	Consultant/ non-academic researcher	This document is the same one as P16. The main focus of the document is to reveal the social impacts that occurred as a result of the construction of a dam.	South Africa
A24	Compliance review report on the Bujagali hydropower and interconnection projects	Consultants	This document investigates whether the proponent of the Bujagali hydropower project (P14) adhered to the requirements of the agency that funded the project. As part of the investigation, socially relevant issues and concerns were investigated (including resettlement, compensation and disturbance to spiritually significant sites), shedding light on the impacts that have occurred as a result of the project.	Uganda