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**ENVIRONMENTAL IMPACT ASSESSMENT
FOLLOW-UP IN SELECTED CAPE TOWN CASE
STUDIES AS AN INDICATOR OF
EFFECTIVENESS**

Demitrios Georgeades

Dissertation in fulfilment of Master of Science degree

Department of Environmental and Geographical Science

Faculty of Science

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I would like to express my sincere gratitude to Dr Richard Hill (*Research Supervisor, Department of Environmental and Geographical Science, University of Cape Town*) for sharing his time, guidance and knowledge with me.

I know the meaning of plagiarism and declare that all of the work in this dissertation, save for that which is properly acknowledged, is my own.

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November 2012

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Abstract

The aim of this dissertation was to study Environmental Impact Assessment (EIA) follow-up during construction as an important indicator of EIA effectiveness. The hypothesis for this dissertation was that EIA follow-up helped to bridge the divide between prediction and reality and is effective in ensuring an adaptive EIA process towards sustainable development. This hypothesis was explored through the investigation of six research questions in four case studies. The research questions were formulated from a conceptual framework derived from various literature sources on EIA follow-up research. These questions cover a range of issues that inform effective EIA follow-up, from theory to best practice.

In the four case studies evaluated, the predicted impacts and Environmental Management Plan (EMP) mitigation measures correlated to a high degree with actual impacts. The correlation between predicted- and actual impacts did not always mean that the goal of EIA was achieved. In complex, natural systems predicting impacts cannot be completely accurate and effective. It is important to rather invest in an adaptable management system to cope with the reality of not understanding the complexity of impacts on the environment. The focus in deciding when EIA is required should therefore be the sensitivity of the receiving environment rather than predetermined triggers and thresholds. It was found that it is important to establish the baseline condition of the affected environment. Proponents of development are, however, not always willing to pay for long and costly baseline research or monitoring programmes to understand the receiving environment or cumulative regional impact. Follow-up can generate information that can be used scientifically to increase knowledge, but developers should not be expected to become scientific researchers. Government should rather fulfil its responsibility in pro-active environmental planning and research.

None of the four cases analysed made provision for cumulative impact assessment during the scoping and evaluation phase. Most cases compared well with the principles and best practice of EIA follow-up at the project level, but poorly when compared with requirements for follow-up on a regional- or cumulative impact basis. A more strategic approach would make EIA follow-up a goal oriented, influential and accountable process towards environmental sustainability and less focussed on being a reactive pollution-prevention mechanism. An integrated evaluating mechanism should be introduced to identify the threat of cumulative impact on local, provincial and national level. Climate change, cumulative impact assessment and biodiversity management present new and uncertain challenges. The application of the precautionary principle of avoiding risk where risk cannot reasonably be established should drive EIA rather than the current approach of mitigation of impact during construction by relying only on predictions in the EIA.

One of the key factors preventing EIA from influencing project decisions was found to be the problem of alignment and timing between the EIA process and the project process.

Integration of EIA concurrent with the design, tender and construction stages should be emphasised so as not to exclude the positive influence of an EIA on implementation decisions. There should be an important iterative process between the formulation of a project proposal and the assessment of its environmental impact. A formal structure to facilitate interaction between role players in the follow-up process is therefore essential. The alignment of the EIA and project processes should also take place on a contractual basis. It was also found that the EIA regulators did not always fulfil their follow-up responsibilities. The follow-up contract or compact should extend to include responsible authorities.

Follow-up has the potential to leverage the effectiveness of EIA by re-allocating resources to the post-decision phase where the complexity of the natural environment often manifests when actual impacts occur. All the different elements of EIA follow-up must be performed (project based follow-up, monitoring and auditing) to generate feedback beyond the scope on the project itself. Another of the proposals put forward in this dissertation, based on the limited investigation of four cases, is that effective follow-up in EIA should be developed further, both in theory and practice, towards the goal of more environmentally sustainable development rather than impact mitigation. There should furthermore be a balance between control conditions and flexible management conditions in EIA decisions. Compliance management and the legal requirement for enforcement and follow-up must be balanced with incentives, such as scoring and grading of environmental best practice leading to more favourable procurement outcomes or offering tax rebates for positive environmental performance.

Follow-up should supplement proper pre-implementation impact assessment and be equally well resourced during the EIA process. Pro-active planning rather than reactive mitigation in environmental governance can yield effective EIA follow-up results. This could take place through setting reasonable control- and flexible management conditions, conducting integrated strategic planning for an area, establishing the baseline state of the environment against which impacts can be measured, and balancing various approaches to control (legislative, social, judicial) with incentives.

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Abbreviations

ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ELC	Environmental Liaison Committee
EMP	Environmental Management Programme
EMS	Environmental Management System
IEM	Integrated Environmental Management
NGO	Non-governmental Organisation
SEA	Strategic Environmental Assessment

1. Introduction

1.1 Background

1.1.1 Environmentally Sustainable Development in South Africa

The Republic of South Africa has committed itself to the pursuit of the United Nations Millennium Development Goals for 2015. These include environmental sustainability amongst other goals also related to the responsible management of the natural environment, such as safe water supplies and sanitation (United Nations, 2008). Effective management of the natural environment is essential in developing countries, like South Africa, where sprawling cities threaten sensitive natural biodiversity and where the poor rely on natural resources like clean water and arable soil for subsistence. Physical development can compete for these very resources and the land from which they originate (Myers and Kent, 2005). Real growth in the economy, a prerequisite for sustainable development, is currently being measured with indices such as the Gross Domestic Product (GDP) which ignores the quality of the environment, food security and education (Myers and Kent, 2005) and favours infrastructure development. More emphasis should be placed on balanced sustainable growth in which it is important to apply effective environmental management. Responsible custodianship of resources can be the legacy that a developmental government leaves behind for a growing nation which relies heavily on its natural resources for tourism and self-sustenance (Myers and Kent, 2005). It is therefore necessary to understand what environmentally sustainable development is and through which mechanisms it can be pursued. It is also necessary to improve these mechanisms as this understanding develops.

1.1.2 The Role of Follow-up in Effective EIA

Environmental Impact Assessment (EIA) is one of many tools used in environmental management to prevent pollution, loss of biodiversity and other detrimental effects of development towards the goal of environmentally sustainable development (Glasson et al., 1999). There is global debate regarding the effectiveness of EIA as it is currently practiced and its role in achieving sustainable development (Lee et al., 1994; Sadler, 1996; Glasson, 1999; Cashmore et al., 2004). The effectiveness of EIA is constantly under review from academics and practitioners in an attempt to improve its performance (Sadler, 1996).

Environmental assessment has been conducted in South Africa since the 1970s and became a legal requirement in 1997 with the adoption of the first EIA regulations under the Environmental Conservation Act, 73 of 1989 (Rossouw and Wiseman, 2004). EIA is currently regulated under the National Environmental Management Act, 107 of 1998 and its regulations, the latest of which is dated June 2010 (Department of Environmental Affairs, 2010).

The question of effectiveness of EIA has also been raised by researchers in South Africa in studies on inter alia the quality of EIA reports (Sandham and Pretorius, 2007; Department of Environmental Affairs, 2008), the evaluation of environmental management policy (Rossouw and Wiseman, 2004), the development of theory (Hill, 2004), EIA's alignment with project stages (Brown and Hill, 1995) and during implementation and follow-up (Hill, 2000; Lochner, 2005). Retief (2007) has furthermore refined approaches for environmental assessment effectiveness research in South Africa.

The degree of post-decision follow-up in EIA is currently an important shortcoming (Sadler, 1996; Arts et al., 2001; Noble and Storey, 2005). Follow-up is a term used to describe activities after the EIA decision during project implementation (Ahammed and Nixon, 2006). According to Noble and Storey (2005) follow-up, monitoring and auditing are all activities that relate to feedback, which develops understanding of the real impacts of development on a complex environment. According to Morrison-Saunders and Arts (2004), follow-up (or feedback) happens on different scale levels. At project level an inspector receives feedback and at a higher level, various EIAs are observed by the authority that assesses the performance of the EIA processes and assimilates learning from these observations. Finally, there is high level feedback that leads to the evaluation of performance of the mechanisms, practice, underlying theory and science.

Feedback and follow-up in the EIA process has been one of the most criticised components and has often been found to be lacking (Sadler, 1996). Ahammed and Nixon (2005) stated that the credibility of EIA lies in the ability to do follow-up in the form of post-decision monitoring and auditing in order to test predictions and ensure that mitigation works. Arts (2007:289) refers to the need for follow-up in dealing with uncertainty that is inherent in planning and new development and that it is "*essential in determining the outcomes of EIA*". Numerous authors around the world have noted that EIA effectiveness is reduced by either weak- or a lack of follow-up, for example in projects in Mauritius (Ramjeawon and Beedassy, 2004), the Czech Republic (Branis and Christopoulos, 2004), the European Union (Barker and Wood, 1999) and India (Paliwal, 2006). In the Southern African context at least two international conferences have identified follow-up as an area for improvement towards more effective EIA, for example the Southern African Institute for Environmental Assessment workshop in Namibia in May 2003 (SAIEA, 2003) and The World Conservation Union African Experts Workshop on Effectiveness of EIA Systems in April 2007 (IUCN, 2007).

The wide reliance on EIA for environmentally sustainable development (Glasson et al., 1999) makes improving its effectiveness vital. Given this background, EIA follow-up can be regarded as an important indicator of overall EIA effectiveness (Sadler, 1996; Ahammed and Nixon, 2005; Noble and Storey, 2005; Arts, 2007). A deeper understanding of the limitations of EIA follow-up practice in South Africa could therefore improve the application of EIA and promote environmentally sustainable development.

1.2 Researching the Effectiveness of EIA Follow-up

1.2.1 Aim, Objectives, Questions and Hypothesis of this Research

The aim of this dissertation is to contribute to the many investigations into the effectiveness of EIA by examining EIA follow-up in four Cape Town case studies during construction, as one indicator of effectiveness. The objectives of this research are as follows:

- Introducing the EIA process and the role of follow-up in the process
- Introducing the concept of environmental sustainability as the goal of EIA
- Briefly exploring complexity, integration and prediction as theories that inform the need for follow-up in effective EIA
- Understanding the current literature on EIA effectiveness and the role of follow-up in the best practice of EIA
- Compiling a conceptual framework for this research based on frameworks used previously by other authors
- Formulating an appropriate hypothesis, research methodology and questions
- Selecting four case studies in Cape Town, South Africa
- Analysing EIA follow-up during the construction phase of each case study
- Compiling research findings based on the outcome of the analysis and relating them to the literature on EIA follow-up best practice
- Reaching a conclusion regarding the hypothesis and research questions posed.

The hypothesis for this research is the positive assumption that EIA follow-up helps to bridge the divide between prediction and reality and is effective in ensuring an adaptive EIA process towards sustainable development. This hypothesis is explored through the investigation of six research questions in four case studies, as well as various interviews with prominent role players in impact assessment in Cape Town. The research questions are formulated from the derived conceptual framework to cover a range of issues that inform effective EIA follow-up, from theory to best practice. These questions address aspects key to follow-up, such as prediction, compliance and institutional arrangements. The six research questions are:

1. Do Mitigation Measures Correlate with Actual Impacts?
2. Are Conditions of Approval Implemented during Construction?
3. What are the Most Prevalent Challenges with EIA Follow-up?
4. How do Cases Evaluated Perform against Best Practice?
5. Does EIA Follow-up Lead to an Adaptable EIA Process?
6. Does the Institutional Framework Enable Effective EIA Follow-up?

The case study approach, coupled with a literature review and in-depth interviews forms a sufficiently robust analysis method to probe EIA effectiveness in the selected EIA case studies in Cape Town. Environmentally sustainable development is one of the prime goals of EIA (Sadler, 1996). The contentious concept of sustainable development (O' Riordan, 2000) provides the context within which to judge the effectiveness of EIA follow-up. Sustainable development refers to development that ensures optimisation of resources for current needs whilst protecting the needs of the future (WCED, 1987). EIA effectiveness and follow-up effectiveness can thus only be assessed if it is clear what is understood or widely accepted as sustainable development (Cashmore, 2004). The concept of sustainable development is not fixed and is difficult to measure making judgements about EIA effectiveness, in achieving sustainable development, difficult (Cashmore, 2004).

The effectiveness of EIA and EIA follow-up was investigated in the literature review. The theories of integration, complex systems and prediction lie at the heart of EIA, mitigating detrimental impacts of development and arriving at a meaningful Environmental Management Programme (EMP). These three theoretical concepts are important to explore as they reveal the fallibility of relying on predicting the future rather than emphasising and providing resources for a flexible management approach. The fundamental advantages and limitations of EMPs are of importance in understanding and improving effective EIA follow-up.

The current best practice of EIA follow-up as an important indicator of EIA effectiveness was investigated in the literature in order to understand how to research and evaluate EIA follow-up. The literature review clarifies and summarises what EIA follow-up is and should be, based on various aspects that inform its best practice, such as the approach, institutional framework required, alignment with project implementation and public participation.

1.2.2 Research Methodology

Noble and Storey (2005) promote an outcomes-based approach to EIA. For this reason EIA follow-up effectiveness research cannot focus solely on measuring the accuracy of the predictions, but it needs to analyse the effectiveness of the mitigation measures and management process to achieve the objectives of the EIA and project. The research methodology is described in detail in Chapter 3.

Effectiveness can be expressed statistically, either as percentages, or as indicators against targets, benchmarks or criteria. This would certainly enable the analyst to cast a scientifically valid verdict on whether EIA follow-up is effective or not (Trochim, 2000). The researcher would need to assess a large sample of cases in a given study area over a period of time to achieve this goal. The standardisation of criteria and formulation of judgements would, however, be a complex task and answers would be limited to the criteria measured. This research rather focuses in particular on the EIA follow-up process. It does not focus on statistics and quantification, but instead tries to understand why follow-up is effective or not.

An appropriate approach for this study is therefore to utilise the case study method which analyses strategically identified cases in detail to probe certain formulated questions, but also to leave opportunity for discovery during the research (Yin, 1993).

In order to meaningfully conduct research on any aspect of South African EIA effectiveness it is useful to rely on previous conceptualisations of a research approach by Retief (2007). Retief's work is a summary of three existing conceptual frameworks in evaluating EIA effectiveness which will be discussed in detail later. These three frameworks were combined in order to derive a conceptual framework which informs the research approach taken in this dissertation, the hypothesis and ultimately the six research questions. This framework is both set up to evaluate feedback (as a combined term for all follow-up activities) across the project level and furthermore to observe whether there is feedback to the practice and theory of EIA. The levels of adaptation and feedback observed in the EIA process during implementation can indicate whether there is opportunity for a cyclic relationship of influence or learning that informs the theory and practice of EIA follow-up, based on the evaluation of its performance. EIA follow-up, although part of the EIA process is therefore also an evaluation of EIA effectiveness or performance. A derivative of Retief's (2007) conceptual framework is used in this research to investigate the performance of EIA follow-up practice in four case studies.

1.2.3 Assumptions and Limitations of this Research

In this research the assumption was made that the hypothesis is true and it is tested by means of six research questions. It is a common view held by EIA follow-up researchers, such as Arts (2007), that follow-up is critical to ensure effective EIA. This research set out to explore this assumption by observation, analysis and discussion of four cases.

This research is limited to the four cases analysed and is reliant on the case study methodology. It cannot be assumed that the findings are conclusive and universally relevant. This study rather sets out to explore the effectiveness of one component of EIA (EIA follow-up) in these specific cases. It evaluates what contributions follow-up made to the researched EIA cases. The results suggest possible approaches towards making EIA follow-up more effective and therefore improving the performance of the overall EIA process towards its goal of environmentally sustainable development.

The research was conducted within the limitations of available time and cost, implying that a more exhaustive selection of cases might yield more conclusive results. The cases were, however, selected to ensure a comprehensive cross section of different development contexts, thus attempting to maximise internal and conclusion validity of the case study research findings (Trochim, 2000).

This dissertation focuses on EIA follow-up and its effective implementation. It does not research the quality of EIA and how well the scoping and assessment was translated into mitigation measures.

Although effective EIA and the subsequent formulation of a relevant and robust EMP to mitigate impact is important in EIA effectiveness, this study is limited to the EMP and conditions of approval being the point of departure, as this is where follow-up commences. It could even be argued that effective EIA follow-up should be able to respond to flawed prediction or not translating proper scoping and assessment into a meaningful mitigation in the EMP. It is thus assumed for the purposes of this research that the assessment of impact and EMP correlate and that all the environmental impacts identified have been addressed in the EMP and conditions of approval.

The non-availability of information can be a limitation on research. It was overcome to a large degree by the cooperation of all parties involved in this research, from the government department and local authority, to the consultants and communities involved in the case studies.

Personal interviews supplemented the documentation available from the different authorities and consultants. It was possible to observe only two of the four case studies during construction. This limitation was overcome by the availability of document information and cooperation of role players.

Finally, the geographic limitation of investigating only Cape Town based case studies does limit the applicability of the research findings, but this research is exploratory and based on legislation, approaches and practices that are common to and comparable with other provinces and cities in South Africa.

1.2.4 Selected Cases

In order to explore EIA follow-up as widely as possible within the limitation of a few projects, the case studies were selected to be different examples of institutional arrangements, sensitive receiving environments, complexity and scale of impact within the surrounding area. One aspect common to each case is that there is sufficient public interest to be able to investigate public participation and find community stakeholders to interview. The selection process is described in detail in Section 3.7.

In an attempt to discover clues for improving effectiveness, cases were identified where the scoping and evaluation, the formulation of mitigation in the EMP and conditions of approval were both good and poor, as described later. It is beyond the scope of this dissertation to analyse and prove whether the EIA was conducted properly or whether the impact assessment translated into the proper mitigation of impacts in the EMP and conditions of approval. The case studies are as follows:

- The Eden on the Bay coastal mixed use development in Big Bay (local scale, moderate complexity, sensitive natural receiving environment)
- The re-alignment of the Duikersvlei water course on an industrial property in Milnerton (local scale, less complex, sensitive natural receiving environment which is already compromised by pollution)

- The development of the new Green Point stadium and public common area (regional scale, complex, less sensitive urban receiving environment)
- The new naval submarine escape training simulator building in Simonstown (local scale, less complex, less sensitive receiving environment).

Annexure G contains more information on the above selected case studies with an overview of the role players of each case study in Annexure G1 and the institutional framework for EIA follow-up in Annexure G2.

1.2.5 Dissertation Structure

This dissertation opens with an introduction to the research in Chapter 1, followed by a review of the literature on EIA and EIA follow-up in Chapter 2. This literature review briefly introduces the topic of EIA and the process of conducting EIA, followed by a brief introduction of the concept and issues of sustainable development as the goal for conducting EIA. The literature review then focuses on EIA follow-up theory, best practice and effectiveness in the current literature. Chapter 3 addresses the formulation of a research approach or methodology. Four case studies are investigated in Chapter 4. In each case study, the various indicators of effective EIA follow-up are observed, analysed, evaluated and summarised. Chapter 5 discusses the findings of each research question and the research hypothesis is addressed. The concluding Chapter 6 forms a final summary of the complete dissertation.

2. Review of EIA Follow-Up and Effectiveness in Literature

This chapter briefly introduces what EIA is and the EIA process, after which sustainable development is explored as the primary reason for conducting EIA. EIA is based on prediction. This predictive aspect of EIA in the context of complex systems and the need for integration is explored to further understand the important role for EIA follow-up in effective EIA. After understanding what EIA is, its goal and also its theory, it is then important to introduce EIA effectiveness research. This chapter then reviews in more detail what is deemed by EIA researchers to be the best practice in EIA follow-up. This review of best practice is utilised to arrive at a meaningful point of departure and model for comparison to research the case studies.

2.1 Introduction to Environmental Impact Assessment

2.1.1 Integrated Environmental Management

Environmental management refers to an integrated approach to achieve sustainability, meaning that development should be sustainable across the social, institutional, economic and physical environments and also take cognisance of their inter-relationships (Lochner, 2005). Integrated Environmental Management (IEM) is the South African practice consisting of *“tools and processes that share the common aim of promoting sustainable development. These processes can be applied at different levels (i.e. at a policy, programme or project level) and throughout the activity life-cycle (i.e. during the pre-feasibility, feasibility, design and planning, construction/establishment, operation/implementation, and decommissioning stage of an activity)”* (Lochner, 2005:6). The basic IEM tool kit incorporates the application of the following instruments before development:

- Strategic Environmental Assessment (SEA) on a higher policy or regional level that guides plans, programmes and policy decisions; and
- Environmental Impact Assessment (EIA) on lower project level that identifies, assesses, mitigates and monitors impacts.

The following instruments constitute the toolkit during- and after development (Lochner, 2005) and form an important part of understanding whether EIA is effective:

- Environmental Management Programmes (including monitoring) concerned with the project or activity life cycles
- Environmental Management Systems that guide management decisions throughout the implementation of an activity and reports on performances
- Environmental Auditing to assess and verify statutory compliance and performance for organisational reporting and governance purposes.

These tools of environmental management are related in their combined function. They can all be seen as decision making informants towards sustainable development (Glasson et al., 1999) by providing feedback on EIA effectiveness. They are as such not only products, but also processes (Glasson et al., 1999). To this end the above tools have the combined and individual aim to aid, inform and improve the quality of decision making regarding actions to be taken. Beyond their theoretical application or purpose, however, their success in practice depends on their effective use. In this research, the effectiveness of EIA is investigated as part of this tool kit by investigating one of its sub-components, EIA follow-up.

2.1.2 Environmental Impact Assessment (EIA)

The assessment of the environmental impacts of activities emerged from wide-spread concern in the developed world (predominantly originating in the United States of America) over environmental issues and pollution in the 1960s and the subsequent implementation of the National Environmental Policy Act (NEPA) by the United States of America in 1970 (Wood, 2000). EIA evolved mainly as a predictive exercise to identify and estimate impacts of development (Wood, 2000). The other tools of environmental management mentioned above, developed later as policy in terms of environmental laws and their application, became increasingly more wide-spread (Wood, 2000). Gibson (2002), for example, tracked the transformation of Canadian EIA tools over time. Their development in scope and complexity is evident from the earlier reactive measures for controlling pollution in (a), through to the more comprehensive system developed to manage environmental impact in (d)(Gibson, 2002):

- a. Reactive pollution control
- b. Pro-active impact assessment and mitigation
- c. Broader environmental considerations taking into account alternatives, socio-economic influence and public reviews
- d. Integrated planning and decision making towards environmental sustainability.

The development in complexity and scope of environmental management policy and tools over time shows a growing understanding of the complex natural and socio-economic environment and the deep inter-relationships between them (Gibson, 2002). More importantly, it reflects the institutional response in pursuing the wider goal of sustainable development through IEM and one of its tools, EIA. Truly integrated planning decisions can only happen in the context of proper policy, cumulative impact assessment, empowerment of the public to participate, recognising and dealing with uncertainty and retaining an adaptable system (Gibson, 2002). The importance of understanding the complexity of systems is examined later in this chapter, as it relates to the effectiveness of these environmental management policies and tools.

2.1.3 The EIA Process

The EIA tool generally consists of six broad steps, although these steps overlap or sometimes blend together (UNEP, 1988). It is important that there is a logical and fluid process of one step leading into the next and constant feedback that informs amendments or improvements during implementation, as follows (UNEP, 1988):

- Scoping
- Prediction
- Evaluation
- Mitigation
- Communication
- Monitoring.

The EIA process above is further divided into two main stages, consisting of the pre-decision and post-decision stages. The pre-decision stage is used to determine the scope of the project and the sensitivity of the receiving environment in the scoping phase, and then attempting to predict as accurately as possible what the impact of the activity will be on the environment (UNEP, 1988). The post-decision or implementation stage follows in which the activity or project is implemented, where the predictions made and measures proposed can either be vindicated or nullified (UNEP, 1988). Both stages, before and after a decision, are equally important. The execution stage could reveal unforeseen challenges. The process of monitoring, managing, compliance and communication of these impacts after a decision is issued to proceed with a project, is collectively referred to as the follow-up stage (Arts et al., 2001).

Environmental decisions regarding activities are also expected to take alternatives into account. These alternatives go beyond comparing different project sites, and can come in many forms, for example (EU, 1985):

- The 'no-go' alternative (no development)
- Policies or objectives to guide further action
- Processes
- Locations
- Abatement measures.

The International Association for Impact Assessment (IAIA, 1999) summarised the objectives of EIA. It proposes how the EIA process should ideally be informed by these objectives. Table 1 illustrates the objectives of EIA and the EIA process proposed by the IAIA adjacent to each other in order to show how the objectives on the left should guide and inform the actual practice on the right.

Table 1: Objectives Informing the EIA Process

Objectives of EIA <i>(Adapted from IAIA, 1999)</i>	EIA Process
<ul style="list-style-type: none"> ✓ To ensure environmental considerations are addressed in development decisions ✓ To anticipate, avoid, minimise or offset adverse impacts as a result of development ✓ To protect productivity and capacity in natural systems and the ecological processes that maintain them ✓ To promote sustainable development that optimises resource use and management opportunities 	<ul style="list-style-type: none"> • Screening • Scoping • Examination of alternatives • Impact analysis • Evaluation of significance • Preparation of report • Review of report • Decision • Mitigation management • Follow-up

These above objectives should be used to test environmental assessment tools that are developed and used in environmental management. Experience and the uniqueness of each project or activity will dictate how the specific process above will be contextualised. No process will be effective without observing, assessing and responding to the question of whether the practice is meeting the objectives. This monitoring, follow up or feedback is a key component in making EIA effective.

2.1.4 The Role Players

Each role player in EIA has a unique perspective on the process, as described below (Weston, 1997; Marshall et al., 2005):

- The approving authority is accountable to the public and will generally welcome an EIA, since the information contained and risk elimination involved in EIA strengthens their motivation for a particular decision.
- The developer would generally not welcome the EIA for its requirement that the development details are made public knowledge, thereby exposing weak areas, providing potential objectors with information and creating the potential for competitors to capitalise on the initiative. Developers should, however, use timely and well integrated EIA to help motivate or integrate other planning approvals for the same project.
- Consultants and specialists are usually paid by the developer, but are deemed to be neutral and unbiased in their evaluation of the project during the EIA. The quality of assessment reports has been criticised in many studies, but regulation by professional registration councils in their respective professional disciplines should see to this quality and objectivity.

- The public's role has traditionally been that of either the affected community or 'watch dog.' The public provides a voice or representation to issues that the authorities need to consider, but that would not necessarily be presented by the proponents. There is always a concern in EIA that decisions are made despite the public representations and that public participation is tokenism. EIA is generally welcomed by the public nonetheless.

Ultimately Weston (1997) proposes that balance in power between parties and representation of views of all the role players shape an effective EIA process.

2.1.5 The Environmental Management Programme

The Environmental Management Programme (EMP) is a part of the EIA containing detail on implementing the findings of the EIA and preventing detrimental impacts of development through mitigation measures. In South Africa the requirement for an EMP was usually contained in the conditions of approval of an EIA, but after 2006 it was legally required as part of the final EIA documentation submitted for a decision on an activity (Department of Environmental Affairs and Tourism, 2006b). The EMP is currently produced as a final step in the pre-decision stage of the EIA process and seen as the start for the follow-up phase. The EMP is a dynamic document that is normally revised as the process of development takes place and is therefore in itself a sub-process inside the EIA process. The objectives and benefits of the EMP can be summarised as follows (Hill, 2000):

- Ensures that conditions of approval of the EIA are implemented
- Ensures allocation of resources for EIA follow-up activities based on the significance of impacts
- Responds to changes in project implementation and unforeseen events
- Verifies environmental performance through information on actual events as they occur.

The above objectives bring environmental management down from the legislative and policy level, through the scoping and assessment stage and finally to the EMP stage where real measurable and tangible actions take place. There is a balance in the above objectives between observation or monitoring and appropriate response to the feedback. The EMP document itself consists of any one or more of the following components (Hill, 2000):

- Mitigation measures to prevent and reduce impacts, rectify and rehabilitate damage that occurs, compensate by substitution (in each case it is necessary to stipulate the time, place and responsible party) – in elaboration this is the response to the predictions made
- Inspection procedures to verify compliance – in elaboration this is the institutionalisation of the process that will follow

- Monitoring programme for the baseline conditions, project impacts and compliance – in elaboration this is the observation or monitoring that creates the context for adaptive responses
- Audits to evaluate the success of mitigation and appraise the effectiveness of the environmental management process – in elaboration this step audits the success of the EIA process and EMP itself from an objective point of view.

The elaboration of each of Hill's four components above was added to relate the content of the document to the process. The EMP gives effect to the conceptual and predictive processes that precede it, making it the step in the actual implementation of the EIA and environmental management process where judgement about the effectiveness of EIA can be determined. The World Bank recommends that EMPs contain the following elements (World Bank, 1999):

- Summary of impacts
- Description of mitigation measures
- Institutional arrangements
- Implementation schedules and reporting procedures
- Cost estimates and source of funds.

This correlates with Hill's (2000) summary. The EMP is an important action primer in the EIA process, since it provides the platform for follow-up and the real meaningful interventions to begin when the activity starts. It also binds different parties together in action, finance and responsibility. The EMP should have legal and contractual weight as a statutory framework for compliance during execution and operation. This makes the financial component and institutional framework important beyond mere prediction and mitigation. Zainal (undated:5) found that in Malaysian road construction projects that *"the role of the environmental consultant is generally restricted to report writing and undertaking environmental monitoring,"* and that the EMP should be translated into practice.

In the South African context, Lochner (2005) elaborates further on the content of EMPs in a guideline document prepared for the Western Cape Provincial Government. He sets out the requirement for different types of EMPs at different stages of an activity, for example construction, operation and decommissioning. Each EMP is tailored and its implementation timed to the specific needs of that particular stage. The EMP is the practical culmination of large amounts of time, cost and science invested to prevent and manage detrimental impacts and maximise positive impacts. The follow-up process is also the area where EIA often fails. This failure presents an opportunity for learning. The examples of failure can provide lessons to improve EIA. This dissertation will focus mainly on the conditions of approval and EMP. Effective follow-up could prove to be the key to more successful EIA and environmentally sustainable development.

2.2 Sustainable Development

One of the primary goals of EIA is to promote sustainable development (Sadler, 1996; Barker and Wood, 1999). If research is to be done or a judgement is to be made on the effectiveness of environmental management and impact assessment methods, the concept of sustainable development as a goal for EIA must first be understood.

2.2.1 The Concept of Sustainability

Development, population growth and pollution have always increased in relation to one another (Wall, 1994). Pollution has grown proportionally in relation to the human population in the industrialised economies of manufacturing, mining and consumerism (Wall, 1994), or second wave economies (Toffler, 1980). Today in the age of information, we are paying the price for the accumulated pollution of the 20th century and it is also realistic in lieu of the above to extrapolate from history that our children and future generations will pay the price for our current endeavours on earth (Wall, 1994).

The concept of sustainable development was formalised during the World Commission on Environment and Development (WCED, 1987) chaired by Norwegian Prime Minister, Gro Harlem Brundtland. According to Desta Mebratu (1998) of the International Institute for Industrial Environmental Economics in Lund, the principle of sustainable development originated from an earlier development process that culminated in the Stockholm Conference on Environment and Development in 1972. According to this author, age old traditional and orthodox religious value systems have always promoted living in harmony with nature and society. Mebratu (1998) continues that an economic foundation for sustainable development lies in the economist Thomas Robert Malthus's theory of growth being limited by scarce resources, thus forcing a kind of balance or constraint on human development. Mebratu further elaborates by pointing to Ernest Schumacher's 1973 book *Small is Beautiful* (Schumacher, 1989) to indicate how the use of appropriate technology can lessen the impact of pollution in developing countries in the wake of globalised economies, forcing the rapid development of these developing industries. Khosla (1995) noted that the concept of time was introduced into the World Commission on Environment and Development (WCED) sustainable development concept, which formed the basis for considering future generations in today's decisions. Further to Malthus's theory of scarce resources, the underlying economic basis for sustainable development implies that the environment will only be considered in decision making where and when it is given value in economic terms (Redclift and Benton, 1994).

Mebratu points out that the terms environment (which refers to a wider defined concept and includes the natural, physical, socio economic and political inter-relationships that manifests together to influence sustainable development) and ecology (which refers to natural systems only) were being used synonymously.

This further compounds the problem of addressing sustainable development in an already compartmentalised organisational/institutional context (Mebratu, 1998), for example in government where environmental affairs, economic affairs, health and transport would reside in different departments with their own law and priorities that do not necessarily integrate. This organisational problem was also raised by the WCED, which emphasised the link between the environment and the economy and pointed out that there is an institutional divide between the managers of the environment and the economy. Policy and institutions must change to achieve sustainable development (WCED, 1987). The concept of organisational reform to address sustainable development was also propagated by Carley (1989) who argued that the problems facing sustainable development are due to the compartmentalisation of social, economic and environment aspects in decision making and planning, when these aspects should be integrated as part of a complex and inter-related system.

Sustainable development has been defined by various organisations addressing the global environmental agenda as the following:

- *“Improving the quality of human life while living within the carrying capacity of supporting ecosystems”* (IUCN-UNEP-WWF, 1991:10)
- *“development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”* (WCED, 1987:383, cited in George, 1999:177)
- *“to equitably meet developmental and environmental needs of present and future generations”* (United Nations, 1992, cited in George, 1999:178).

In South Africa, the definition adopted by the erstwhile national Department of Environmental Affairs and Tourism is most relevant to the context of this research, because it is reduced to a more action-based definition:

“Sustainable development means the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations (Department of Environmental Affairs and Tourism, 2006a:18).”

A major problem with achieving sustainable development as a goal on the global agenda, lies with its definitions and more specifically with the application and measuring thereof (O’ Riordan, 2000). There is no clear agreement, apart from the broad definitions, on the exact meaning of sustainable development (O’ Riordan, 2000). George (1999:175) states that *“for sustainable development to be more than just a popular description for any desired goal, it must be defined with some precision”*. In searching for criteria for sustainable development, the following could be considered (Nieslony, 2004):

- Consensus through participation
- Education of stakeholders
- Consideration of cumulative, indirect and long term impacts
- Integrating ecological, economic and social decision making.

The sum of the above criteria amounts to a subjective and localised approach of doing the best that can be done in pragmatic terms.

2.2.2 Conflicting Views on Sustainable Development

To conduct EIA properly and attain environmentally sustainable development, each individual's definition and interpretation of what sustainable development is needs to be clear (Cashmore, 2004). This implies that the EIA process will need to establish some level of agreement among all parties involved on what exactly is meant by sustainable development. With divergent development interests, such consensus may be difficult to achieve. Furthermore it can be reasoned that this could deliver a different output of what sustainable development is each time an EIA is done in a different area with different parties or even in the same area at a different time when different interests prevail. Sustainable development could therefore be a subjective value-based outcome and part of a particular political, economic and social context. Sustainable development can be the conceptual framework within which to apply rational science or resolve the conflict between the environment and development and establish compromise solutions (Ghanbarpour and Hipel, 2007). In other word sustainable development would refer not only to balance in a natural state, but also in a socio-economic state, and ultimately the judgement of what constitutes sustainable development may be different every time it is measured.

2.2.3 Measuring Sustainability

In addressing the problem of quantifying sustainable development in order to measure it, Sarang et al. (2007) remarked about the lack of criteria and indicators of sustainable development in water resource management as one example. The solution these authors proposed was a risk-based approach focussing on vulnerability, resilience and reliability of specifically water resources rather than monitoring indicators. Various authors of prominent sustainable development texts cited by Sarang et al. (2007:200-201) argue that:

- *“it is impossible to accurately estimate what these impacts may be, or even what future generations will want or value.”* (citing Loucks, 1994).
- *“some scientists believe that in order to bridge the obvious gap between theory and practice, the sustainable development concept should be considered as an endless process rather than a fixed goal or static state”* (citing Peet and Bossel, 2000; Decleris, 2000; Nath, 2003; Partridge, 2003; Hjorth and Bagheri, 2006).

- *“there are no adequate and appropriate tools based on conventional science and linear thinking which lead to sustainable development”* (citing Hjort and Bagheri, 2006).
- *“there has been an attempt to connect the concept of sustainable development with humankind’s ideals which come from ethics and values and indeed, we cannot quantify those terms.”* (citing Mitroff and Linstone, 1993).

A universal solution to sustainability is thus seemingly elusive and a grass roots approach of contextualised value judgements would need to be taken into account in each case, making the EIA process itself a difficult process to standardise and even more difficult to manage in traditional terms. On a more practical level, Ravetz (2000) shows how these value judgements can be problematic in comparing whether high levels of public transport or housing density can indicate either poor city form, social deprivation, good ecological practice or all of these together.

In conceptualising the assessment of sustainability, Australian researchers noted two approaches that are most commonly used. The first is the EIA-driven approach that responsively aims to identify impacts in an integrated way (physical, social, economic) and test against a baseline whether these impacts are acceptable (Pope et al., 2004). The second approach, derived from the practice of strategic environmental assessment, is based on a proposal promoting certain pre-determined objectives or contributions for the immediate social, economic and physical environment (Pope et al., 2004). Their opinion was that these two approaches avoided defining a greater condition of sustainability (Pope et al., 2004) and that the best approach would entail setting general integrated targets and measuring how much each proposal incrementally contributes towards or impacts negatively on such a vision for sustainability.

2.3 Effectiveness of Environmental Impact Assessment

2.3.1 Theoretical Base of EIA Effectiveness

This section briefly examines the scientific foundation for scoping and prediction of impacts on which EIA practice (including EIA follow-up) is currently based and explores some theoretical shortcomings. EIA is applied to complex natural systems. It is necessary to investigate how characteristics of these systems will influence EIA effectiveness, as it will emphasise the role that proper feedback and follow-up must play in EIA.

2.3.1.1 Integration

One of the primary goals of EIA is to achieve sustainable development (Sadler, 1996). The approaches used in EIA towards environmentally sustainable development and their ability to yield results have drawn much criticism and triggered wide review during the last few decades (Lee, 1994; Sadler, 1996; Glasson, 1999; Cashmore, 2004). The failures of EIA have in the past been ascribed in part to its supporting institutional framework being established without a sound scientific foundation (Beanlands and Duinker, 1984) and not promoting integration (Pope et al., 2004). These failures could thus mean that the legal and governmental approach to EIA has not been able to reconcile with how scientists analyse and describe the natural environment or propose that impact assessment be addressed.

Integrated assessment of environmental sustainability could take place in various forms. Authors agree that EIA can contribute to sustainability if social and economic considerations are assessed with the environmental and physical ones by horizontally integrating assessment tools (Pope et al., 2004, citing various authors). A second approach could be to vertically integrate government planning and management institutions in order to set predetermined targets for sustainable development that informs assessment of environmental sustainability in projects or programmes on a wide scale as envisaged by Pope et al. (2004). This would entail reforms in the current fragmented and sectoral institutional approach of government in South Africa.

The current institutional approach in the EIA procedure has showed the following weaknesses in responding to the integrated assessment of environmentally sustainable development (Carley, 1989):

- Focus on large impacts has ignored smaller or indirect cumulative impacts.
- Highly technical EIA reports serve to motivate development rather than objectively evaluate it.
- Research during EIA phases is not inter-disciplinary.
- Focus is placed on environmental organisations and not inter-organisational relationships.
- Political and/or economic considerations take priority over environmental concerns.

- Highly sectoral approach in the organisation of government is working against sustainable development, which requires an integrated approach (vertically between policy and practice and horizontally between disciplines and sectors of society).
- EIA is unable to predict outcomes in complex systems.
- There is no bottom-up participation process involving and empowering all role players equally.
- Integrated management is required for EIA to balance science, politics and socio-economic factors, but is rarely found to exist.

It is interesting to note Carley's assessment as early as 1989 of challenges still relevant today, as Cormier and Suter (2008:543) refer to a lack of integration being *"a problem, because practitioners of various approaches to environmental assessment may not see how they are conceptually linked"*. Carley (1989) further refers to the failure to properly implement integrated planning as a meta-problem that spans across different spheres of organisation and requires institutional reform to address it. Meta-problems exist and are caused by turbulence (uncertainty, inconsistency, conflict, incomplete information, fluidity, external impacts and more) which is a fundamental characteristic of a complex system (Carley, 1989). Addressing this problem, which is systemic in nature, with a rational approach like traditional planning models tend to do, will not yield the required result (i.e. sustainable development). A key factor Carley (1989) points out will be the monitoring process towards adapting to the complex uncertainties of the system and of sustainable development. This approach requires that monitoring becomes a primary function and that rigid institutional organisation and processes in EIA become more flexible (Carley, 1989). To enable effective EIA, its supporting organisation must be integrated and flexible to respond to the dynamic nature of environmental management and incorporate feedback mechanisms.

There are complex linkages between the social, economic and physical aspects of the environment. Ravetz (2000) provides an excellent summary of the need for integration in the assessment of sustainability when pointing out that economic pressure in cities or regions drives environmental change. These economic pressures are in turn driven by social needs and demands in layered geographical patterns established by what aspect of it is measured (Ravetz, 2000:43). To achieve the integration necessary, it is important to understand this complexity in the environment.

2.3.1.2 Complex Systems

The complexity of the natural environment showing system-like characteristics is called natural complex systems by Perez-Trejo (1989). These systems form by evolution and have a self-generated spatial structure. Their dynamics are not linear and they respond unpredictably to intervention. Natural complex systems have highly complex components which are inter-related with other complex natural systems forming a web of inter-dependant natural systems and sub-systems that respond to change and adapt together.

Where the inter-related sub-systems influence each other's development, there is co-evolution (Kaufman, 1993). Their survival may depend on their complex relationships to one another and co-development or symbiosis.

Social systems affected by development and those that play a role in decision making are as complex as natural systems due to human reflexivity. This reflexivity takes place where information on impacts circulates in social networks, changing the way people perceive and act on that information.

Reflexivity results in the manifestation of two unique features (Kaufman, 1993):

- a. A seemingly insignificant impact can have much larger, far reaching effects on inter-related systems
- b. The original impact may not always be reversible.

This has significant implications for environmental management based on attempting to understand or intervene in complex systems. The so-called butterfly effect is an example of such a reaction, albeit an analogy that is disputed by some leaders in complexity studies, such as Cilliers (2000a), cited later. In this example the small change of a butterfly's wings in one area can cause exponentially greater changes in weather patterns elsewhere. Due to its linkages and inter-dependence with other complex systems, a complex system is sustainable if it successfully survives (Nooteboom, 2007). Therefore a possible definition of sustainable development based on complex systems theory could be that it is development that allows a system to sustain itself in its whole and as part of other systems of which it forms a part and depends (Nooteboom, 2007). The concept of the whole earth being one such super-system or inter-related, inter-dependant systems was famously propagated in the late 1970s by James Lovelock, which he termed GAIA (Lovelock, 1979). This reality alludes to a world where a differentiated or categorised view of the environment is challenged:

"The new vision of reality we have been talking about is based on awareness of the essential interrelatedness and interdependence of all phenomena – physical, biological, social and cultural. It transcends current disciplinary and conceptual boundaries and will be pursued within new institutions." (Capra, 1982:285)

Complex systems display the following characteristics (Cilliers, 2000a):

- Complex systems have large amounts of elements that in themselves can be simple
- Elements have rich, non-linear interactions where information and energy are exchanged
- There are many direct and indirect feedback loops
- Complex systems are open systems
- There is a memory or history to a complex system that is distributed in its elements
- Behaviour of the system as a whole is based on the interaction of its components
- Behaviour cannot be predicted deterministically by investigating these components

- Complex systems are adaptive.

From the above it can be argued that achieving or predicting an outcome in a complex system is a difficult task and that the mere act of measuring or observing a system can in itself cause a reaction in the system. The latter lesson was learned in quantum physics where a Cartesian or Newtonian analytical approach was employed which reduced the whole into its parts to explain and analyse it mathematically and through this reduction failed to explain the observed phenomenon (Capra, 1982). Cilliers (2004) states that the analysis process may not capture the emergent properties of complex systems. These properties result from interaction between components.

Complexity theory itself can point the way towards effective management by organisations or institutions dealing with complex systems (Cilliers, 2000a) where context, history and a flexible integrated approach should be adopted. He proposes distributed control with constant feedback and monitoring in an organisation dealing with complex systems (for example, EIA authorities).

Changes in systemic relationships (networks) are caused by positive feedback, whereas negative feedback retains the status quo. The status quo may in itself be movement in a constant direction, or development that is retained (Morgan, 1997) which is more predictable. Change in complex systems can be instituted pro-actively by means of positive feedback into the system towards a desired result, but the change will face barriers of vested interest (Nooteboom, 2007). In an economic or political system for example, these change barriers could be tensions in networks that require power or cooperation to change (Jasanoff, 1990). The application of power between inter-dependent parties will result in a compromise, negotiated settlement and a new more acceptable knowledge state being achieved. The system will only change under tension. Below a critical value of tension, inertia of the system will be sustained. Above a critical value the system will break down into chaos. At some point between these values, change in the system is caused by adaptation while retaining its internal complexity (McKelvey, 2001). Whether the goal of EIA is managing responsible development (positive feedback) or ensuring conservation (negative feedback), the institutions managing the process needs to learn from the above complexity theory in its application of the EIA procedures.

Systems can adapt successfully due to impacts or regular interactions. Nooteboom (2007:651) believes that *“a sub-system can co-evolve with its environment only if it can create complex (creative) behaviour that matches the complexity of the changes in its environment.”* A sensitive natural ecosystem could for example absorb certain impacts on it and adapt to cope with these changes.

A system is required to be able to react to changes, or turbulence, by producing counter-actions. Cybernetics is the study of system functions and processes that have goals and causal chains that work towards higher effectiveness and efficiency through learning, adapting, social control or cognition (Nooteboom, 2007, citing Couffignal, 1958).

In cybernetic systems, for example in complex computer robotics, the ability of a system controller to achieve a specified state in the system will depend on the controller's ability to generate and manipulate these counter-actions. This process of adaptation is referred to as the Law of Requisite Variety in cybernetic systems (Nooteboom, 2007, citing Ashby, 1956). Through this process of adaptation and learned response, developers of computerised systems are hoping to develop intelligent computerised systems that can yield reasonably learned responses in the face of unknown or unexpected changes.

These computer models are not just simulations for factory application, but applied to aid decisions and understanding of complex systems such as climate (such as the impact of climate change on coastal regions or forecasting the weather accurately) and safety (such as flight simulator training and mining). They can assist any science based on prediction, such as EIA.

This adaptive ability is not limited to computer systems, but an inherent characteristic of all complex systems. Civil policy is a complex system, for example. Understanding the inter-relationships and adaptability of this complex bureaucratic or political system that influences environmentally sustainable development will make environmental management more effective. Furthermore a measure of learning has increased in environmental management due to the mere fact that EIA is being done and knowledge is being created about complex natural systems. This can be called requisite learning. Knowledge and trust gained as a result of this requisite learning is essential in interactions between relevant parties' varied interests in environmental management. Finding a balance of trust and shared knowledge within these often strained relationships is required to achieve efficiency and progress (Nooteboom, 2007) and not delay commonly important decisions due to the barriers to change.

If an impact on a complex natural system is to be assessed against the desired goal of sustainable development (in itself an unclear goal as shown before), the possible outcomes could be that (i) the system adapts and remains sustainable (copes with the impact) or (ii) that it can remain inert (no change due to insignificant impact) or (iii) collapses due to the impact (chaos state).

Since complete knowledge of any complex natural system and all its sub-systems and inter-related systems can never be achieved, it can be argued that an impact can never be reliably predicted beforehand. According to Cilliers (2000b), a reductionist approach to analysing complex systems always leads to distortion. Unless all possible information is available about a complex natural system (which is impossible), it can be argued that full understanding or observation thereof is not possible. Therefore estimating reliable outcomes with or without an impact - in other word estimating the effects of an impact or just merely estimating what will follow in a state of inertia - is difficult, if not impossible. In practice though, a degree of learning, experience and testing may well arrive at a modestly reliable answer, as the next section on prediction will show.

2.3.1.3 Prediction

EIA entails making predictions about or forecasting the future and as such is prone to fallacy and error. Although flawed, it is a part of EIA that must be done as well as possible in the quest for environmentally sustainable development. Before arriving at the theoretical foundation for accepted prediction practices, it is necessary to examine the most common flaws with prediction in impact assessment.

If an assessment is made about the future it is inductive, in that it assumes that the future will resemble the past. In impact assessment methodology practitioners should use inductive assessment with care, as it assumes linear progression and ignores externalities that may still arise. Prediction or forecasts founded on inductive argument are fundamentally flawed (Vught, 1989). Deductive assessment is done by making deductions from known information that is tacitly accepted as true at present time. A deductive assessment can only be true for a specific time, not for the future. The limits of inductive assessment must be acknowledged in EIA theory and practice.

A further pitfall of prediction is to only rely on evidence that proves a result or outcome in isolation from possible alternatives or new outcomes. This is referred to as a circular argument (Vught, 1989). Deduction, while true for the present, can only be one possible future.

Empirical observation of the past is flawed according to Vught (1989) due to the unique experience base of the observer that cannot be universally held as true/objective. Even the most basic experience of reality for an observer can therefore only be argued in a particular context. This flaw in prediction methodology is referred to as psychologism or the nature of the observer to bring his own personality, conviction, intellect or reason to the observations, either intentionally or unintentionally. There can therefore be no purely objective observers.

Yet another flaw according to Vught (1989) is rationalism in science, especially where there is as yet no theoretical base in science for forecasting. Theory would be the knowledge and experiences that science has not yet proved false. Due to incomplete human knowledge, ultimately truth cannot prevail, but theory can be formed towards truth. Rationalist theory may therefore ignore complex system realities. In forecasting, corroboration after an event is frequently used as proof. But Vught (1989) argues that even though a theory has as yet not been proved untrue, despite rigorous testing, it cannot be assumed that it is true and will always be true. The degree of testing and corroboration simply means that there is a more reliable indication of potential risk. In EIA this must be understood, as no amount of corroboration can totally eliminate the risk of predictions being wrong at some future point in time.

In closed systems, if the complete past history is determined, all possible futures can be predicted and therefore impacts on the system can be forecasted accurately.

While this is true for simple closed systems, with more complex systems the more the system is simplified or elements removed in attempts to model it or understand it, the less reliable the outcome will be (Fatmi and Chow, 1989). Understanding the past complete history is a deterministic approach to forecasting that does not hold true for complex systems where the history cannot be known, or where, even if known, the future outcomes could be uncertain or unexpected.

The risk is present in EIA that vast amounts of expensive and time consuming information could be assimilated in the hope that it is relevant and that the full history or current situation will shed light on the future impacts (Vught, 1989). With complex systems these resources should possibly rather be used for adaptive management purposes that could yield greater likelihood of success. This does not negate gathering baseline information where warranted, but baselines can never assure accurate adaptive management in future, as humans can never understand all possible externalities that affect those baselines and baselines may also distort the understanding of the full system themselves.

Although passing inductive arguments off as true is risky, Van Staal (1989) argues that the practice of inductive assessment is useful if the accepted point of departure is to generate a state of optimal knowledge for decision making that is based on experience, and not in the pursuit of complete knowledge or absolute truth. Inductive arguments can be credible if they are probable and based on sound logical evidence. Where such evidence is used and effectively addresses a goal (even in the absence of absolutes) it can be useful in itself. This methodological approach to forecasting is referred to as pragmatism by Van Staal (1989), a philosophical approach that underpins the notion of prediction in EIA.

This pragmatic approach is further entrenched in probability, according to Van Staal (1989), which is the science of inference by mathematical calculation, logical statements in relation to one another, observing a sequence of events over time and finally imposing a subjective belief. Mathematical or statistical inference uses models in its advanced stage. Statistical models using sampling can give an indication of the likelihood of occurrence of a phenomenon based on certain assumptions and parameters. Other models used in economics focus on obvious trends and ignore norms, values and theory and simply try to eliminate conjecture by predicting time intervals or parameters in a given context, such as discursive quantitative models (Van Staal, 1989).

Dynamic computer models try to reflect real world complex systems in mathematical terms through calculated relationships. These models incorporate sub-systems observed over time and their fit to the real world is tested statistically over time and then when proved to be fairly reliable, can be applied to extrapolate an outcome based on a given scenario. Since it is impossible to capture all the sub-systems and their relationships, as well as externalities, a model can never yield a concrete result. The predictions can, however, be given with a known degree of reliability (Van Staal, 1989). In certain types of computer models, the required knowledge is not the forecast, but the reasons and manner in which the sub-systems affect one another.

In other words the interactions observed can teach model developers about the relationships and lead to a more effective model and forecast being developed (Fatmi and Chow, 1989). The time period of observation can influence the outcome of model results and their interpretation. Observations and predictions based on an economic model are inherently relatively unreliable, but planetary physics is relatively reliable because the rate of change in planetary orbits observed is small compared to the volatility in the global economy. Yet even the reliable results that physics-based models will yield for planetary movement will become more and more unstable if the time period is increased.

This instability is due to the incomplete knowledge of the scale of the universe, the elements contained in the universal system and unknown influences at work on it (Fatmi and Chow, 1989). The rate of change in the system is thus of cardinal importance in the methodology applied to forecast future states. Dealing with complex natural environments in EIA, the assessors should therefore determine the most realistic and applicable horizon of the assessment and interventions proposed. Models, depending on how they are put together and applied, can be effective for a specified forecasting function, but their predictions can never be passed off as the absolute truth.

2.3.2 Introduction to EIA Effectiveness Research

There is global debate around the effectiveness of EIA as it is currently practiced and its role in enabling sustainable development (Lee et al., 1994; Sadler, 1996; Glasson, 1999; Cashmore et al., 2004). Many researchers have studied the effectiveness of EIA by investigating one of the following aspects of EIA practice:

- EIA Report quality (Barker and Wood, 1999; Canelas et al., 2005; Sandham and Pretorius, 2008; Nadeem and Hameed, 2006; Samarakoon and Rowan, 2008; Polonen et al., 2011)
- Changes to programmes, policy or projects as a result of EIA (Barker and Wood, 1999; Fujikura and Nakayama, 2001; Jay et al., 2007)
- Review of EIA legislation, policy or procedure (Hickie and Wade, 1998; Rees, 1999; Moduying, 2001; Wang et al., 2003; Ramjeawon and Beedassy, 2004; El-Fadl and El-Fadel, 2004; Ogunba, 2004; Aslam, 2006; Paliwal, 2006; Riffat and Khan, 2006)
- Improving the theory of EIA (Lawrence, 1997; Lawrence, 2000; Cashmore, 2004; Hill, 2004; Cashmore et al., 2008).

The above authors mainly focus on EIA and the aspects of its performance, but the contextual influences, such as political or socio-economic systems also influence effectiveness. Practitioners taking part in an Australian study (Morrison-Saunders et al., 2001) regarded good quality reports as key to improving EIA effectiveness.

In evaluating the effectiveness of environmental assessment, authors such as Retief (2007) and Pope et al. (2004) have proposed outcomes-based criteria against which to measure the influence of SEA and EIA on policy, plans and sensitive environments in order to evaluate whether EIA had any real influence or impact. It becomes apparent to readers of effectiveness literature that there are many different approaches to evaluating the effectiveness of EIA, even in combination.

According to Retief (2007), three broad aspects of impact assessment have been reviewed by researchers in the study of EIA effectiveness. These have been the underlying theory of what impact assessment is, how it is being applied in practice and how well it is being executed. Most of the past focus has been on the application of EIA, but recently the focus has shifted to its underlying scientific theory and its performance (Retief, 2007). The theoretical foundations, limitations of EIA as a science and the goal it aims to achieve are now clearer from the brief investigation of its underlying scientific theory in Section 2.3.1. As previously shown, sustainable development cannot be achieved by a singular intervention like EIA, but EIA should be an important part of a larger integrated and more strategic approach including SEA. SEA should inform EIA, but according to Retief et al. (2008) SEA in South Africa is currently ineffective in influencing policy and planning at system level, as well as EIA at project level, primarily due to a lack of integration between consultants and decision making processes, as well as the varied opinions, interests and values informing the concept of sustainable development. This leaves questions about the effectiveness of EIA itself in South Africa and its role in enabling sustainable development in projects. The EIA effectiveness research approach adopted in this dissertation is to investigate the performance of South African EIA through analysing one of its important sub-processes, EIA follow-up.

2.3.3 EIA Follow-Up Best Practice

Effective EIA must include post-decision follow-up or activities broadly defined as monitoring, evaluation, management and communication after the EIA has been completed and during and after the activity or project takes place. In the implementation stage attention should be given to the institutional arrangements to facilitate follow-up, the application of appropriate techniques applied, communication and participation by all relevant stakeholders, training and development and finally improving the quality of EIA processes through feedback from the follow-up process (Morrison-Saunders et al., 2001a). These proposals point to an effective EIA through adaptive management, enabled by incorporating proper follow-up in the process. Adaptive management refers to the process of flexible reaction to change and unpredictability (Canter and Atkinson, 2010), typically as part of uncertain prediction or operation in the complex and sensitive natural environment where EIA is applied. Adaptive management relies on follow-up and monitoring (Canter and Atkinson, 2010).

2.3.3.1 What is EIA Follow-Up?

Follow-up is a term used to describe activities after the EIA decision stage during implementation (Ahammed and Nixon, 2006). According to Noble and Storey (2005) follow-up, monitoring and auditing are all activities that relate to feedback, which develops understanding of the real impacts of development on a complex environment. It can be argued that without proper feedback, the real impacts of development will not be known, making follow-up a critical aspect of EIA. Follow-up is currently neglected (Arts et al., 2001) or partially done (Noble and Storey, 2005) where follow-up relates only to observing and reacting to the accuracy of prediction or the effectiveness of mitigation measures. Going further than Noble and Storey (2005), two additional components of feedback can be added to this repertoire, being those of evaluation and post project analysis to achieve the broader learning through the feedback cycle mentioned above.

It has been shown in Section 2.3.1 that prediction in complex systems is inherently flawed, making it essential in EIA to observe impacts during construction after assessment and decisions. It is furthermore equally important where impacts were predicted to not just test the accuracy of predictions, but also ensure that the mitigation measures are effective (Noble and Storey, 2005). To be effective, both of these aspects of follow-up require feedback and adaptability of the process after implementation.

2.3.3.2 The Approach to EIA Follow-up

In clarifying the terms 'integrated' and 'strategic' beyond their dictionary definitions, but in their application in EIA, Hacking and Guthrie (2008) developed a theoretical framework for combining the approaches to assessing environmentally sustainable development effectively.

This framework, which could make EIA more effective, requires consideration of the degree of 'comprehensiveness' of the study (assessing sustainability means assessing complex systems and can never be totally comprehensive, but can position itself at an appropriate level for the specific task at hand). This will lead to more informed and adaptive follow-up taking into consideration a more comprehensive list of environmental influences and narrowing them down where critical elements or impacts are identified. Effective follow-up thus depends on a thorough, yet scoped comprehensiveness in assessment so as not to miss important informants and to focus within reasonable limits on the key issues.

The degree of 'integratedness' of the study (assessing environmental, social, economic and other aspects of impacts) has an important implication for institutional structuring during follow-up and its ability to deal with the arising issues during construction or operation. Effective follow up should take place within a framework for integrated assessment and planning.

The institutional arrangements or organisational structure for follow-up should allow for follow-up to be empowered to deal with socio-economic and infrastructure impacts that arise from development before they lead to detrimental effects on the natural environment.

The degree of 'strategicness' of the study (assessing the scope of application or focus of the assessment) should be considered. Impact assessment should be preceded by integrated strategic planning and policy formulation for a wider area before an intervention in that area can be assessed in itself. This will make assessing a particular development easier. Without this strategic planning in place, reactive site specific studies will never reveal cumulative impacts or finance the establishment of wider environmental benchmarks. Assessment and feedback activities should be layered by government in order for the conductors of particular studies to know what level of strategic depth to take on in their own assessment or follow-up stages.

Hacking and Guthrie's (2008) theoretical framework alone is not all that is required from the EIA process for it to be effective in attaining the elusive goal of sustainable development. George (1999) developed practically applicable criteria for assessing environmentally sustainable development and the effectiveness of EIA in achieving it during assessment, based on the Rio Declaration (United Nations, 1992). In the criteria the issues of equity between current generations (intragenerational equity) and future generations (intergenerational equity) are addressed on a scale ranging from local, national to global impacts. An attempt is thus made to assess impacts in a context which is more cumulative and global.

On a more fundamental level, Noble (2000) outlines three requirements of adaptive management related to the effectiveness of EIA follow-up. Firstly, management should be able to deal reasonably accurately with the uncertainty of predicting impacts in complex systems. Secondly, it needs to deal with how well the mitigation measures are working to regain a stable state in these systems. Thirdly, it needs to accommodate the interests of all stakeholders. Effective EIA follow-up will therefore need to be based on a comprehensive and integrated assessment approach, applied within a pro-active, strategic framework of governance. This may require the current EIA governance structures and even strategic planning organisations to reform.

2.3.3.3 Scale of Application

Morrison-Saunders and Arts (2004) identify three distinct approaches to follow-up based on the scale at which it takes place. The first level is project-based follow-up, which relates to compliance monitoring, mitigation monitoring and improvements to the EMP during construction or operation. This feedback ensures responsible development on site by adapting the original EIA assessment based on observed outcomes. The second level of follow-up should take place at a macro-level where the general effectiveness of EIA is assessed based on feedback from the various project level EIAs.

This feedback aims to improve the EIA tool by adapting the governing policies and laws that govern its application. The third level identified by these authors is meta-scale feedback of whether EIA is achieving its goal of environmentally sustainable development in theory and practice.

Project proponents and environmental practitioners may use follow-up to test and adapt the predictions to the actual observed situation on a specific site (micro-level), but there is real value in the accumulated learning that takes place through tracking the results or trends of these continual feedback processes at macro-level. Understanding and knowledge of natural systems will increase by means of the EIA process being viewed as field research, if assessment data is centrally maintained and centres of learning consolidate this data into integrated and comprehensive regional information systems. This dissertation is an example of such effectiveness reviews. Macro-level feedback will eventually inform meta-level review of the approaches adopted towards the attainment of sustainable development.

Government and practitioners can already improve the effectiveness of EIA by actively promoting the use of all three of the current feedback tools across the different scales mentioned by Noble and Storey (2005):

- Follow-up
- Monitoring
- Auditing

In this case Noble and Storey (2005) refer to follow-up in its activity-based EMP application and management form. The term follow-up is more generally used to refer to the collective repertoire of feedback tools used during the implementation stage.

The legal framework, resources, skills and institutional support for follow-up is currently a challenge (Branis and Christopoulos, 2005). Feedback will only lead to improvements to the EIA process itself if a higher authority can evaluate practices and shortcomings and respond with amendments to education, training, policy or legislation. Monitoring programmes are required by some EIA decisions and present an opportunity to observe impacts due to development in real time. This important macro-level feedback loop can influence all areas of EIA theory and application. Feedback can take place at different scales as mentioned by Morrison-Saunders and Arts (2004) to improve on the more general understanding of the natural and social environment and more specifically EIA practices by drawing on successes of singular mitigatory interventions in EMPs. Feedback of many EIAs over time (incorporating all the feedback tools such as monitoring programmes and auditing of the EIA process for effectiveness) could ultimately lead to a better understanding of the cumulative impact of development and progress towards environmentally sustainable development.

2.3.3.4 EIA and Sustainable Development

The effectiveness of the EIA process has received wide attention since its inception (Lee et al., 1994; Sadler, 1996; Glasson, 1999; Cashmore et al., 2004). The main critique raised against the process has been whether it is contributing meaningfully towards sustainable development. The EIA process can contribute to the goal of sustainable development if it is effective in identifying and addressing potential risks to the environment or opportunities for better management. Authors like Senner (2011) have identified shortcomings with the comparison of proposal alternatives in project level EIA without using some form of legislated criteria for sustainability. They also noted the over-emphasis of direct project related effects while giving less consideration to cumulative impacts.

EIA is a tool that is utilised in resolving the conflict between economic development and environmental protection (Sadler and Jacobs, 1990). In conducting EIA to achieve sustainable development, it is necessary to ascertain what the different stakeholders in the process deem as sustainable development (Cashmore, 2004). It was argued earlier that sustainable development is an elusive goal. It is therefore clear that EIA is open to political and social influence (Hardi and Zdan, 1997). It was shown earlier that sustainability cannot easily be measured, since there are limited universally accepted criteria or indicators. Not being able to make quantitative assessments towards sustainability still provides the opportunity for qualitative assessment and consensus in EIA, since there are many agreed principles of sustainable development. The regulation and legal enforcement of sustainable development still remains a challenge. This holds challenges for follow-up, as enforcement forms a central function of follow-up in EIA.

According to Cilliers (2004) the concept of justice is an ethical concept and part of our society, which is a complex system. A judgement on ethical grounds can only be made with consensus based on a shared value system at a given place in a given time. The law, however, is an absolute that tries to maintain non-exploitative relationships within this complex societal system and that was derived by prior consensus in a particular place and time. The law or legal framework EIA is founded on can be applied in assessment of an activity. Once again the theme of consensus emerges, even where this consensus is founded within the legal framework instituted by a government.

The mere act of doing an EIA is already a step towards sustainable development, irrespective of whether the effectiveness of the EIA is adequate or there is consensus on what sustainable development is. The act of doing EIA could in itself be a form of adaptive management.

In a study of effectiveness of EIA, it was noted by critics how rarely the decision following EIA results in the activity being refused (Nieslony, 2004). An interesting finding was made by researchers that developers in the United Kingdom and Germany modified their projects before submission of their applications for planning approval (Barker and Wood, 1999). The mere act or requirement of doing an EIA was shown here to be a form of mitigation.

The rare refusal of disputed development does not necessarily point to an imbalance of power and resources between the proponents of the development and the environment. EIA involves many parties reviewing the proposed activity or project - from its proponents, to the authorities, agencies, academics, specialists, organised interest groups and the general affected or interested public. Problems identified in assessed activities or projects can be adapted through the process of EIA in such a way that the project is allowed to proceed, but in a more acceptable way than originally proposed. This compromise points towards the consensus solution to sustainable development and that sustainable development may not necessarily be a measurable, definable state or limit to development, but a process of organised and integrated decision making.

2.3.3.5 Cumulative Impact- and Life Cycle Management through EIA Follow-up

According to Senner (2011:503) cumulative effects assessment is a “*natural and viable way to appraise sustainability.*” In an attempt to develop a conceptual framework for cumulative impact assessment, Masden et al., (2010) noted that there is a difference between the impact and the effect of that impact. Cumulative impact assessment is thus the process of determining the outcomes of all the actions taken together within a pre-defined space and time (Masden et al., 2010). Senner (2011) noted the importance of metrics and a rating system to measure sustainability in cumulative impacts assessment at project level, for example in energy efficiency of building design, construction and operation. In conducting cumulative impact assessment, Connelly (2011) quoted the importance of legislated requirements to include this type of assessment in the EIA stage when conducting scoping by identifying the valued ecosystems and their important attributes, defining the space and time in which they occur, establishing a baseline to measure impact against and finally, having a follow-up programme in place to monitor impact. Cumulative impact assessment thus plays an important part in effective EIA and EIA follow-up best practice.

A problem facing an assessor would be demarcating the boundary of the system or measuring the area of function or occurrence of a certain element or process being measured. An appropriate scoping envelope is thereby determined which goes meaningfully beyond the activity or project site and includes the wider receiving environment. Tukker (2000) proposes to determine the natural resources that a system uses and conserve them, rather than to try and measure the accumulated effects of the impact of an activity on the natural resources system. EIA follow-up should therefore be situated in an equally wide and well understood impact management area.

In a study of 50 environmental impact statements in the United Kingdom, Cooper and Sheate (2002) found that half mention and only nine assessed cumulative impacts. In some of these statements the proponents identified cumulative impacts during the scoping phase of the EIA (being residual effects of a project, interactions between projects, combined effect with other projects and incremental impact over time), but did not address the impacts as direct impacts of the assessed project or programme.

Making cumulative impacts the responsibility of project proponents to manage beyond the impact of their own projects or actions is difficult (Therivel and Ross, 2007). Connelly (2010) noted the current challenges in the United States of America with cumulative impact assessment being administrative boundaries, lack of baseline data, unknown thresholds for measuring detrimental impact and limited use at project level.

The key to cumulative impact assessment at project or programme level is, according to Therivel and Ross (2007), to keep to wider environmental limits and targets during conceptualising, planning and execution. Cumulative impacts should be seen as equally important to the direct project impacts in EIA (Cooper and Sheate, 2002:435). Connelly (2010) and Therivel and Ross (2007) proposed a change at policy and legislative level that will result in the inclusion of cumulative impact assessment at project level when it is combined with good collaboration amongst government departments, the establishment of thresholds for valued ecosystems and inclusion in follow-up and monitoring programmes.

Life cycle assessment and cumulative impact assessment are tools that are both by nature and cost implication better suited to strategic environmental assessments and regional planning. The reason for this lies in the complex nature and high cost of the monitoring programmes associated with the two forms of impact assessment and the inherent value that governments, rather than project proponents can reap from the results by applying them on a wider scale in regulating land use and development. Where life cycle monitoring is done as part of an Environmental Management System (EMS) like ISO 14000, auditing is done periodically, but it is more strategic and judgemental in its approach than EIA. This is due to the fact that audits are aimed at compliance, risk assurance management and liability aversion, rather than assessing specific impacts for mitigation (ICC, 1991). An audit is there to measure the performance of the monitoring or implementation of mitigation measures and provide accreditation that can be used in public relations, marketing and activity expansion. An audit process is meant to start off identifying problem areas and then later become more sophisticated in verifying compliance and confirming management decisions. Auditing is mostly voluntary at present, but becoming more prevalent, especially amongst corporations, multi-nationals or exporters. Auditing is dependent on a firm support base from management and shareholders in the form of policy, overt support, compensation-performance linkages, organisational planning, resource allocation, access to information and a clear commitment to follow-up and action (ICC, 1991).

In a study to measure the effect of a specific housing development in Phoenix Arizona USA on the natural flora (Allen, 2009), the study area definition was not emphasised, but instead attention was given to the formulation of a tool to rapidly assess ecological impact through limited and effective measuring of a select few indicators. These indicators were proven to be relevant in the study results and could be applied to the rest of Phoenix where similar problems of assessing the long term effects of urban sprawl are encountered. The study and tool is an example of how localised follow-up can work efficiently over a short time to determine long term impacts during the life cycle of an activity.

2.3.3.6 Institutional Framework

EIA follow-up is regulated or facilitated through three types of institutional approaches, being governance, self-regulation and public pressure (Morrison-Saunders et al., 2003; Morrison-Saunders et al., 2001b). In these three approaches the drivers respectively are the regulator, the proponent and the community. Just as follow-up is mandated and required by legislation when driven by the regulator, the other approaches should also be formalised in contracts or agreements to enable their respective outcomes, whether it be accreditation, ratings, liability and risk management or the management of public perception (Morrison-Saunders et al., 2003).

According to Weston (1997) the popular view of the term 'environment' has been narrowed down in the United Kingdom to the bio-physical only. This tendency to narrow down a complex and wide application area to a digestible portion is typical of many governments' approach to policy issues, where the smallest most focussed policy is more likely to succeed in solving a set of problems (Rabe, 1986). Most countries have a government department tasked with environmental management that would typically function separately from for instance public health, development planning, fiscal and monetary policy, trade and industry, and agriculture. Yet these aspects are all integrated in human interaction with the environment. In South Africa, the environment is more widely defined, but similar functional separation exists, as referred to by Rabe (1986) writing about the United States of America.

This fragmentation of the institutional approach to environmental management leads to ineffective, fragmented policy and application. In the United States for example, fragmentation in policy and institutions leads to a situation where a myriad of different permits existed from different government agencies, all regulating a small component of the environment (Rabe, 1986). The more effective the environmental lobby became, the more permits were required from developers. There was no integrated management approach. Where coordination of permits was sought, the main aim was to streamline administrative efficiency and political acceptability and not to achieve real integration of environmental management. According to Rabe (1986) real integration only happens when the basic policy ideas and political pressure exist together. Then institutional reform can be induced if a strong advocate for change takes up the challenge. The task to integrate policy alone is daunting, working across specialist professions and with widely distributed data.

2.3.3.7 Aligning EIA and Follow-up with Project Planning

The degree to which the EIA aligns with the project life cycle will greatly contribute to its effectiveness. Using a project management approach to implement activities, rather than a sectoral departmentalised management approach typical of bureaucracy, already provides an opportunity for an integrated process favourable for addressing complex issues. To make EIA follow-up effective, this alignment needs to already happen prior to construction during the inception, planning and design stages.

No level of effective follow-up later can account for the lack of early integration of the environmental and design processes. To this end, Brown and Hill (1995) addressed the change that EIA should undergo from a passive process in evaluating a project, to a role in which it contributes positively to the design of activities or projects as part of the professional team. Information from the EIA comes too late (after project design or site procurement) or too early when the design can still deviate from the original proposal making re-evaluation or a completely new EIA process necessary.

The significance of environmental impacts become clearer as the planning progresses through stages aligned with an EIA. At first, in screening, it is decided whether an EIA must be done based on the concept development proposal. Thereafter scoping determines the sensitivity of the receiving environment and the anticipated level of project impacts. The design team developing the project can make amendments to the design in response to information from specialists studying the environment as this information becomes available. Throughout this process the detail, availability and communication of environmental information are developed and are thus able to affect the decisions taken by the design team, authorities and interested and affected parties (Wood, 2008).

Typically various site alternatives and development concepts are assessed and evaluated during the EIA stage. A site and concept for the development is supported, but this is only the start of the detailed design process where risks associated with the feasibility of the development have been sufficiently reduced to justify spending more time and money. In practice, it is often only at the decision stage of the EIA with a requirement for an EMP to follow when details of the project design become clear. There is currently little or no integration in South African common practice between the EIA consultant's work and the design team's work.

It is ideal to appoint the EIA consultant early and develop the project concept with the design team in an iterative process where expertise and experience is shared. When the feasibility analysis and design concepts are far enough advanced to apply for an authorisation in terms of the legislation, the design team must be aware that this legal process may still impact on the design. Even at the construction stage, the design may still need to respond to arising environmental challenges.

This iterative process of design and evaluation is the ideal model for ensuring that the evolution of the project design and the EIA process are integrated. This process of informing subsequent decisions is referred to as decision-scoping (Brown and Hill, 1995).

The relationship between design professionals in South Africa is governed by legislation, contracts and practices dating back prior to EIA becoming prevalent or legislated. The structuring of the relationship between the design team members (of which the environmental professional is a part) is difficult in terms of the current contracts and compartmentalised approach in building design teams.

Projects or activities outside of the built environment (for example in agriculture) are structured differently, but EIA is commonly used in construction related projects or activities. In South Africa these are governed by strict fee scale guidelines and contractual agreements for each professional member of the team. Instead of promoting integration these contracts, division of fees and work and liability issues actually serve to discourage coordination in the design and development of a project. The way the built environment professionals interact is not conducive to decision-scoping.

2.3.3.8 Public Participation

Public participation and awareness of the citizen's inputs in development has increased dramatically in the latter half of the 20th century (Allen, 2004). The total amount of non-governmental organisations (NGOs) in the world has been growing from 20 000 in 1990 to 50 000 in 2001 (Myer and Kent, 2005). Even on a voluntary basis, communities are becoming more involved in EIA and monitoring (Harvey, 2006). These facilitation mechanisms like participating in decision making and monitoring build mutual adjustment between parties (Hill, 2004) and further the attainment of consensus towards a decision based on the principles of sustainable development. The process of involving the public in decision making (to whatever degree this is taking place, from mere advertising of developments in the print media to full decision making partnership) is often seen as a delaying factor by developers. Planners of activities and projects have different objectives from the public. Their studies may fail to address the issues of concern for the public and if shared, the complexity of reports can be technically incomprehensible to the layman (Weston, 1997).

Without public participation being effective, EIA follow-up cannot be effective since it depends on successful partnership with the affected community. Public participation is usually a requirement for a decision, but rarely required after when it can contribute to the evaluation of prediction accuracy, corrective actions or enforcement (Hunsberger et al., 2005). One study mentions an approach to public participation that is independent from projects (Hunsberger et al., 2005). Ecological boundaries are identified and a sensitive environment is monitored by a community or interest group looking at cumulative impact of various effects or projects (for example salmon spawning areas or wetlands). These interest groups are in a better position to negotiate agreements with proponents that typically includes benefit streams or compensation sharing from the access to natural resources or property. These agreements can also include monitoring and feedback towards more adaptive and informed impact management (Noble and Birk, 2011), especially over the life cycle of an activity when the project proponent may no longer be involved.

2.3.3.9 Valuing the Environment

Sustainability strives to avoid development at the cost of the environment. But what is the value of the environment?

A possible answer may be that environmental management through rehabilitation or habitat substitution constitutes a large cost to developers and thus attaches value to the lost natural features. Bateman (1995) states that the environment's features are often treated as free goods and thus no monetary value is attached to natural assets. According to basic economic theory, there needs to be a demand determined for natural environments to have a monetary value. Certain pricing methods exist for the valuation of the natural environment (Bateman, 1995):

- Opportunity costs (productive value or use lost due to loss of environment)
- Cost of development alternatives compared to each other excludes the environmental cost comparison
- Cost of projects to replace lost natural assets through re-creation of habitats, transplanting and rescuing programmes or upgrading existing natural assets
- Reward or subsidies for good environmental practices
- Relating the amount of pollution to degree of damage and costing the damage in real terms
- Hedonic pricing method of what users are prepared to pay for the use of a natural amenity.

The view of sustainability in terms of equity could provide the answer. The Constant Natural Assets (CNA) rule (Turner and Pearce, 1990) determines that the total stock of natural resources passed on from one generation to another must remain constant, implying that where stock or assets are lost, they should be replaced. Where the natural asset is not renewable, the compensation should be to invest in replacement early enough. This could be an important measure or indicator of EIA being effective or not during follow-up, because it enables the measuring of effectiveness by assessing value assigned to certain natural elements beyond financial value. It is important to have feedback on the retention of environmental value during construction or operation and an off-setting that is not based on money.

2.3.3.10 Cost Considerations for Follow-up

EIA follow-up can benefit an industry by empowering the developer or operator to have demonstrable and measurable control over activities that may impact on the environment. It also builds trust with the interested and affected parties around the development and in doing so, reduces resistance to projects and decreases liability on the part of the developer (Morrison-Saunders et al., 2001b; Marshall, 2005).

The cost of EIA on the proponent can be a constraining factor and detract from the effectiveness of EIA or limit the achievement of its goals. For this reason, the scope of the EIA and follow-up activity should be relevant to the significance of the potential impacts or receiving environment. The EMP must therefore be an appropriate document containing relevant mitigation measures and not imposing unreasonably onerous demands for specialist inputs or review, monitoring programmes and expensive auditing on a project with relatively insignificant impacts.

Many of these more onerous requirements should be met by the various spheres of government in strategic environmental assessments, frameworks and strategies. Large scale monitoring should be in the ambit of provincial or national governments or large NGOs for example, where resources are centrally budgeted and not project linked.

The following guide can assist to determine how extensive the follow-up should be:

- Degree of confidence of the predictions
- Level of risk or damage if unanticipated impacts occur
- Significance of losses if controls are not properly implemented
- Opportunity to gain information that will make future EIA more effective.

In many cases sound environmental baseline information is lacking and the cost of establishing a monitoring programme to assess a baseline against which to measure impacts can be a complex and expensive exercise for a smaller project or activity. In most cases though, the cost of rehabilitation of damage and liability to the developer may well exceed the cost and time implications of an EIA process that aims to avoid this damage or liability, providing an incentive to do EIA.

This cost off-set can be further motivated by lower maintenance costs through more appropriate developments. This concept of off-setting costs, providing amenities, improving neglected nature areas or conservation initiatives to replace those lost due to development can improve relations in affected communities and promote sustainability (Weaver et al., 2008). This off-setting could in some cases form part of a negotiated settlement whereby the project finds favour through minimal additional investment. Any project that is refused will likely have cost more in time and fees lost.

2.4 Summary of EIA Follow-Up and its Effectiveness in Literature

EIA is a set of procedures and processes that form part of an integrated environmental management approach to investigate and manage environmental impact of development. EIA developed over time from basic pollution prevention and rehabilitation into a more comprehensive process of scoping, prediction, evaluation, mitigation and monitoring involving many different role players.

EIA draws on the scientific theories of integration, prediction and complex systems. The theory underlying EIA is not fully developed (Retief, 2007) and fallible (Vught, 1989). This makes pursuing the main goal of EIA, that of environmentally sustainable development, hard to measure or attain with certainty in the practice of EIA (O' Riordan, 2000). The focus should therefore be on consensus during each EIA undertaken (Cashmore, 2004). It has been indicated that effective EIA requires an integrated approach where the planning of the physical, socio-economic and institutional environments responds to the challenges posed by development in complex natural systems (Calrey, 1989). The degree of integration is an important measure of evaluating EIA effectiveness. EIA and follow-up happens in the context of a complex environmental system with inter-related sub-systems impacting on each other with unpredictable and disproportionate outcomes (Cilliers, 2000a). It is not possible to achieve full knowledge of these systems and organisations need to adapt to dealing with these uncertain outcomes in a flexible, responsive manner (Cilliers, 2000a) learning from the adaptation process (Nootboom, 2007, citing Ashby, 1956). The risks of prediction without full knowledge or understanding of complex systems are explained by Vught (1989) when using inductive or deductive argument. Both can fail due to either the assumption of linear progress or the applicability of the result or argument in a limited time frame for one set of parameters measured. Vught also mentions the risk of resource intensive over-analysis that cannot yield the desired certainty in complex systems. Van Staal (1989) indicated the best approach to be achieving a reasonable degree of corroboration within the observed rate of change of a complex system (Fatmi and Chow, 1989) and learning from that experience using observations as clues and not concrete predictions.

Effective EIA must include follow-up, which provides the much necessary feedback loop in maintaining the sustainability of complex systems (Noble and Storey, 2005). At project level this follow up describes all activities after scoping, assessment and decision (Ahammed and Nixon, 2006). Follow-up includes monitoring and auditing activities that create an adaptive management response to environmental impact realities emerging from the implementation (Noble and Storey, 2005). This follow-up should also exist on micro-, macro- and meta scales in and beyond a particular project and process and also in the broad theory of EIA (Morrison-Saunders and Arts, 2004). In an evaluation of EIA performance in eight European Union countries, alternatives and mitigation was the worst performing category of evaluation (Barker and Wood, 1999). Follow-up (post authorisation monitoring, evaluation, management and communication) is an important and often neglected step in the EIA process, the most used tool that attempts to ensure that development is sustainable.

The EIA tool and its feedback cycle (of which follow-up is one aspect) is currently being used in isolation and not in context within a broader strategic planning or integrated approach. The analysis of the effectiveness of EIA shows many constraining factors such as its cost, the unappreciated value of environmental assets, misalignment with project life cycles and tokenism in public participation processes. To a large degree these constraints are being addressed in their respective fields of policy, research and practice. This study is, however, focussed on follow-up alone, one key area of effectiveness that can improve EIA and contribute to the restoration of balance between predicting impacts and facing the reality of construction and operation. Follow-up has been shown to be necessary for an effective, adaptive environmental management process that responds to development issues successfully. Follow-up alone may not revolutionise EIA effectiveness, but can lead developers, government and communities to confront constraints inherent in the pre-decision EIA process during construction. Research into the effectiveness of follow-up is a key intervention in addressing EIA effectiveness.

Criteria for evaluating effective follow-up must be scientifically founded in a proper conceptual framework. This framework must evaluate not only practice and method, but also interaction with theory and performance assessment to improve EIA across all scale levels of application.

3. Formulation of Research Approach

The preceding literature study frames the common understanding of what environmental impact assessment is, the limited understanding of sustainable development, how impacts are predicted and how effectively the EIA follow-up process is currently applied. EIA follow-up is one of many areas of concern in the effectiveness of EIA that warrants further research in a South African context. Effective EIA is central to protecting the environment in a sustainable way. The prediction of impacts is seen to be key in this process. In attempting to effectively predict impacts to protect the environment, detrimental effects of development can be avoided. This prediction-based approach is currently the foundation of EIA. Certain selected topics were studied to inform and contextualise further research. These topics centred around three main themes:

- Environmentally sustainable development as a goal for effective EIA
- Impact assessment theory (integration, prediction and complex systems)
- Current effectiveness and best practice in EIA follow-up.

The study of relevant literature on these three aspects forms the conceptual foundation for this research on EIA follow-up. EIA follow-up manages or bridges the divide between the scoping and prediction process established before a decision is taken on an activity, project or intervention and the environmental impact reality after implementation, as illustrated in Figure 1.

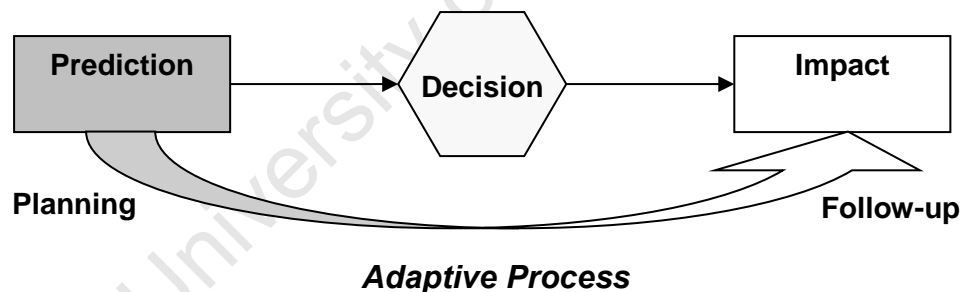


Figure 1: Managing the Divide between Prediction and Impact in EIA

EIA follow-up has been shown to be neglected despite being key to an adaptive EIA process that deals with post-decision implementation. This research aims to contribute to other investigations on whether the EIA process is effective and adaptive by examining the outcome and effectiveness of EIA follow-up during construction as an indicator in selected cases in Cape Town, South Africa. This question is important, due to the substantial resources currently being allocated to the scoping and prediction phase of EIA in relation to that of the poorly resourced follow-up phase.

It is not the intention of this research to evaluate the effectiveness of EIA or whether the identified impacts have been translated into the EMP and conditions of approval appropriately.

This type of research is valuable in EIA effectiveness, but this dissertation is limited to the EIA follow-up phase and thus assumes that the identified impacts have been addressed in the formulation of the EMP and conditions of approval. The opposite assumption can also be made that the EMP and conditions of approval could have been weakly formulated from the EIA or that the EIA itself was poor. It should, in fact, be assumed that scoping and prediction is flawed and accepted that the subsequent EMP and conditions of approval will be equally fallible. The point of departure for this dissertation is therefore to evaluate how effective the existing mitigation measures and conditions of approval are implemented and not how effective the formulation of mitigation measures and conditions of approval has been. The research specifically explores how EIA follow-up responds to address flawed prediction, unforeseen impacts and other structural or scientific shortcomings in the EIA process in order to contribute to a more effective overall EIA process.

3.1 Evaluating Effective Follow-up

In this section the criteria to evaluate effectiveness of EIA follow-up in this research are determined based on the preceding theory and best practice of EIA follow-up.

The Oxford Pocket Dictionary of Current English's definition of the adjective 'effective' is to have an expected or desired outcome achieved (Fowler et al., 2000). In the context of environmental management this outcome is not always clear, as reviewed in the EIA literature. The expected outcome of the EIA process in the literature could be understood to be any of the following examples:

- Sustainable development
- Authorisation for a project or activity to proceed
- Pollution prevention or avoiding damage to the environment
- Consensus on a decision (despite the possible lack of the above three outcomes).

In the context of this research, the desired outcome (thus effectiveness) of the EIA process is defined as achieving the goals of the EIA process. According to Retief (2007) the research on effectiveness should not focus on a 'yes' or 'no' answer on whether EIA is effective or not, but broadly address the degree of, or reasons for, effectiveness of EIA. Retief warns against the use of the word 'success' in this regard, as success implies only two possible outcomes. The case study methodology selected in this dissertation addresses Retief's concern, as it guards against conclusive judgements, but focuses rather on discovering and observing information and clues for improving practices.

In reviewing follow-up best practice internationally, Marshall, Arts and Morrison-Saunders (2005) listed 17 principles for effective EIA follow-up. These 17 principles summarise what effective EIA follow-up should entail, further to the review of current literature.

Effective EIA follow-up should:

- enable the outcomes of the impact assessment
- promote transparency
- follow from clear EIA follow-up commitments
- require the proponent to meet EIA follow-up responsibilities
- be ensured by regulators
- require the involvement of communities
- require cooperation from all parties
- be appropriate for the project and receiving environment
- follow on from and address cumulative impacts
- be timely, adaptive and action-based
- result in learning and knowledge growth
- require clear definition of roles and tasks
- be objective or goal oriented
- be fit for the intended purpose
- be measured against performance indicators
- be built on by life cycle follow-up
- be assigned adequate resources for follow-up.

These principles are an attempt to set criteria for proper EIA follow-up by rigorous empirical analysis, but it is not divulged how they are founded in scientific theory.

Upon reviewing the accuracy of predictions and effectiveness of mitigation in EIA case studies, Noble and Storey (2005:168) found that *“there is little practical value in comparing obsolete predictions with actual outcomes. This reinforces the need to move away from the emphasis on determining predictive accuracy to one that focusses on objectives in follow-up”*. EIA follow-up effectiveness research cannot focus only on measuring the accuracy of the predictions, but needs to analyse the effectiveness of the mitigation measures and management process to achieve the objectives of the EIA and project. Noble and Storey (2005) and other authors such as Morrison-Saunders and Bailey (2000) promote an outcomes-based approach to EIA. Compliance cannot be assumed to be sufficient to protect the environment (Morrison-Saunders and Bailey, 2000). Adaptive management is more important than quantified prediction, especially where resources are limited (Morrison-Saunders and Bailey, 2000), for example in developing countries. It is thus more important to measure the level of adaptive management interventions to enable the objectives and outcomes of the EIA, rather than measuring the accuracy of the predictions in the EIA process. It is still, however, important to note that most management actions that avoid the identified detrimental environmental impacts from occurring have been found to originate in the pre-decision EIA stages and therefore the importance of proper scoping and assessment cannot be discounted (Morrison-Saunders and Bailey, 2000).

3.2 Conceptual Framework

In the evaluation of EIA effectiveness in literature, either the project level (individual EIA practice case studies) or the system level (system elements such as legislation or capacity) can be the focus (Kolhoff et al., 2009). This research investigates one indicator of project level EIA effectiveness and is thus a project level evaluation of EIA project cases.

Retief (2007) presented three structured conceptual frameworks to investigate effectiveness. These conceptual frameworks provide a credible point of departure for the formulation of criteria for the evaluation of effectiveness. One such conceptual framework is Sadler's (2004) framework for EIA effectiveness review based on effectiveness across levels (micro, macro to meta) and dimensions (institutional, methodology and practice) for project, strategic assessment or policy review. Retief (2007) proposes the triangular test approach. This entails firstly evaluating performance from the perspective that theory, practice and performance are linked. Secondly, investigating the iterative processes between the practice and performance and how it feeds back to the theory to make EIA more effective. Thirdly Retief proposes a framework developed by Lawrence (1997). Lawrence looks at EIA quality and effectiveness in a structured manner across the macro to micro scale, using input and output of processes, methods and documents to evaluate overall effectiveness.

Further to Retief, Kolhoff et al. (2009) developed another conceptual framework to evaluate specifically the system performance of EIA in developing countries. Their conceptual framework defines the EIA system as the formal regulatory framework and its capacity and the context as the various formal and informal influences on this system, for example politics, donor agencies, conventions and information available on the internet (Kolhoff et al., 2009). Context and capacity was used as the key drivers in the evaluation of EIA system performance.

From the various conceptual framework examples above, it is clear that simply formulating a set of criteria from empirically analysing EIA follow-up practice across the world will not suffice if these criteria relate only to the method of application. In their 17 principles, Marshall, Arts and Morrison-Saunders (2005) suggested that there must be a wider analysis across scale, theory and practice, where they refer to performance indicators, feedback cycles and institutional enablement.

A conceptual framework for research of follow-up effectiveness in this study needs to incorporate the following aspects to be credibly founded in the theory of EIA and arrive at appropriately grounded research questions or criteria (as illustrated in Figure 2):

- Investigate follow-up across project level, regional scale and meta scale
- Investigate feedback and the iterative interaction of practice and performance by researching how follow-up (feedback) leads to adaptation and formulation of solutions to issues that arise

- Evaluate the link between quality of inputs (prediction, assessment or baseline studies) and the eventual outcomes or outputs by establishing the degree of compliance and correlation between the inputs and conditions on a construction site
- Investigate the structure and functioning of the institutional framework for follow-up and whether there is a dynamic iterative process of adaptive management in the organisational structures to respond to the needs of the follow-up tools and practices.

Figure 2 illustrates performance, practice and theory across different concentric circles indicating the levels of EIA (micro, macro and meta-levels). EIA theory has not, for example, been thoroughly researched as practice over the meta-level, as indicated by a shorter arrow. Inputs and outputs are measured, as proposed by Retief (2007) across all levels. The conceptual framework provides the opportunity to review the feedback, evaluation and adaptability of EIA; each in turn informing the other.

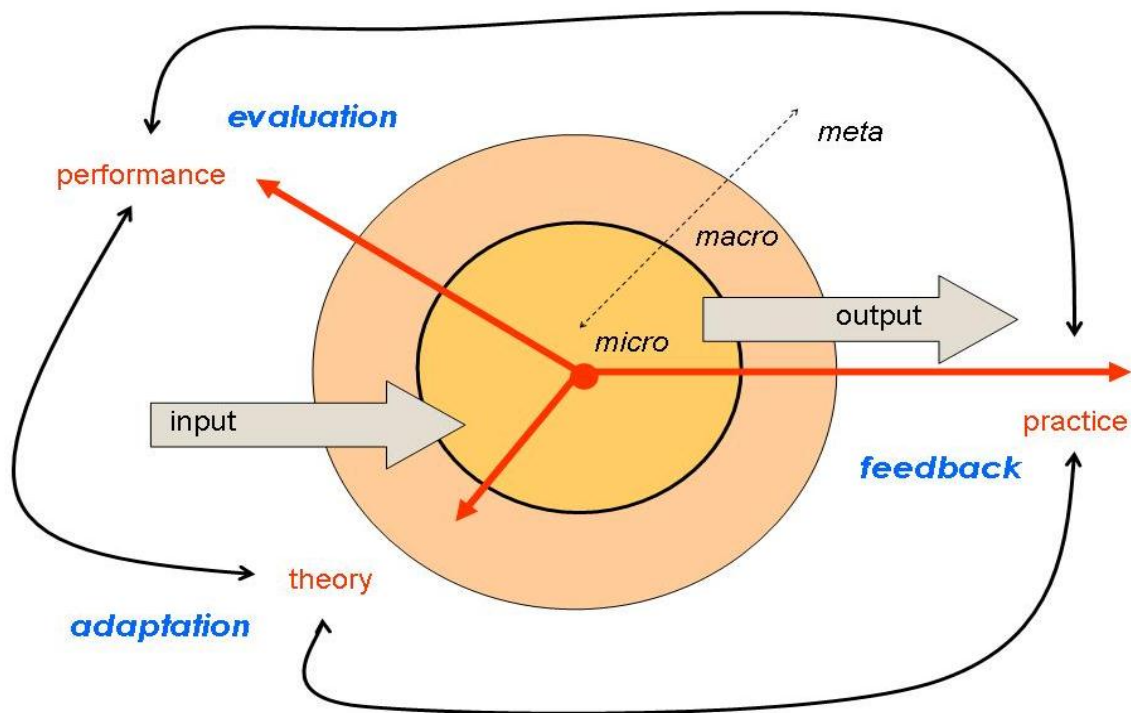


Figure 2: Conceptual Framework for Researching Follow-up (adapted from Retief, 2007)

According to Retief (2007) much research has been done into input criteria for EIA effectiveness that focus on methods of scoping, approach to assessment and the reports generated. The quality of the input according to Retief does not necessarily imply effective output, due to the myriad of externalities that could influence method and practice during post decision implementation. This is why output evaluation has become critical to develop and improve EIA theory and practice. Researching the effectiveness of follow-up contributes to output evaluation. Therefore this research can be said to be output focussed. Despite the focus on power balance in the institutional analysis, the conceptual framework is limited in its dealings with politics and other influences more discursive in nature.

3.3 Research Hypothesis

Figure 2 illustrates how the output-based research of follow-up practice can indicate effectiveness or performance through the different dimensions of EIA application, provide hints to improve theory and the quality of inputs through effective feedback and ensure an adaptive management approach that deals with change. A research hypothesis can thus be formulated from this conceptual framework as a general positive statement that requires testing:

EIA follow-up in the cases analysed is effective in ensuring an adaptive EIA process that bridges the divide between prediction and the environmental reality during construction.

Following from this hypothesis the main research question that this research dissertation addresses is formulated pragmatically, as case analysis cannot necessarily be generalised to all cases or prove the hypothesis completely:

Did the EIA follow-up in the cases investigated lead to an effective EIA process that facilitated adaptive management in moving between predicted impacts, conditions of approval and the actual environmental reality on site during construction?

To understand why EIA follow-up succeeds or fails in being effective, it is necessary to investigate the role of two important indicators of its success or failure during the EIA process, prediction and compliance, through the formulation of specific research questions. The process of follow-up is investigated more broadly through exploratory research questions and further indicators of success or failure, such as the institutional arrangements during follow-up stage of each case study. The result is six research questions to analyse each case study and provide evidence towards effectiveness of the follow-up process. The research findings will act as an indicator of effectiveness of the EIA process in each case.

3.3.1 Research Question 1: Do mitigation measures correlate with actual impacts?

(Indicates measure of failure in impact predictions during EIA)

The legislated EIA process culminates in the EMP and conditions of approval in the pre-decision stage of EIA. The accuracy of prediction is shown in the literature to be flawed in many ways. Effective follow-up is partly reliant on accurate prediction, but should ideally be robust enough to respond to unforeseen issues that arise during the post-decision implementation stage of EIA. In doing so, follow-up bridges the divide between prediction and reality to bring about adaptive solutions where scoping and assessment fall short. The answer to this research question could indicate the effectiveness of prediction and follow-up in terms of flexibility, since some of the follow-up is done in reaction to new issues that arise without prediction or formulated mitigation measures and conditions of approval.

Apart from the assessment and evaluation, EIA currently focuses much of its resources (for example time, costs, quality, human resources, government capacity, community inputs) on the two factors of predicting and mitigating impacts and formulating conditions of approval. The overall success of EIA and follow-up processes towards sustainable development may, however, depend on many more factors during construction or operation after a decision is taken. During construction and operation the environmental impact reality could emerge in contrast to the predictions in the scoping and assessment stage.

Hill (2000) proposes the standard of content for EMPs to include mitigation, inspection procedures, monitoring (monitoring against baselines to evaluate project impact and monitoring compliance) and finally, provision for external auditing to evaluate the effectiveness of the EIA and mitigation. The EMP in each case will be compared against Hill's standard content criteria to evaluate the point of departure for the EIA follow-up.

In each case, the EMP mitigation measures are analysed against actual events by analysing the ECO site audit reports. Where possible, the mitigation proposals are grouped together or summarised from the EMP document in tabular format to simplify analysis. Unforeseen impacts and the follow-up responses are discussed separately. The aim is to judge whether there is correlation between the predicted impacts and true impacts. Apart from the document analysis of the case studies, interviews with credible sources further adds value by providing a more in-depth and general foundation for learning about the effectiveness of the formulated mitigation and correlations with real site issues.

3.3.2 Research Question 2: Are conditions of approval implemented during construction?

(Indicates compliance as part of effective follow-up)

Conditions of approval can generally be grouped into two categories, being firstly typical control orientated conditions to be met and secondly more flexible requirements towards a specific goal or outcome where the detail methods are left for the proponent to develop (Dik and Morrison-Saunders, 2002). The second type of condition enables an adaptive management response to arising issues where predictions fail and requires rigorous follow-up and monitoring to evaluate effectiveness. Both types of conditions of approval are important. Apart from compliance with the conditions of approval, the inclusion of both of these two types of conditions in the EIA needs to be analysed. This question firstly evaluates in each case to what degree the flexible types of conditions of approval were employed, allowing for a more adaptive EIA follow-up approach. This is done by classifying the type of conditions in the approval documents in tabular format. Thereafter an analysis is done of whether detailed method statements or action plans were developed after the conditions of approval and EMP to supplement the management actions proposed before decision with new and more relevant actions. From the analysis of the case data it is established whether there was follow-up and monitoring to test the effectiveness of these post-decision action plans and flexible management responses.

This research question secondly investigates whether developers or project proponents implement conditions of approval laid down by the approving environmental authority. These conditions are development parameters set by the approving authority to protect the environment and typically include the environmental management plan and associated mitigation measures, but also planning approvals and other parameters beyond the EMP.

Non-compliance could indicate poor EIA follow-up and issues with the enabling institutional arrangements. The conditions of approval for each case study are compared to reported transgressions, complaints raised, ECO reports filed, site audit reports and, where available, external audits of the EIA, to identify transgressions and non-compliance. The results are analysed in tabular format where the most relevant conditions of approval are summarised. Not all conditions of approval relate directly to follow-up and environmental impact. Only the conditions of approval that relate to mitigating environmental impact or enabling follow-up are selected for analysis. The documentary data on compliance is complemented by focused personal interviews with EIA role players to provide more insight and test the data collected from the case study against another source.

3.3.3 Research Question 3: What are the most prevalent challenges with EIA follow-up?

(Open question for new input, observation and discovery)

Practitioners, contractors and clients all have unique views of the cases studied and the EIA process in general, based on many years of experience or a single involvement. These views may reveal evidence to improve the follow-up process in future. The detailed analysis of the cases and interviews with relevant role players could reveal important factors that contribute to a successful follow-up outcome. This non-specific research question creates opportunity for exploration and discovery.

3.3.4 Research Question 4: How do the cases evaluated perform against best practice?

(Comparison of case practices against best practice for EIA follow-up in literature)

The case studies are tested against the broad principles of best practice for effective EIA follow-up, as formulated by various other authors in the current literature.

- The 17 principles of effective follow-up as in Marshall, Arts and Morrison-Saunders (2005) provide detailed criteria for evaluating follow-up on a case basis
- Cases are tested against the three vertical levels of EIA follow-up as in Morrison-Saunders and Arts (2004) across micro, macro and meta scale from project to wider strategic feedback and eventually overall assessment of the achievement of the goal of EIA
- Three different aspects of EIA feedback as in Noble and Storey (2005) containing firstly monitoring programmes, secondly typical project related EIA follow-up activities (including site inspections) and thirdly external audits.

An acceptable measure of judgement can be made about each case based on the above criteria to determine whether follow-up practices in the four selected cases are currently present, effective and creating the enabling environment for an effective EIA process. This analysis is discussed and reflected in tabular format for easy comparison between the case studies.

3.3.5 Research Question 5: Does EIA follow-up lead to an adaptive EIA process?

(Contribution of follow-up to an over-all effective EIA process)

Each case study is analysed to determine whether the EIA process showed adaptive management during the follow-up stage. This question more directly addresses the hypothesis that EIA follow-up can bridge the divide between prediction and reality on the case study sites during construction by ensuring an adaptive and flexible EIA process that ultimately leads towards environmentally sustainable development. To ascertain this level of adaptability, it is required to know what the indicators are for an adaptable management process and test each case against these indicators.

Noble (2000) identifies three broad indicators of adaptable management relating to EIA follow-up. These include:

- Management that deals with the uncertainty of prediction in complex systems
- Monitoring of how well mitigation is working
- Accommodating the interests of all stakeholders.

According to Cantor and Atkinson (2010) certain key elements indicate adaptive management, which will be used to evaluate the case studies under review:

- Management objectives that are revised regularly according to follow-up
- A model of the system being managed (for example baselines and thresholds)
- Monitoring and follow-up of outcomes
- A mechanism for learning from the feedback
- A collaborative structure for participation amongst role players (this element is more comprehensively investigated in research question 6).

Each case study is analysed, discussed and reflected in tabular format against the above indicators to enable comparison between cases.

3.3.6 Research Question 6: Does the institutional framework enable effective EIA follow-up?

(Shows whether legislation, organisational structures and communication support follow-up best practice as promoted in literature)

Each case study was selected due to its institutional distinctiveness in order to assess how different institutional frameworks influence effective follow-up. The study of the theory, goal and best practice of EIA follow-up indicate how the institutional framework needs to enable or facilitate an approach for conducting proper EIA follow-up. This research question evaluates each case to determine problem areas for possible reform or opportunity areas for reinforcement in each institutional framework. This is done using literature on the institutional framework for effective EIA follow-up as guidance.

In section 2.3.3.2, Hacking and Guthrie's (2008) approach to effective EIA follow-up is reviewed. According to these authors, the institutional framework for effective EIA and follow-up to take place must be founded in the three principles of comprehensiveness, integratedness and strategicness. In each case, the approach guiding the practices of EIA follow-up will be analysed against these broad principles.

In Section 2.1.2, Gibson's (2002) four stages of EIA evolution was discussed, from being merely pollution prevention to the EIA being integrated in planning and decision making. In each case, the EIA follow-up practices will be evaluated against Gibson's evolutionary stages of EIA to determine the level of EIA and follow-up maturity. According to Gibson, this provides an indication of the institutional response to enabling EIA that pursues environmentally sustainable development.

Morrison-Saunders et al. (2003) suggested that there are three drivers for follow-up, being the regulator, the proponent or the community. An ideal approach would have all three drivers facilitated and made part of follow-up in order to provide for their respective needs or outcomes. In each case the type of institutional framework is established. Following this, the requirement and enabling institutional framework for legislated follow-up in each case is investigated. The cases are further analysed to determine whether public drivers of follow-up or voluntary follow-up by the proponent is included or facilitated in the project contracts or agreements.

3.4 Research Methodology

3.4.1 Methodological Approach

The approach of this research is to explore the EIA follow-up process in case studies. It is possible to determine the statistical success of indicators in follow-up (for example prediction or compliance to conditions) by measuring correlations and compliance in a large dataset. Such a statistical analysis that would reveal the rate of successful prediction or compliance, would not necessarily reveal why the process was adaptive or successful, nor prove to be reliable or valid without a reasonably large sample group across a range of projects and geographic areas.

This research approaches the hypothesis from the view that a few purposefully selected case studies would reveal issues of interest in EIA follow-up. Aspects of effective EIA follow-up identified in literature are investigated in each case study as indicators to better understand problems in the process of EIA follow-up. In this case the topic of research, EIA follow-up, is in itself also an indicator of EIA effectiveness. Indicators act like pointers and do not provide full answers. Indicators reveal evidence or results that can be investigated or probed towards reliable solutions.

It is important to note that even where prediction of impact fails and there is no compliance to approval conditions, damage or pollution can still be prevented by a successful environmental management process during follow-up. In an opposite situation where impact predictions are accurate and there is good compliance, adverse outcomes may still be present, indicating a failure of the EIA to reach the goal of sustainable development. It is therefore more valuable to identify indicators of a good or bad process and research the process of EIA success or failure for indicators to improve it, rather than to develop only statistics on how many times the mitigation or conditions succeed or fail.

This research is based on a post-positivist approach accepting that knowledge about the topic is not complete and the outcome of the study is not absolute. It also accepts that the observer forms part of the system of observed phenomenon. This research is thus more qualitative. A positivist approach is argued to be flawed in the study of EIA effectiveness, as elaborated upon in the preceding discussion of relevant literature on prediction and systems theory. There is no complete knowledge of the research subject or possibility to measure comprehensively any phenomenon related to it. This research does not attempt to solve this aforementioned meta-problem or meta-physical base in EIA. It aims to investigate the effectiveness of the current practice of environmental management methods and -process in selected case studies during construction within the context of the meta-problem – which is the suspected failure in predicting impacts with accuracy and reliability and the EIA process's response to this failure.

In this research the focus is further placed on empirical research and not the development of EIA follow-up theory. The empirical observations are to a lesser degree nomothetic - pertaining to the study or discovery of general laws where research findings can be generalised beyond individual cases and can hold true in the general case or EIA process (Trochim, 2000). The emphasis of the research is to elaborate on the process applied in selected EIAs and not to reveal findings from a large data sample. The intention is to reveal the hypothesised problem in the approach to EIA that was informed by the preceding literature and confirm that the research problem exists and attempt to clarify why it exists and how it can be addressed.

3.4.2 Time Period

The factor of time in research features as a specific longitudinal period of observation of a number of case studies and not measurement or observation at a specific cross section in time. This research does not make complete enough observations to make a time series approach possible. Each case study is observed, but unique information is discovered in each case study and may not necessarily correlate with other cases. The document research and observations take place over a flexible period, stopping only when sufficient data is accumulated to enable proper analysis.

3.4.3 Validity

For research results to be acceptable, the research method must be valid, or reach a high degree of validity. Validity is relevant to large scale sampling, probability calculations or other quantitative approaches to research (Trochim, 2000). The principle of validity is, however, important to inform responsible research even if a more qualitative approach is employed, such as in this case study-based research.

This research seeks to ascertain whether the selected Cape Town EIA cases are effective by investigating one variable of their EIA performance, EIA follow-up and its relationship to an adaptive EIA process. This variable is further researched by looking at its known attributes, such as compliance, adaptability and other attributes that make it effective or not.

There are different forms of validity (Trochim, 2000). The relationship between cause and effect (or variables with different attributes) seeks to establish the simplest form of validity - conclusion validity. If the relationship is causal, internal validity can be proven. Where it can be shown that effective follow-up causes an adaptive and effective EIA process to happen, then there is conclusion and internal validity in the research findings. Due to the nature of exploratory research and case studies, construct validity and external validity that generalise to the construct of a hypothesis and externalise beyond the cases studies are not possible with this research methodology and topic.

3.4.4 Evaluation

In essence this effectiveness study or case study approach is an 'evaluation' that systematically acquires information and assesses this information. The goal of evaluation is to provide feedback to interested parties and decision makers.

There are different types of evaluations in theory (Trochim, 2000):

- needs assessments (evaluating need in order to respond to it)
- evaluation of evaluability (how well evaluation is able to be conducted)
- structured conceptualisation of an evaluation (evaluating how to evaluate properly)
- implementation evaluation (evaluating aspects of or the success of implementation)
- process evaluation (discovery of flaws, successes or attributes of a process as it unfolds).

This research is largely an evaluation of the implementation of the EIA follow-up in each case study and eventually an evaluation of the processes applied in each case study.

3.4.5 Case Study Methodology

This research uses case studies with multiple survey techniques in an effort to triangulate the data gathered and build the internal validity of the research findings (Soy, 1997). The research is mostly qualitative. The data analysis is non-quantitative in expressing whether and how much the research questions are corroborated, but rather a qualitative investigation into the nature and reasons behind the issues uncovered and the performance of the process involved in specific cases. Qualitative research prefers insight, discovery and interpretation to rigorous measurement (Noor, 2008 citing Merriam, 1988). This qualitative assessment is obviously open to the criticism of inability to generalise or externally validate the findings, as raised by many scientists against the use of case study methods (Noor, 2008 citing Johnson, 1994). It is therefore important to avoid the ecological fallacy where an incorrect generalisation is made and applied to a group based on insufficient or incorrect observation (Trochim, 2000). It is rather attempted to clarify the observations by valid, reliable and probability inductive reasoning without trying to be absolute in generalisation. The aim is to provide clues or a guideline for better practice and not an absolute truth.

Yin (1993) identified three types of case studies:

- Exploratory (establishing relationships and formulating an hypothesis out of field work and analysis of raw data gathered first)
- Descriptive (data surveyed and analysed to describe a specific theory or topic further)
- Explanatory (explaining relationships based on more detailed research questions and hypotheses formulated to gather specific data).

This research is not exploratory in the sense that Yin describes, since the hypothesis and research questions are posed before the field work takes place. There is an element of exploration in the fact that new issues emerge through some of the research questions. The approach is mostly explanatory (*why and how?*) in its analysis of the relationships between the variables and their attributes. The approach becomes descriptive (*what takes place?*) where new findings emerge and where results can be clarified with sufficient confidence and insight.

Case studies are triangulated research strategies (Tellis, 1997 citing Starke, 1995) since various sources are surveyed and brought up against each other to ensure accuracy. Denzin (1984) as cited in Tellis (1997) identified four types of triangulation of data:

- Source triangulation (same fact verified by different sources)
- Investigator triangulation (same fact verified by different researchers)
- Theory triangulation (researchers with different viewpoints verify the same fact)
- Methodological triangulation (different approaches verify the same fact).

In this research the source and methodological triangulations mentioned above are employed to strengthen findings. Yin (1994) further poses three conditions for the design of a case study, where:

- a. The type of research questions set determines the approach as being descriptive, exploratory or explanatory
- b. The amount of control the researcher has over the case study events
- c. The degree of focus on observing contemporary events in context and not relying on historical information.

The research combines four cases where observation takes place and one where the researcher actively participated in contemporary events. Six types of research information sources are identified by Yin (1994) for case studies, namely documentation, archive records, interviews, direct observation, participant observation and physical artefacts. This research utilises three, being documentation of each case study, interviews of relevant role players and direct observation of events.

3.5 Methods of Research

Table 2 shows methods that were incorporated in an attempt to triangulate data observed in the case studies:

Table 2: Data Triangulation Methods

Review of existing documents (<i>primary data</i>)	EIA and EMP reports Specialist reports Conditions of Approval (Record of Decision)(refer to Annexure C) Appeal documents (if applicable) Decision on appeal (if applicable)(refer to Annexure C) ECO reports and external audit reports Minutes of environmental liaison committees
Semi-structured interviews (<i>primary data</i>)	Detailed interviews of key role players (Annexure I): Developer Contractor Environmental Compliance Officer EIA consultant Approving authority Interested and affected parties from civil society Project manager
Site observations (<i>primary data</i>)	Own observations on site over the period of the study

3.5.1 Review of Existing Documents

In each case study, the EIA documentation (consisting of reports, approvals, EMPs, audits and general correspondence) were studied in order to come to terms with the scope of predicted impacts of the development based on the systematic assessment process that included key specialist studies. The EMP forms the key to this research, since it contains the specific site related mitigation measures to address the identified impacts. The environmental compliance officer (ECO) keeps a detailed record of complaints, transgressions and occurrences that are compared to the mitigation in the EMP to form a picture of what was expected in the EIA and what actually took place on site during construction. Other documents examined were the specialist reports by consultants, conditions of approval (referred to in the Republic of South Africa as a Record of Decision or more recently the Environmental Authorisation) as included in Annexure C, appeals against the developments, replies by the project proponent to appeals, minutes of liaison meetings and site audits.

3.5.2 Semi-Structured Interviews

The key role players in the case study projects were interviewed to determine specific answers to the empirical questions through initial rigorous probing and thereafter allowing the interview to develop spontaneously. Various role players with varied interests in the project were interviewed to avoid bias and triangulate data observed as much as possible. These semi-structured interviews, together with the document analysis, formed the core of the research and also added a reliable source of additional information on the specific cases investigated. The respondents targeted were in positions where their expertise and responses ranged beyond the cases to address crucial aspects of the research questions posed. The list of respondents is attached as Annexure I: Interview Respondents.

3.5.3 Observation

Where projects were still underway during research, key observations were made together with an ECO on site to test the compliance to the conditions of approval and follow the general audit process and role player interaction. Through ad hoc observations on site with the ECO, the effectiveness of the ECO monitoring process could be observed first hand.

3.6 Data Analysis

3.6.1 Data Capturing

The case information was analysed from the project files of the approving authority (Western Cape Provincial Government Department of Environmental Affairs and Development Planning in Cape Town) after approval for access was issued in terms of the Republic of South Africa Access to Information Act 2 of 2000. More information was obtained and analysed from the ECO and local authority files, as well as from community representatives. The semi-structured interviews were recorded by taking notes of important points during discussions. In this way, themes or recurrent issues were identified. Probing questions focussed on identified themes or recurring issues raised during interviews or identified from the case documentation.

3.6.2 Data Analysis

3.6.2.1 Mitigation/Impact Management

The case file information like audit reports, minutes of liaison meetings and complaints revealed whether predictions were accurate and addressed issues on site. These sources also revealed where unforeseen issues were raised and how these were managed and where the process succeeded or failed in terms of the EIA conditions or mitigation. The effectiveness of the prediction, the mitigation and the follow-up process could be induced from the case information and direct observation.

3.6.2.2 Semi-Structured Interviews Data Set

Semi-structured interviews were conducted to target areas where the documented project data and questionnaires revealed unresolved issues or new unclear issues that required further investigation. The semi-structured interview for example probed issues with specific role players about the process followed when it was known that mitigation was present or effective, but there was a problem with the process or the site management failed. The interviews also added value to the research in that certain role players interviewed had wide ranging experience and insight into follow-up in general.

It was, however, necessary to remain mindful of the fact that the role players themselves contributed to either the success or failure of follow-up in as much as the mitigation and conditions in place.

3.7 Case Study Selection

To guide the meaningful selection of suitable projects for case study, the following six criteria for selection were applied by which cases were selected that meet all criteria:

- The cases must be examples of where there were differences of opinion on whether the EIA process generally succeeded or failed
- The institutional arrangement and interests of the various role players in each case should vary in order to observe the effects of institutional organisation in the research
- The projects should ideally be located within the wider Cape Town metropolitan area in South Africa for logistical reasons
- The projects must be located within a sensitive receiving natural environment
- The projects must have generated public interest or reaction
- The projects must be in construction or recently completed at the time that this research was initiated in order to verify information with relevant role players
- The projects must be of fair complexity and scale in terms of size, cost and over-all impact in its immediate area.

The case studies were identified based on the opinions and recommendations from officials, consultants and the community, as well as personal involvement and knowledge about the respective EIAs by the researcher. An attempt was made to identify cases where the quality of the EIA, decision, appeal or institutional framework raised either praise or concern. The intention of this dissertation is, however, not to research the effectiveness of the scoping, EMP formulation or conditions of approval formulation process. This research aims to evaluate whether EIA follow-up can contribute to improving the overall performance of the EIA process beyond the decision stage, despite a good or poor prediction process.

In order to achieve the objectives of this research, it must be investigated whether the predicted impacts and associated mitigation and actual problems on site correlated and the extent to which conditions of approval were implemented on site. If the above two aspects were not taking place, it would indicate possible failure of the EIA process. In this research a decision was taken on how many case studies to investigate in order to show that the above research problem was valid and needed further attention in future research. In current literature, research into effectiveness was usually done in one of the following ways (see Section 2.3.2. for more detail):

- Assessing the quality of EIA reports (where quality is a measure of effectiveness)
- Measuring large samples of EIA cases against a set of criteria for effectiveness
- Choosing strategically selected cases to understand the processes involved.

The aim of this research was not to do a wide sample assessment of whether EIAs are effective and provide a statistical confirmation or judgement of whether EIAs are or are not effective. The focus was rather to select a few important EIAs and investigate in-depth whether and why there is a problem with effectiveness in these EIAs or where the failures may be with the EIA process towards finding possible solutions on how to make EIAs more effective. Therefore strategically selecting appropriate case studies was more important than selecting as many as possible to establish a representative sample. Furthermore including EIA cases where the process was either a resounding success or failure, or the outcome was uncertain, further enriched the research into the EIA follow-up process. Table 3 indicates the cases selected for this research.

Table 3: Selected Case Studies

Project	Scale, Complexity and Receiving Environment	Specific value to the research
Eden on the Bay retail and residential development	Local scale, moderate complexity, very sensitive natural receiving environment	Follow-up in lieu of contractor compliance failures and institutional conflict during planning and construction. An active community and involved local authority attempted to manage a poor EIA process towards a successful outcome. An example of many current issues with EIA and follow-up failing to achieve its intended purpose.
Duikersvlei partial re-alignment of water course	Local scale, less complex, less sensitive natural receiving environment which is already compromised by pollution	A project that had a positive outcome for all parties involved. An example of good follow-up and monitoring process after EIA approval. This industrial development site solved environmental challenges, while enabling industrial densification in an established industrial area, preventing further sprawl.
Green Point stadium	Regional scale, very complex, less sensitive urban receiving environment	Example of local government as project proponent and a large scale development costing billions and causing great controversy, but with relatively insignificant environmental impact in an urban area with little environmental sensitivity. This case examines a City's response to a visual intrusion and an institutional process that ultimately address the largest impact, which was visual.
Simonstown submarine escape training simulator	Local scale, less complex, less sensitive receiving environment	Direct observation made with ECO during planning and construction by national government within a military base. This case is an example of poor project and EIA alignment and national government as project proponent ignoring due process. EIA was required to be effective, but was not given the opportunity to do so.

Cape Town is a city where the rich biodiversity and natural beauty exist in constant conflict with the pressure to develop, due to urbanisation and limited development space. This makes Cape Town an ideal location for studying EIA case studies. Most metropolises grow in concentric circles around the central business district, with more growth towards certain directions than others, but coastal cities and mountainside cities need more space in one or two directions only. Cape Town is limited by mountains around its central business district, as well as the sea. The urban expansion of the city is limited by the Atlantic Ocean to the west and the limited development opportunities of the Cape Peninsula in the south. The resultant growth pattern has been northwards and eastwards along the arterial roads and freeways. The four Cape Town case studies were selected in these areas of maximum conflict between biodiversity, growth of the city and natural beauty. These areas are respectively the city fringe along the Atlantic Ocean, the northern urban edge area along the west coast, the industrial area affecting the coastal rivers and lagoons and the mostly saturated southern Cape Peninsula town with limited development space and infrastructure. All these areas are reflective of the close proximity between development and conservation in the Western Cape.

3.8 Summary of Research Goal

In summary, the goal of this research is to provide insight into the effectiveness of the EIA process by investigating EIA follow-up as one important indicator in ensuring environmentally sustainable development. In this research four case studies are evaluated against the context of current literature on EIA effectiveness and follow-up effectiveness to ascertain whether proper follow-up took place and whether it has led to an adaptive EIA process that addressed the needs of the project and the protection of the environment. This research probes the use of mitigation measures and conditions of approval in environmental management plans in Cape Town, and the compliance and institutional framework for feedback on follow-up practices measured against the principles of effective follow-up in the literature. It contributes towards a better understanding of the EIA follow-up effectiveness in the case studies.

4. Case Analysis

This research uses a case study approach to determine how effective EIA follow-up was applied in selected projects in Cape Town, South Africa. It poses the hypothesis that EIA follow-up is important in ensuring an adaptive EIA process that bridges the divide between prediction and environmental reality and that assists in bringing about the objectives of the EIA towards environmentally sustainable development. This research is done in the context of recent effectiveness studies and literature on the subject of EIA and follow-up as a component of the EIA process. The current literature was examined to establish the basic theory and best practice of EIA follow-up within the context of the EIA process. This background enables judgement to be made about the effectiveness of predicting and mitigating environmental impact in four case studies of EIA follow-up in Cape Town is investigated.

In each of the cases the project EIA approval documentation, audit reports during construction and minutes of meetings were sourced from the relevant approving authority or consultants involved, and analysed to answer the research questions. Interviews were conducted with the different role players involved in the EIA during construction to clarify the document analysis and further probe the different experiences, perceptions and knowledge of those involved in the cases.

For the purposes of continuity, each case is not only described and analysed in Chapter 4, but also evaluated against the research questions to arrive at preliminary research findings for the specific research question and case study before continuing to the next case. The analysis is summarised after each research question, and discussed after each case. Inevitably this approach leads to the blending of pure analysis and observation with deduction, discussion and arriving at findings, which is done in greater detail in Chapter 5 across all case studies. This approach is specifically apparent in the analysis of Research Question 3 dealing with the challenges that the EIA follow-up process faced in each case study, calling for a degree of discovery, discussion and evaluation and not just pure observation. This approach was adopted, because it allows for better continuity and argument development for each case study, before moving on to the next case study and eventually to Chapter 5 where all case analysis outcomes are discussed together in a combined comparative analysis of the findings.

4.1 Eden on the Bay Beach Front Development

4.1.1 Case Study Introduction

The mixed use beach front development known as Eden on the Bay is located on Erf 801 Big Bay approximately 20 kilometres north of Cape Town (GPS coordinates 33° 47' 33" South, 18° 27' 26.43" East) and consists of a mixed use residential and retail centre. The Eden on the Bay development forms part of a larger 120 hectare development initiative in the recently established township area of Big Bay. The City of Cape Town released public property for the development of Big Bay in a structured disposal process guided by a spatial plan. The Big Bay development area consisted of various phases of development behind the primary coastal dune dividing the beach from the coastal vegetation areas. The environmental authorisation for this project was issued in 2001 and re-issued after an appeal in 2002 (Department of Environmental Affairs and Development Planning, 2002).

According to the local authority district head of the Environmental Resources Management Department (Titmuss, 2009a), the decision about where and how to develop Big Bay could not have been easy given the conflicting planning and environmental milieu. Big Bay borders on the Blaauwberg Conservation Area to its immediate north and lies within the West Coast Biosphere, a designated biodiversity reserve in terms of the United Nations Educational, Science and Cultural Organisation (UNESCO) programme to establish an international network of biospheres (iKapa Enviroplan, 2007). The sensitive coastal dune areas in Big Bay are under pressure from northward city growth, since the Cape Metropole is constrained by ocean on the west and limited space on the Cape Peninsula. The Route 27 Provincial Road (West Coast Road) passing Big Bay to its east is an important arterial collector-distributor road for commuters, business and tourism between the city centre and decentralised node of Table View leading north up to the Cape West Coast. The coastal beachfront of Table View further south is under pressure from high density, high rise development. Big Bay provides a market for medium density residential and some mixed residential and retail development in a higher income market than that of adjacent suburbs of Parklands, Sunningdale and Blouberg Sands along Route 27 arterial road. Photograph 1 and 2 show the proximity of the Eden on the Bay development to the beach and its position immediately behind the primary coastal dune separating the beach from the coastal vegetation and fresh water system.



Photograph 1: Big Bay aerial view indicating Eden on the Bay (Google, 2011)



Photograph 2: Eden on the Bay development after completion (Big Bay Beach Estates, 2010)

4.1.2 Research Question 1: Correlation between Mitigation Measures and Actual Impacts

4.1.2.1 Predicted Impacts

The EMP for the Eden on the Bay development precinct (Ecosense, 2005) was formulated to mitigate construction impacts identified during the scoping and evaluation. These mitigation measures can be compared against actual incidents encountered on site during construction by analysing the weekly environmental compliance inspection reports by the ECO and recording when fines were issued for transgressions of the EMP between 3 December 2008 and 13 July 2009. The ECO issued a total of R206 470 worth of fines for transgressions by the construction contractor.

All the transgressions noted by the ECO correlated with identified mitigation measures in the EMP (from impacts identified in the EIA) for the construction phase. The analysis of the EMP transgressions (Annexure A1) shows many repeat transgressions for which fines were issued.

Transgressions that did not result in fines were recorded in the audit reports between 14 May 2008, when preparation for construction was taking place, and 8 May 2009. All of these were addressed by the mitigation measures in the EMP. The transgressions recorded by the ECO were due to non-compliance by the contractor or, to a lesser degree, due to the inability of the ECO and approving authority to regulate the actions of the contractor through inspections, negotiations or contractual compliance enforcement. Despite frequent fines imposed by the ECO, this monetary disincentive did not have the desired effect, as can be seen by the weekly and monthly audit reports and letters to the contractor from the ECO (Refer to examples in Annexure D: Memorandum to Contractor on Cement Contamination 25 September 2008, Site Closure Compliance Review 19 June 2009 and Site Visit Report for 1-15 October 2008). This could be explained by a combination of the lack of influence of the ECO in the institutional framework, the lack of compliance enforcement by the relevant authorities and the low cost of fines in lieu of the large contract value of the construction and high cost of delays (Sasman, 2009a).

This construction site is located on the shore and an average of 50 metres from the high water mark. The coastal dune area within which the construction took place drains onto the beach. This makes cement water pollution from concrete batching a likely threat. Construction impact management measures for cement pollution were addressed sufficiently in the construction EMP according to the ECO on the project (Sasman, 2009a). Mitigation against this threat is contained in the EMP as measures to manage storing, handling and mixing of cement and concrete, as well as the management of storm water, cement water sumps and drainage, and the disposal of cement dust as hazardous solid waste. Analysis of the weekly ECO audit reports for site inspections during a selected one year sample period between May 2008 and May 2009 revealed that pollution due to cement batching water run-off was noted by the ECO in every site inspection report. This was a problem with potentially dire consequences that was not being prevented, despite being identified and predicted in the EIA and mitigated in the EMP. Building occupancy was withheld pending payment of all fines issued and granted on 21 April 2010. The local authority has the power in terms of the National Building Standards Act and Regulations to take this action if inter alia compliance to other legislation is outstanding. The occupation of the development commenced illegally in May 2009, long before official occupation was granted. Analysis of the inspection reports to investigate cement water pollution incidents showed the following:

- The threat of cement water pollution was identified and predicted
- The threat realised on site on a monthly and sometimes weekly basis
- The mitigation measures to avoid this threat were not successful
- Withholding building occupancy to recover outstanding fines had a limited impact
- The follow-up failed, despite prediction and mitigation being in place
- The environment was polluted by cement contaminated water.

It can be concluded that the issues predicted and provided for in the mitigation measures correlated with the actual impacts, but the mitigation measures in the case of one specific identified impact, cement batching water pollution, could not be resolved.

4.1.2.2 Unforeseen Impacts

The EMP for Eden on the Bay included some of the important elements identified by Hill (2000). The EMP included mitigation, inspection procedures, compliance monitoring and the provision for external audits of effectiveness. It excluded monitoring of environmental impacts against a pre-determined baseline, values or targets for EIA outcomes.

The ECO (Sasman, 2009a), local authority environmental district head (Titmuss, 2009a) and a community representative (Raubenheimer, 2009) all reported during interviews that an important impact of the development on the perched water table and storm water flow of the site was neither foreseen, nor addressed. These parties claim that the cumulative impact of the Big Bay precinct has caused the unforeseen impact of sub-surface storm water to emerge on the beach, erode the primary coastal dune, resulting in algae forming in the standing fresh water on the beach. This phenomenon was observed by the researcher on numerous occasions during 2009 and 2010.

A phased development approach was followed in Big Bay, where various construction contractors built separate developments in the area surrounding Eden on the Bay. This fragmentation meant that the environmental impact of each separate development initiative during construction had to be managed separately with no assessment of cumulative impact during construction and operation (Raubenheimer, 2009). According to the head of the districts environmental management unit, the poor evaluation of storm water impact ultimately led to the most significant impact of the development being a perpetually wet, algae covered beach (Titmuss, 2009a). This issue was first reported in March 2009 after completion of the two-level basement parking for the Eden on the Bay development. The local authority has admitted that a lack of comprehensive planning of the storm water management for the development was a result of inadequate scoping. There was no comprehensive review where the cumulative impact of the Big Bay development was assessed.

Big Bay beach was granted the status of Blue Flag beach in December 2009 by the Danish Blue Flag organisation. This coveted status was awarded by the independent review body based on four criteria - environmental education and information, water quality, environmental management, safety and public amenities. Although the award has positive tourism implications, some community members view this award as unwarranted, due to the perpetually wet beach with algae where the ground water seeps onto the beach more or less midway between the natural dune and the water's edge. The green algae turn brown in standing water and make it impossible for beach goers to lie on or even walk comfortably on the beach. The Blue Flag status was revoked in January 2010 after no resolution could be found by the local authority for this problem.

At the time of this research studies were being conducted towards possibly solutions such as building storm water cut-off drains, but this process has not been finalised (Sasman, 2009a; Titmuss, 2009a). Still more unfortunate is the fact that the local authority and approving authority was informed by community representatives that have lived in the area for decades that the development area was, and still periodically turns into, a wetland (Raubenheimer, 2009). The ECO and local authority representative confirmed that this claim was never investigated independently (Sasman, 2009a; Titmuss, 2009a). This oversight now allegedly causes significant volumes of the perched underground water to seep out onto the beach, a phenomenon that can happen when a wet area is hardened or boxed with deep basement levels over large areas. This seepage emerges down-slope which, in this case, is in the middle of the beach (Ball, 2009). The water remains on the beach and algae forms in this water. The water can be up to an inch deep in places (Researcher's observations on site, 2009).

The beach, coastal dune and wetland system function together in the coastal landscape. Changes to one will affect the other (Ball, 2009). The changes to the larger wetland system have impacted on the dune and beach and may have compromised the very asset that was the draw card for Big Bay (the beach). Community members strongly believe that, unless the storm water problem is resolved soon, the beach will erode to rock and the Eden on the Bay centre will in future be a promenaded development above a rocky shore instead of a beach (Raubenheimer, 2009).

The unforeseen environmental impact of seeping water, algae and possible beach and dune erosion could thus also not be addressed through EIA follow-up as the impact became clear. The feedback provided to the approving authority and local authority has as yet to yield a solution to these problems.

4.1.2.3 Identified Issues with EIA Prediction and Evaluation

According to Aaron (2009) who researched the role of EIA and planning in facilitating environmentally appropriate development in Big Bay, the Cape Town Metropolitan Spatial Development Framework of 1996 proposed integrating the Eden on the Bay site with the Metropolitan Open Space System due to the importance of the coastal dune systems in the area consisting of wetland areas, vegetated sand dunes and the beach. This correlates spatially and in principle with the City of Cape Town Biodiversity Conservation Strategy (City of Cape Town, 2008) that requires development to be set back from this complex natural system. The design concept of Eden on the Bay was inexplicably in contrast with spatial planning proposals of the time. This was confirmed by the fact that spatial planners and environmental managers for the district disagreed on the interpretation of the strategic planning (Titmuss, 2009a), with the environmental professionals believing that development should step down in density and intensity towards the northern urban edge of the Blaauwberg Conservation Area and western coastal dune areas.

The Eden on the Bay development in Big Bay is part of the larger Big Bay beach front and surrounding development that had various development phases. An EIA was done for the whole Big Bay development and a spatial plan was formulated to guide development. Local authority officials confirmed that EIA follow-up for the precinct was fragmented with various sections in Big Bay being built independently (Titmuss, 2009a). The area was planned in terms of various scale levels of spatial and land use processes, but the environmental study conducted to evaluate the impact of the development was criticised by the local authority environmental branch at the time as being too descriptive and poor in its scoping and assessment quality (Aaron, 2009).

This criticism of the Big Bay EIA process was raised in the environmental approval (Department of Environmental Affairs and Development Planning, 2002) issued after an appeal against the original 2001 approval. The Minister of Environmental Affairs and Tourism noted shortcomings in the EIA and set the following conditions.

“1.2. The Development Framework for Big Bay and Environs (1997) can be singled out as the spatial planning policy that can be applied most appropriately to the development site, and has been approved by the City of Cape Town: Blaauwberg Administration. The proposed development is not totally in line with this policy. The most noteworthy difference is that the policy allocates the area west of the current Otto du Plessis to extensive recreational facilities. A limited amount of buildings are proposed, focussing on recreational/tourism uses. The Big Bay Development proposal in this application earmarked this part of the development area for mixed use development with a 100m setback from the highwater mark. No motivation, scientific information or assessment of the 100m setback has been provided in the Scoping Report or the Big Bay Development Framework. This constitutes a significant deviation from the spatial planning policy” (Department of Environmental Affairs and Development Planning, 2002: 10)

The explanation above refers to the development proposal being in contrast to land use spatial planning policy for Big Bay and that this issue was not resolved in the EIA, which is further criticised for lacking detail on certain aspects of its evaluation:

“3.1. Issues and concerns have been broadly described in the Scoping Report The individual issues and concerns (including those identified by interested and affected parties) and their related impacts have not been adequately described in the Scoping Report....” (Department of Environmental Affairs and Development Planning, 2002: 11)

“3.2. The environmental impacts have been discussed on a strategic level, but individual impacts have not been assessed in terms of their significance.” (Department of Environmental Affairs and Development Planning, 2002: 11)

“3.6. The scoping report did not assess the impact of the proposed development on the aesthetic value of the site in detail, apart from promoting guiding principles to be included into the development layout.” (Department of Environmental Affairs and Development Planning, 2002: 12)

During the appeal, the Minister viewed the EIA process as flawed, despite dismissing the appeal against the development. The Minister’s decision is revealing in its comment on the shortcoming of the EIA process when it clearly refers to the lack of understanding of the dynamics and management requirements of the coastal dune system in front of the Eden on the Bay development.

“4.4. The existing and potential impact of dynamic coastal processes on the management of the dune area in front of the existing Big Bay resort has not been addressed”. (Department of Environmental Affairs and Development Planning, 2002:13)

The storm water pollution problem on the beach that was neither predicted, nor addressed by mitigation, can thus reasonably be attributed to a failure of the scoping, evaluation and mitigation in the EIA. It is therefore remarkable that the appeal was dismissed.

4.1.2.4 Evaluation of Research Question 1

The description of this case study and the analysis of this first research question indicate that, although most of the predicted impacts correlate with the mitigation measures, cement batching water pollution remained an unresolved threat throughout construction. The storm water seepage onto the beach was neither predicted, not addressed by mitigation measures. These two issues constitute significant and unresolved environmental impacts. There was demonstrable correlation between prediction and arising impacts. This correlation did not meaningfully contribute to the protection of the environment in the case of Eden on the Bay.

4.1.3 Research Question 2: Compliance with Conditions of Approval during Construction

Eden on the Bay is one of the Big Bay development precincts. One environmental authorisation (Department of Environmental Affairs and Development Planning, 2002) for the larger Big Bay development area was issued in 2007 and is applicable to Eden on the Bay. Only conditions in this approval document (Annexure C) that were relevant to construction were analysed and categorised into two condition types, being control conditions and flexible management conditions (Dik and Morrison-Saunders, 2002). The EMP also constitutes conditions of approval, because it is a legal requirement for the proponent to implement its measures. The level of compliance (full, partial and non-compliance) was evaluated for sections of the approval document dealing with conditions related to the construction of Eden on the Bay (Department of Environmental Affairs and Development Planning, 2002).

Some general conditions provided for information, relating to administrative requirements, the planning of the broader Big Bay development or to an appeal, were omitted in the analysis. The reason for this omission is that this research focuses on those conditions of approval specifically related to the protection of the environment during construction.

4.1.3.1 Types of Conditions of Approval

There is a balance in the selected conditions of approval between 10 control conditions and 10 flexible management conditions relating directly to construction (Annexure B1). The presence of both control and flexible management conditions is an indication that opportunity was given for the proponent to make use of the flexibility allowed in the conditions of approval (Dik and Morrison-Saunders, 2002). Flexible management conditions created an enabling environment for adaptive management in this case study.

4.1.3.2 Compliance with Conditions of Approval

An external audit of the EIA process was conducted by Cerff (2007) between August and October 2007, before construction of Eden on the Bay commenced. Analysis of this external audit found that the project proponent (the City of Cape Town) was compliant with 30 conditions, partially compliant with 5 conditions and non-compliant with 4 conditions of approval directly related to the construction activities on site. The external audit indicated relatively poor compliance with conditions of approval, considering that 30% of the conditions for the larger Big Bay area were not fully met. It is important to note that the construction of Eden on the Bay only commenced in 2008 and this audit also covered all other development areas in Big Bay and not only Eden on the Bay.

The more recent 2009 analysis of the conditions of approval during and after construction of Eden on the Bay, indicates marginal improvement in compliance with the 20 conditions of approval selected for analysis in this case study (Annexure B1). There was only 1 instance of overall non-compliance, but 4 of partial compliance, constituting 25% of the conditions of approval. In the case of the flexible management conditions, there were 3 cases of partial compliance. These 3 opportunities for adaptive management did not result in the envisaged benefit or action during construction. One control condition was not met and another partially met. Non-compliance or partial compliance with control conditions could indicate a lack of enforcement or an institutional problem. Overall, compliance was not fully achieved. Importantly the 3 opportunities provided in the EIA decision for adaptive management at precinct level failed to be fully realised during construction.

4.1.3.3 Compliance with EMP

Analysis of the audit reports from site visits conducted by the ECO revealed frequent transgressions.

The most recurrently recorded transgressions were pollution from cement batching water, incorrect paint disposal and the storage of construction material outside the construction site boundaries. Fines were issued to the contractor for these transgressions. The ECO issued a total of R206 470 worth of fines for 37 serious transgressions of the EMP by the construction contractor (Annexure A1). Many less serious transgressions were recorded in the ECO monthly site audit reports. Compliance with the EMP seems to have been erratic and fines were not paid when issued. In the case of Eden on the Bay the fines were not paid, the contractor ignored instructions to comply and pay the fines and on one occasion ended the appointment of the ECO. It would be reasonable to say that the contractor did not fully comply with the EMP, but partially complied.

4.1.3.4 Evaluation of Research Question 2

The conditions of approval for this case study comprised of a good balance between control conditions and conditions allowing an adaptive management response to manage environmental impact. Compliance was only partially achieved in this case study, with some indication of enforcement issues and indication that the flexibility allowed in the conditions of approval was not fully utilised by the proponent or followed up by the approving authority.

4.1.4 Research Question 3: Prevalent challenges with EIA Follow-up

This research question provided opportunity for discovery. From the preceding analysis of the predicted impacts and compliance with the conditions of approval, the most prevalent EIA and especially follow-up challenges seem to be a combination of the institutional structure and the quality of the EIA. Both gave rise to the inability to either manage predicted impacts, or unforeseen impacts.

4.1.4.1 Integration of EIAs for Big Bay

An example of a lack of integration and overall assessment was the pipe line and detention pond planned as part of the project. The route of this pipe traverses a protected conservation area to a property outside of this protected area which is designated in the local authority land use planning framework as a conservation area, specifically referred to in the same environmental authorisation approving the development (Department of Environmental Affairs and Development Planning, 2002). The pipe and pond were planned as mitigation measures to address the storm water issues that may have impacted on the coastal dune system as a result of the Eden on the Bay development on the coastal side of the main road. The measures, however, failed to fully achieve the intended purpose by causing secondary damage. The approving authority thus issued an environmental authorisation for the Big Bay development to the City of Cape Town (the applicant and erstwhile land owner) with known information about the route of this storm water disposal pipe line and detention pond in the EIA report (Department of Environmental Affairs and Development Planning, 2002).

Subsequently, the ECO requested the approving authority to visit the site and clarify this contradiction in the conditions of approval (Sasman, 2009a). After legal opinion was sought (Kantor, 2003), the approving authority requested another EIA study to be conducted for the pipe line. This example could indicate that the development is not reviewed as a whole by the approving authority. It could further point towards insufficient cooperation and agreement beyond the standardised inputs between the different spheres of government managing development in the Big Bay area and even in the same authority between different departments dealing with planning, the environment and bulk infrastructure. These issues are investigated in research question 6 dealing with the institutional framework for EIA follow-up.

4.1.4.2 Enforcement of Conditions of Approval

It was recorded during interviews with respondents and in Environmental Liaison Committee (ELC) meetings attended by the researcher that there was no enforcement of the conditions of approval by the approving authority. According to the local authority environmental management department, the local authority enforced environmental requirements through its role in issuing (or withholding) planning approvals and engineering services. In doing so, the local authority took over the enforcement role for environmental compliance when the approving authority (provincial) failed to respond (Titmuss, 2009a). This placed an even larger role on the local authority, who were effectively conducting strategic planning through integrated planning and spatial frameworks, making inputs to EIA applications, involved in ELCs or as partners during development with the ECO, acting to withhold occupancy certificates and clearances and managing problems that arose during the construction and life cycle of developments. The approving authority in contrast, legally mandated as custodian of the environment, only received and processed the EIA application and issued the decision with conditions. The approving authority did no compliance monitoring and no enforcement in this case study. The local authority thus had to adopt the approving authority's environmental responsibilities without a legislative mandate.

4.1.5 Research Question 4: Comparison of Case Study and Best Practice Principles

In the tabular analysis of the case study against the principles and best practice guidelines for follow-up, the outcome was a score of 58% (Annexure E1) indicating that reasonably acceptable project-based follow-up took place. There were, however, shortcomings in the broader requirements for proper EIA follow-up with respect to environmental feedback beyond the project to a larger regional knowledge base or performance evaluation of the EIA tool.

4.1.5.1 Follow-up to Enable the Outcomes of the EIA

The EIA for the Eden on the Bay development was done to protect the environment from damage and pollution during construction and to ensure environmentally sustainable development.

The storm water problem that emerged as the most prevalent impact of this development, together with predicted construction impacts, indicates that the follow-up process could not enable the outcomes of the EIA fully. This is due to two reasons; firstly that the EIA did not predict the storm water problem and no measures to mitigate this problem were incorporated into the EMP for construction or operation (Ecosense cc, 2003; Ecosense cc, 2007), and secondly that the follow-up process could not address this problem when it emerged.

4.1.5.2 Project Level Follow-up

The EIA follow-up process allowed for transparency, participation and cooperation visible in the success of the ELC (Raubenheimer, 2009). The commitment was there from all involved to accept their role in the follow-up process, except for the approving authority that had the primary responsibility of compliance monitoring. The EIA made provision for follow-up (Department of Environmental Affairs and Development Planning, 2002) and allocated roles and responsibilities, but the developer failed to take up the responsibility for compliance due to the lack of enforcement action from the approving authority.

As analysed in Annexure E1, the construction stage EIA follow-up was adequately resourced, adaptive and timely. Although certain funding issues gave rise to audits being missed (Titmuss, 2009b) and clearances being withheld (Sasman, 2009a), EIA follow-up was properly enabled. The follow-up could not prevent the repeated pollution from cement-contaminated water. The follow-up was appropriate, goal oriented and fit for the purpose of managing this localised development. The enforcement aspect of the follow-up was, however, unsuccessful, judging from the long period of outstanding fines only recovered in full with the threat of occupancy being withheld. It could be stated that the follow-up was properly facilitated, structured and enabled at project level, but not fully effective due to compliance and enforcement challenges.

4.1.5.3 EIA Follow-up Beyond Project Level

Analysed against the principles of Marshall, Arts and Morrison-Saunders (2005), EIA follow-up for Eden on the Bay was primarily criticised for not resolving the emerging cumulative impact of this one development in conjunction with all the other Big Bay construction precincts around it and learning from the EIA follow-up experience that indicated the need for a SEA or cumulative assessment for the Big Bay area. None of the Big Bay developments made provision for regional level EIA follow-up or monitoring of development impacts after completion of construction.

In this case study the feedback required for effective EIA follow-up lacked the establishment of a meaningful and comprehensive baseline of the sensitive environment. The receiving environment was identified as being at risk in the City of Cape Town planning and policy documents, spatial plans, biodiversity studies and even the West Coast Biosphere initiative.

Yet this sensitive environment was never researched sufficiently to establish environmental baselines (such as identifying potential wetland areas) and monitored thoroughly to assess environmental impacts over time (Raubenheimer, 2009) on the beach, the primary coastal dune and the fresh water ecosystems beyond. The external audit of the EIA process conducted by an independent consultant (Cerff, 2007) did not point out some follow-up limitations beyond compliance and implementation of the construction EMP to address impacts (Sasman, 2009a). The wider feedback required for effective EIA did not transpire in the form of learning from this EIA to inform others in the Big Bay area and the same inadequacies still apply to other project EIAs in this area of Cape Town (Titmuss, 2009a). To date no strategic environmental assessment has been done of this area (Titmuss, 2009a) although the local authority's Environmental Management Framework (EMF) is in draft stage awaiting adoption as the environmental planning layer of the Spatial Development Framework (SDF) for the area. It could be stated that EIA follow-up was not effective beyond project level, when compared with principles for best practice.

4.1.5.4 Evaluation of Research Question 4

The EIA follow-up for this case study was partially effective at project level, but failed to address the EIA follow-up best practice requirements beyond project level.

4.1.6 Research Question 5: Adaptive EIA Follow-up Process

Indicators for an adaptive management process (Noble, 2000; Cantor and Atkinson, 2010) were applied to the case study in tabular format (Annexure F1). The analysis revealed a reasonable outcome for the predicted project level construction pollution impacts, but a poor outcome for achieving an adaptable process necessary to respond to the uncertainty of prediction and emerging environmental impact during construction. It may not be possible to respond adaptively if the environmental baseline or thresholds are not understood. The seemingly reasonable score of 50% may be acceptable if the direct construction impacts were the only goal of an EIA follow-up process. The failure to deal with the uncertainty of prediction in complex systems and monitoring of how well the mitigation worked, detracted from the adaptability of the EIA follow-up process.

4.1.6.1 Understanding the Receiving Environment

The Big Bay EIA was done in response to listed activities in legislation and not the sensitive receiving environment (Raubenheimer, 2009). The activities that triggered the EIA were the proposed electrical bulk services, roads and change of land use (Department of Environmental Affairs and Development Planning, 2002). If these activities did not form part of the development, the impact on this sensitive natural environment would not have been evaluated in an EIA. The critical feedback mentioned by Noble and Storey (2005) where follow-up, monitoring and audits lead to an adapted EIA process did not take place.

The EIA did not adapt to ensure that the problem of seepage onto the beach was addressed by the developer, no on-going monitoring is taking place and audits merely revealed pollution problems without being able to solve them. Half of the EIA decision conditions of approval consisted of flexible management conditions. Not all of these conditions were fully achieved. Better understanding of the receiving environment could have guided more effective or objective-based and adaptive management during construction.

4.1.6.2 Adaptive Project-Based Follow-up

The Eden on the Bay EIA follow-up process led to the reasonably effective mitigation of construction activities, but failed to ensure environmentally sustainable development when an unforeseen cumulative impact arose - that of the storm water emerging on the beach. The local authority is faced with extensive studies and an expensive solution to address this problem that neither the approving authority, nor the developer will take responsibility for (Titmuss, 2009a). This constitutes failure to ensure an adaptive EIA process beyond the construction pollution impact of Eden on the Bay.

4.1.6.3 Evaluation of Research Question 5

In summary, the EIA follow-up process made sufficient provision for an adaptable process that can respond to both predicted and unpredicted impacts. The limited effectiveness of the follow-up can be partially attributed to the fact that there was no baseline condition or target to measure impacts against. As a consequence, the flexibility of the conditions of approval could not be used appropriately to respond to arising impacts. Prediction in complex systems is flawed and this EIA follow-up process, albeit well instituted and resourced, could not adapt to respond to the unforeseen impacts or test how well mitigation was implemented, because there was no evaluation of impacts beyond typical pollution impacts and no monitoring programme to observe changes and identify unforeseen impacts such as the wet beach early enough to respond to them.

4.1.7 Research Question 6: Institutional Framework for Effective EIA Follow-up

4.1.7.1 Description of the Institutional Framework

Morrison-Saunders et al. (2003) suggested that there are three drivers for follow-up, being the regulator, the proponent or the community. The presence and facilitation of all three may lead to more effective follow-up. In Annexure G1 the institutional framework for the Eden on the Bay case study is summarised. The drivers of the EIA follow-up process was the proponent and the community in this case study (Annexure G2). The proponent (City of Cape Town) was also largely responsible for regulation of the follow-up process in the ELC. This unusual deviation from its normal responsibility, led to a conflictive relationship between internal City of Cape Town branches.

The City of Cape Town appointed the construction contractor and was responsible for the delivery of the project on time. The City was also playing a central role in planning the development of Big Bay where development and conservation priorities were not reconciled. During construction the City of Cape Town organised the follow-up and enforcement in the absence of the legally mandated regulator when it established and undertook chairmanship of the ELC. The proponent in the Eden on the Bay development was effectively regulating itself.

Gibson's (2002) proposes that the maturity level of EIA can act as indicator of the institutional response for enabling environmentally sustainable development. In the case of Eden on the Bay, the EIA resembled the more traditional attempts to manage pollution responsively and included mitigation measures that were based on impact assessment. Some of the components that reflect a more mature EIA and institutional response to environmentally sustainable development during follow-up were present in this EIA, such as the evaluation of public interests or integration with planning decisions. Unfortunately much of the institutional intent to integrate processes or take cognisance of issues beyond the development site failed in this EIA follow-up process.

4.1.7.2 Contribution of the Environmental Liaison Committee

Apart from the community's in principle objection to the development or densification of the Big Bay beach front (Raubenheimer, 2009), the construction period had many instances of non-compliance by the contractor and lack of enforcement by the relevant authorities (Sasman, 2009a). The development benefited from a dynamic ECO and the formation of an environmental liaison committee (ELC), funded in part by the developer through fines recovered from the contractor before occupation of Eden on the Bay was allowed (Sasman, 2009a). The compliance monitoring during construction itself was thorough, albeit conducted by the ECO and the local authority and not the approving authority (Titmuss, 2009a). The ECO was dismissed by the developer at one point and subsequently re-hired and dismissed again, while compulsory ECO audits and external audits in terms of the conditions of approval were not funded or executed (Titmuss, 2009b). During this time the local authority (a member of the ELC) confirmed that it was powerless to enforce compliance, as it was not the approving authority (that is not part of the ELC). The local authority was furthermore in itself partially at fault for the state of non-compliance with regard to external audits. According to minutes from the ELC meetings (Titmuss, 2009b), the external audits relied heavily on the establishment of the Big Bay Master Property Owners Association (MPOA) and levying of fees through this institution, but this process was delayed due to disputes between owners and the local authority regarding its constitution.

In a typical South African single residential sub-urban environment, each owner pays rates and taxes and the local authority manages the environment and delivers services in accordance with their Constitutional mandate.

With the recent trend towards group housing complex typologies and communal responsibilities (exacerbated by poor service delivery by local authorities) the fate of each property owner rests increasingly with structures like the ELCs, bodies corporate and home owners associations. An example of this phenomenon is the City Improvement Districts (CIDs) that form where groups of property owners in inner-cities establish an interest group and a trading account and take over certain service delivery components from struggling authorities in exchange for rate rebates, tax holidays or other discounts and benefits. The Big Bay Masters Property Owners Association is such an organisation and is tasked with conducting environmental audits annually with a ring-fenced 9.75% part of their revenue from the rates and taxes base allocated for this audit. According to the chairman of the Bloubergstrand Ratepayers Association (incorporating Big Bay), instead of taking on this expenditure the MPOA attempted to revert the audit and its expense to the Big Bay ELC, who only had limited funds owed to it from fines during construction. These fines for a specific development cannot be used in other development estates. Ethically, fines for a specific site paid by that developer should only be used to rehabilitate that site's damages or address administrative issues to improve that specific development (Titmuss, 2009a). This shows how the community structures that are set up sometimes fail to honour the responsibilities given to them by the approving authority or try to divert the responsibilities to other structures. Without over-sight and compliance monitoring by the Provincial Government, it is reasonable to speculate that these structures could also fail in future. This will result in audits not happening and environmental conditions of approval and operational environmental management plans not being funded or followed. The Big Bay ELC is still effective despite construction in Big Bay nearing completion. The respective MPOAs for each Big Bay development precinct need to meet the continued environmental responsibilities. These MPOAs have, at the time of this research, been established, but with some unresolved issues and only partial operational effectiveness.

4.1.7.3 Proponent-Regulator Internal Conflict

The City of Cape Town was at once the proponent and contributing regulator, with the approving authority largely absent from its mandated follow-up and enforcement role. Environmental officials in the City of Cape Town challenged the quality of the EIA. Some of their comments related directly to the storm water and ground water impacts of the development. The City of Cape Town appealed the EIA decision, which resulted in the subsequent imposition of additional conditions of approval addressing preservation of coastal dunes, storm water discharge to sea and coastal erosion (Aaron, 2009). It seems from Aaron (2009) though, that this appeal outcome did not sufficiently change the EIA decision. It was further obvious from Aaron (2009) that the approving authority at that time intended using the additional conditions of approval requiring further assessments and specialist studies to correct the initial shortcomings of the EIA. The independent auditors of the EIA process that mediated the appeal also provided guidelines on improving the EIA. In considering the appeal, the provincial Minister of Environmental Affairs over-ruled some of these items in order to expedite the development.

The obviously conflicted EIA process came to an end in a final appeal decision taken not on the grounds of environmentally responsible development, but rather the expedient of the development.

4.1.7.4 Enabling Planning and Policy through Institutional Cohesiveness

The case of Eden on the Bay revealed that internal institutional issues, specifically a lack of cohesive objective-setting in the policy and planning of Big Bay, led to the deterioration of an already threatened ecosystem in order to achieve development outcomes. The City of Cape Town failed to adhere to its own environmental policy and planning when Big Bay was developed. The natural environment in terms of biodiversity in Big Bay is classified as Cape Flats Dune Strandveld and is listed as endangered in the City of Cape Town Biodiversity Report of 2008 (City of Cape Town, 2008). This natural environment is part of the critically endangered Cape Fynbos Biome in South Africa. Big Bay falls outside the regional biodiversity corridors. The 401 km² of original Cape Flats Dune Strandveld in Cape Town has largely disappeared due to development and only 180 km² remain of which 64 km² is located within formal reserves such as the Blaauwberg Conservation Area immediately north of Big Bay. According to the biodiversity management strategy of Cape Town, all efforts should be made to minimise the impact of development in areas with remnants of this vegetation type, such as Big Bay. The Report does not state how this is to be done. In contrast though, Big Bay is inside the delineated urban edge of Cape Town and in terms of the 2009 Spatial Framework for Blaauwberg Planning Region, it is earmarked as an urban development zone, but with emphasis on the protection of the linear dune system and coastal zone. The Spatial Framework does not stipulate how this should be done. Developers and planners may be left without a clear direction on how to interpret the various plans and strategies for this area from a development and biodiversity point of view. The Spatial Development Framework and its Environmental Management Framework layer have also not yet been adopted by the local authority as formal policy. In this policy and planning vacuum, the EIA and assessment of the sensitive environment must play a major role. Despite the EIA process and spatial planning aligning to a degree in this case study in terms of the hierarchy of plans down to precinct level, the eventual resultant development neither resembles the 2001 spatial development proposals for Big Bay, nor the recommendations of environmental scientists and the community on how the sensitive environment should be researched and protected.

4.1.7.5 Approach to EIA Follow-up

The institutional framework could not fully support the necessary approach to EIA follow-up required for effectiveness. Hacking and Guthrie (2008) outlined this approach as comprehensive, integrated and strategic. The Eden on the Bay follow-up approach marginally took cognisance of factors other than the physical environment (social, economic and political) in the EIA, but focussed mainly on the project and physical environment. The approach cannot be said to have been comprehensive. There was an attempt to integrate the environmental, planning and conservation policies and practices.

The institutional framework could not resolve the conflicts that arose when these policies and plans were in conflict or government departments disagreed on the aspects of evaluation or design of the project. Finally, the follow-up approach was to focus on project-specific impacts and to respond to arising issues at the development site. There was no integration of the development site evaluation into the regional or cumulative context, or attempts to understand and analyse the environment (baseline research) and monitor actual impact during development. The institutional framework did not support the proper approach to EIA follow-up.

4.1.7.6 Evaluation of Research Question 6

In the case of Eden on the Bay the institutional framework did not enable effective EIA follow-up, because the third driver (Morrison-Saunders et al., 2003), being the regulator, did not participate in follow-up. The proponent effectively regulated itself, leading to problems with the enforcement of control conditions and implementation of flexible management conditions, as also discussed in the research questions on compliance and an adaptable management process.

4.1.8 Case Study Evaluation

4.1.8.1 Correlation did not Result in Effective EIA

The Eden on the Bay case revealed how predicted and unpredicted impacts went unresolved, despite correlation between the mitigation measures in the EMP and actual impacts. The case also indicated that the flawed scoping and evaluation stage of the EIA made it essential to have flexible and adaptive management during EIA follow-up. The EIA follow-up could unfortunately not be guided by baseline information on the state of the environment in which the development was taking place.

The EIA in the case of Big Bay was triggered due to a change of land use, bulk electricity upgrades and road construction (Department of Environmental Affairs and Development Planning, 2002), not because the coastal zone is sensitive or the wetland, coastal dune and beach transition zone was compromised. The legislative requirements in South Africa absolve the developer from impact assessment responsibility in terms of the EIA legislation if an activity does not correspond to one of the listed trigger activities or thresholds promulgated in law. This categorisation of activities in an attempt to net detrimental development impact, results in cumulative or life cycle operational impacts being ignored if it cannot be shown that the development results in direct environmental impact. This situation of trying to identify and categorise all possible detrimental activities, specifically using threshold amounts as legislated EIA triggers, may therefore not contribute to effective EIA. The argument can be made that, all other factors being equal, an impact of a certain threshold or size requiring no formal EIA process in terms of the applicable legislation can cause just as much damage as an impact slightly exceeding the threshold or size and requiring a legal authorisation, if these impacts are not located or operated properly in a sensitive receiving environment.

More strategic level scoping and impact assessment that focuses more on the receiving environment and less on categorising or quantifying the development or activity is therefore required. This approach, together with a more responsive feedback system and comprehensive follow-up, monitoring and audit system, could perhaps have avoided the Eden on the Bay storm water seepage problem.

4.1.8.2 Proponent Tasked with Compliance

The conditions of approval and EMP allowed for both flexibility and control. Compliance was achieved when measured quantitatively against the conditions of approval in the environmental decision. In the case of Eden on the Bay though, the institutional framework compromised the ability to implement the flexibility in management required to respond to arising issues or to enforce control conditions. This was due to the fact that the proponent was tasked with enforcement and monitoring during construction as convener of the ELC. The approving authority did not honour their responsibility to participate or conduct monitoring and enforcement. This resulted in a situation of de facto self-regulation. At the same time, the contractor appointed by the proponent did not comply fully with the EMP or respond to actions by the ECO or local authority to correct this non-compliance.

The Eden on the Bay case illustrated the disparate role between the local authority and the approving authority, as well as the increasingly important role that the ECO plays. Apart from monitoring the construction, the ECO also fulfilled an important role in mediating to clarify the development parameters and engaging with the approving authority on behalf of the developer to ensure responsible and legal development. Constant communication and cooperation during construction is important. The ECO was there to help solve problems and assist the contractor in understanding the environment and impacts of activities. An example was given by a Cape Town based environmental practitioner (Shippey, 2009) regarding another construction project in the Cape within a coastal dune environment. The contractor's perception that beaches are sensitive environments led to them driving heavy construction equipment through the coastal dune Fynbos to access areas unreachable by road. The ECO could have prevented the damage by rather allowing the equipment across the beach where damage to the endangered dune Fynbos would have been limited. No action was taken against the Eden on the Bay developer by the approving authority due to a lack of capacity. This left the attendees of the ELC powerless in many instances (Sasman, 2009a).

4.1.8.3 EIA Follow-up Challenges

Two challenges of interest to follow-up emerged during the analysis of follow-up in the case of Eden on the Bay. The first was that the local authority (also the proponent) had to use indirect means without a legal mandate to enforce compliance with the EMP and conditions of approval. This was due to the absence of the regulator in the follow-up process. The second is that there was an apparent conflict between planning and conservation policy in the City of Cape Town.

Both allude to institutional framework failures where the organisation of parties was not consistent with the best practice of prescribing the respective roles of proponent, regulator and interested parties. In this case the proponent was also the regulator and involved in the community ELC, attempting to ensure responsible development. Yet another conflict arose earlier during planning when the developmental and environmental agendas of the local authority were in conflict and the EIA failed to resolve this conflict effectively. This conflict was confirmed in the appeal decision by the provincial minister.

4.1.8.4 EIA Follow-up Best Practice

In the analysis of this case against international best practice and principles, the characteristics of the EIA follow-up compared well with project-based follow-up best practice, but poorly against requirements for establishing a baseline and monitoring impacts against a known knowledge base of this sensitive environment. There is also no feedback mechanism for follow-up to contribute to this knowledge base or to learn about the performance of EIA as a tool.

In the Asian context the Asian Development Bank (1997) identified the government's lack of ability to plan strategically (SEAs), enforce compliance and address cumulative large scale effects as a major problem in current EIA practice. The World Bank study on improving its EIAs (Rees, 1999) stated the Bank's intention to enhance environmental assessment at strategic level to reduce the need for project specific EIA. This could be achieved by sectoral EIA, economic policy and regional Strategic Environmental Assessments (SEAs). The Bank also noted that the effective implementation of EIAs could be improved through better quality management plans and mitigation.

From international best practice, the project-based EIA should take place within an integrated process of wider strategic environmental assessment, planning and follow-up, both in terms of managing environmental- and cumulative impacts, and also to enhance EIA and improve its effectiveness.

4.1.8.5 The Role of Follow-up in Adaptive Management

While the EIA made provision for flexibility and adaptive management during the follow-up stage, there was insufficient understanding of the sensitive receiving environment to formulate an informed response, and an opportunity for effective EIA follow-up was lost.

It is reasonable to assume that a period of observation and measurement of the coastal dune environment, or even application of the knowledge gained elsewhere on the Cape West Coast could have informed the EIA for the Big Bay area. The EIA was, however, shown to be flawed in its scoping and evaluation. Now that the impact of seepage onto the beach has been observed, there has also been no attempt within the institutional framework of the Big Bay EIA process to analyse or intervene to resolve the issue.

4.1.8.6 Institutional Framework for Follow-up

The active involvement of the local authority, in place of the approving authority was evident in the case of Eden on the Bay. This case study suggests that the approving authority could cede its mandate of enforcement or monitoring to this lower sphere of government during construction, which can revert back to it if a higher level of compliance enforcement is necessary. How effective this would be in future is disputed, as many local authorities in South Africa are not capable or capacitated to perform this function as well as the City of Cape Town metropolitan local authority.

A prominent Bloubergstrand community activist stated that the City of Cape Town could not enforce its own town planning design guidelines and the conditions of approval provided in the planning applications and EIA process. One such example is the design guidelines for the Eden on the Bay development. These require a village type mixed use development typology with loose standing units, rather than the linked, bulky three storey buildings that were built. The coastal dune landscape could have remained visible through managing the height, location and bulk of developments according to the dune horizon line. These urban design guidelines were never implemented during plan approvals or construction of Eden on the Bay.

In England a study of whether EIA mitigation measures were converted into planning conditions showed that a large degree of measures (50%) are not covered by the planning approvals, meaning that they are reliant on the developer alone to implement (Tinker, 2003). In the case of the Big Bay area, the spatial vision translated to meaningful land use planning proposals on precinct scale. According to Aaron (2009) there was even proper procedural alignment between planning and environmental processes with regard to the Big Bay development area, with an awareness of the environmentally sensitive receiving environment. This, however, was not translated into responsible development in Big Bay, as shown in the Eden on the Bay case study. The EIA process was not given the weight in the planning decision making process it required to ensure that this sensitive environment prevailed in the development of the Big Bay township area.

Hickie and Wade (1998) suggested improvements to EIA from a review of water-based environmental assessments. They suggested the provision of clear non-technical information in reports, standardised report formats, a review of the assessment system to ensure that all issues are covered sufficiently and finally an action plan for implementation during design, site, operations and maintenance stages of the activity. The synthesis of planning and environmental objectives through to the design and construction process will require greater institutional integration. Many strategic regional level and even local development plans exist for the Big Bay area, yet the local and provincial authorities could not see a solution for dealing properly with the conflict between development and conservation. The conclusion can thus be made that these strategic plans, spatial plans, land use policies and site development plans either carried little statutory weight in ultimate decisions taken, contradicted each other or never had the support of all parties involved.

This failure in the Big Bay township area can also not be blamed on an improper and less thorough participation process. Participation does not lead to consensus if power is not shared in the making- and taking of decisions. Aaron (2009) found that the EIA did little to contribute to the conservation of areas below the high water mark, but affected by the Eden on the Bay development in Big Bay. The EIA could not control the higher than agreed upon density and bulk of the buildings in Eden on the Bay. The evaluation of environmental and visual impact that led to the urban design proposal for density and bulk was ignored. The design decisions were taken despite the clear scientific link between what happens below the high water mark of the sea and the ecology beyond.

University of Cape Town

4.2 Milnerton Re-Alignment of Water Course

4.2.1 Case Study Introduction

An EIA was completed in 2006 for the re-alignment of the Duikersvlei water course across erven 10778 and 6220 Milnerton, 15 kilometres north of Cape Town (GPS coordinates 33° 51' 07.34" South, 18° 31' 30.66" East). This project was authorised in terms of the Environmental Conservation Act, 73 of 1989 in April 2006, legislation that has subsequently been superseded by the National Environmental Management Act, 107 of 1998. The EIA decision required the implementation of an EMP and an ECO to be appointed. It was also required that a license be obtained from the Department of Water Affairs for water use, remediation work within a flood line zone and storm water management. This project was an intervention to remediate site pollution and not a typical development project. This means that, as a case study, it could provide direct indication of the attainment of the goal of the EIA and the effectiveness of the EIA process.

The Kynoch fertiliser factory in Milnerton, Cape Town, was decommissioned and the brownfield site on which it was located is currently being redeveloped. The property owner proposed that the Duikersvlei river course be re-aligned from its course traversing the site to flow along the southern site boundary (Photograph 3) in order to maximise development space on the site. Moving the stream into a new semi-structured watercourse (Photograph 4) would facilitate the rehabilitation of polluted soil on site that previously carried pollutants to the Flamingo Vlei wetlands further downstream and ultimately to the sea at Milnerton lagoon (Doug Jeffreys Environmental Consultants, 2006). The re-alignment also created more development space on site, constituting a positive outcome for all parties involved.



Photograph 3: Aerial view indicating re-aligned stream on southern site boundary (Google, 2011)



*Photograph 4: New water course constructed
(Rabie, 2006)*

The EIA was important to ensure that the intended objective to remove soil pollutants and rehabilitate the site was achieved without unintended harm to the already degraded environmental condition of the river. The approving authority imposed a condition requiring the establishment of baseline environmental data and a monitoring programme as a part of the EIA process. It required re-vegetation and monitoring of water quality, soil quality and stream superstructure, during and after construction. A property owners association was formed to deal with the rehabilitation, re-alignment and life cycle management in accordance with the environmental authorisation (Department of Environmental Affairs and Development Planning, 2006).

4.2.2 Research Question 1: Correlation between Mitigation Measures and Actual Impacts

4.2.2.1. Analysis of EMP and Actual Impacts

The ECO conducted twice-weekly site visits and monthly audit reports during construction between April and October 2006.

The analysis of the audit reports (Annexure A2) indicated that most impacts that occurred were predicted in the EIA and addressed in the mitigation measures contained in the EMP. These impacts included dust, noise, storm water and silt handling, and hazardous materials. Two incidents reported by the ECO were not predicted or provided for in the EMP, but were successfully resolved on site by the ECO. These two impacts were firstly the erosion of a working platform created adjacent to the stream that required stabilising with sand bags and secondly the draining of an adjacent wetland area that required re-landscaping after construction.

The EMP included all elements identified by Hill (2000) as important, being mitigation measures, inspection procedures and monitoring of impacts and compliance. There was no external audit to evaluate the effectiveness of the EIA, as the monitoring programme achieved this purpose.

4.2.2.2 Management of Construction Impacts

The project was assessed and executed under the previous environmental legislation, applying less refined practices than currently employed. The EMP for the project focussed on materials management, noise and the handling and disposal of contaminated soil. The EMP was supplemented by method statements for activities with potentially detrimental environmental impacts. These method statements included detailed planning of various construction interventions to re-align the river, management of materials and machines, as well as a detailed storm water management plan prepared by civil engineers.

On the few occasions when the mitigation measures or methods did not work properly, it was due to incorrect implementation. An example of this was the straw bale weirs intended to catch silt in the stream, not being correctly maintained by the contractor and the water becoming turbid. Once this was reviewed by the City of Cape Town representative (Pat Titmuss) it was resolved by the contractor with the introduction of a rock weir to replace the straw bales (Rabie, 2006). On another occasion noted by the ECO, the over-flow from one of the interceptor weirs caused a measured increase in nitrate values. The weirs were built to temporarily divert and control polluted water. The maintenance operator found that the cause was a pump that failed. A system was immediately implemented whereby an automated message was sent to the operator's cellular phone when a pump failed on site (Rabie, 2008). Straw stabilisation against silting, dust pollution and loss of topsoil due to earth moving activity worked as predicted (Rabie, 2008). Where the straw failed, a chemical soil binder was used successfully to avoid erosion, wind-blown dust and mud forming.

The purpose of the realignment of the stream was to remedy the pollution from chemicals remaining in the soil and transported in run-off storm water down the river. Two years of testing after the implementation of the project proved that the main prediction, that the intervention would resolve the pollution of the Duikersvlei, was realised. Soil remediation was also successful, as measured by the water quality of run-off storm water and the pH level of the soil being neutral (Rabie, 2008).

Water monitoring through the course of 2006 to 2008 revealed low ammonium nitrate values (less than the stipulated maximum level of 18 milligrams per litre) and low presence of coal tar fuel (Rabie, 2008). Nitrogen levels reduced from an average of 550 parts per million (ppm) to 8 ppm after re-aligning the stream. Four years of baseline water quality values could be used to compare against the measured values to ensure the effectiveness of the project. Botanical assessment on the re-vegetation of the site indicated positive results from the clearing of aliens and re-establishment of indigenous vegetation (Rabie, 2008). This project in itself was a mitigation measure to address the goal of the EIA. In that sense the predicted impact and mitigation measures correlated and realised the goal of the EIA.

4.2.2.3 Evaluation of Research Question 1

Construction site audits and external audits confirmed the correlation between predicted impacts and actual construction impacts (Rabie, 2009). The predicted impacts could be mitigated and the outcome of the EIA was attained (Titmuss, 2009a). Minor unexpected incidents that arose could be addressed by the ECO with the cooperation of the contractor. The final ECO audit after construction was completed noted that *“The new stream has carved out a natural meandering water course and both the landscape architect, Tanya de Villiers and the consulting freshwater ecologist, Dr Barbara Gale are satisfied with the dynamics and sinuosity of the new stream.”* (Rabie, 2006b:2).

4.2.3 Research Question 2: Compliance with Conditions of Approval during Construction

4.2.3.1 Compliance during Construction

The conditions of approval relevant to construction and follow-up and contained in the environmental decision (Department of Environmental Affairs and Development Planning, 2006) included in Annexure C, consisted of four control conditions and four flexible management conditions (see Annexure B2) This allowed for balanced EIA follow-up with the opportunity to develop adaptive management responses to identified or arising impacts. A high level of compliance with the conditions of approval was achieved. When the audit reports during construction were analysed, isolated contraventions were noted, for example:

- Excavators crossing stream (June 2006)
- Failure to maintain straw bale weirs (June 2006)
- Handling of unused asbestos pipe that was uncovered (June 2006).

The ECO confirmed that the contractor submitted the required method statements for containment of contaminated water and silt, hydro-carbon spills and others required during the course of the project as required by the EMP. It was important to prevent the downstream movement of contaminated silt.

The contractor had to ensure that run-off water retained in specially constructed cut-off weirs and channels was isolated in ponds where the polluted solids could be recovered and disposed of according to the EMP. This was done by the contractor without fail (Rabie, 2006). Officials attending an audit in April 2007 commended the process of re-vegetation and the success of the rehabilitation along the banks of the new water course to the extent that Malachite Kingfisher birds have been noticed returning to the site (Rabie, 2008) indicating an improved river habitat.

4.2.3.2 Compliance after Construction

Four audits were conducted during April and October of 2007 and 2008 (scheduled after the wet and dry seasons in this Mediterranean climate region) to evaluate compliance with the Operational EMP after construction had been completed in 2006. In all four audits conducted, the water quality values leaving the site were within the required limits. The re-vegetation and control of alien invasive vegetation was proceeding as prescribed. The engineering and structure for the water course was inspected on all four audit occasions by an engineer and was performing as expected. Adequate funding was being made available and the Property Owners Association (POA) was functioning well.

4.2.3.3 Institutional Arrangement for On-going Follow-up

The POA was established for on-going implementation of the conditions of approval over time as a condition in the environmental authorisation for the remediation project. Monitoring of water quality during re-alignment works ensured a flexible approach to EIA implementation. The future of the property owners association, provision of funding and general intention to continue with the life cycle management will further determine the success of the re-alignment. This positive outcome could by no means be contributed in this case to compliance monitoring, involvement of the mandated authorities or regional comprehensive water and environmental management. The role of the local authority in this case was important as the local monitoring and advisory authority, but with no locus standi to act against non-compliance or issue approvals for amended processes of mitigation based on new findings (Titmuss, 2009a). The approving authority was absent from the follow-up process.

4.2.3.4 Evaluation of Research Question 2

Site audits both during and after construction indicate a high level of compliance with the conditions of approval, EMP and operational phase EMP. Both control and flexible management conditions allowed for an adaptive response, balanced with control over the site to prevent pollution. The POA was established to ensure compliance after construction ended and to ensure full rehabilitation of the site, water quality and flora around the new river course.

4.2.4 Research Question 3: Prevalent challenges with EIA Follow-up

4.2.4.1 Establishment of Environmental Baseline and EIA Objectives

This EIA process established baseline environmental information and set target values that needed to be achieved. This allowed the measurement of environmental impact and the effective checking of the outcome against the EIA objectives during construction and operation. A botanical baseline report was compiled, making it possible to compare monitoring after construction with the original environmental condition before the intervention (Low, 2007). The baseline water quality information from 2006 could be compared with later monitoring samples (MEGA, 2008). If this baseline information did not exist, the objectives of the EIA would neither have been measurable, nor would it have been possible to formulate an appropriate management response to the monitoring results during EIA follow-up.

4.2.4.2 Evaluation of Research Question 3

Understanding the state of the environment before intervention and measuring the impact on the environment during intervention meant that decisions and actions could be adapted towards a desired outcome.

4.2.5 Research Question 4: Comparison of Case Study and Best Practice Principles

4.2.5.1 Case Analysis of Best Practice

The case study analysis (Annexure E2) indicated a score of 73% when the case study was analysed against the best practice requirements for EIA follow-up. The follow-up process enabled the outcome of the EIA. The soil and water pollution was minimised and the development space was maximised. The EIA decision included follow-up requirements. The follow-up was appropriate for the project and environment, fit for purpose and measured against performance indicators. Provision was made for the establishment of baseline information and life cycle follow-up which could potentially input to the wider knowledge of the river and the wetlands system of which this site forms part. Feedback took place in the form of EIA follow-up during construction, but was augmented by external audits to confirm that the EIA process was conducted properly and also by a water quality monitoring programme to evaluate the intervention against a baseline.

4.2.5.2 Regulatory Commitment to Follow-up

The EIA regulator did ensure appropriate EIA follow-up as part of the EIA decision. The proponent committed to the follow-up process.

The absence of a mandated regulator in this project during follow-up, as well as the participation in the follow-up by the surrounding community (albeit industrial property owners) are both aspects of this EIA follow-up process that detract in comparison with international best practice. Both departments of Environmental Affairs and Water Affairs were regulating the project and both were involved during the EIA, but not during follow-up to monitor compliance. The local authority took up the role of regulator without a formal mandate. The MPOA continued the responsibility unchecked by a regulator.

4.2.5.2 Evaluation of Research Question 4

It can be stated that the follow-up in this case study compared well with best practice and from that point of view was effectively implemented. There was no input to- or evaluation of the impact of the re-alignment of the water course on the regional or cumulative context. In this case, an opportunity to contribute to the learning or knowledge of water course realignment as a science or practice was lost. The case could have served as an important example of treatment of water courses in industrial or built-up areas as an alternative to canalising rivers.

4.2.6 Research Question 5: Adaptive EIA Follow-up Process

4.2.6.1 Case Analysis of Adaptability

The case study analysis (Annexure F2) indicated a score of 80% for adaptive management during follow-up when compared with indicators for an adaptive management process (Cantor and Atkinson, 2010; Noble, 2000). There was sufficient provision for flexible management conditions in the EIA conditions of approval. Implementation decisions could be taken in response to the monitoring of measurements of water quality and soil pollution against a baseline environmental state and targets set during the EIA. The objectives of the EIA were clearly set and the follow-up could track progress against these objectives. The management on site could thus deal with uncertainty in predictions and the interventions and mitigation could be monitored.

The two issues that detracted from a fully adaptive process was the absence of both a mechanism for learning from the EIA follow-up beyond this specific project and of wider public participation during EIA follow-up. Wider public interests were not considered.

4.2.6.2 Evaluation of Research Question 5

Despite not taking wider public interest into account and providing for a regional or cumulative contextual impact evaluation, the Milnerton case is a good example of an adaptable follow-up process. If the proponent's intention to realign the water course was contested, the EIA would in all likelihood have had to address regional impact and cumulative impact. This evaluation would have created learning or knowledge about river re-alignment that could be used in future.

4.2.7 Research Question 6: Institutional Framework for Effective EIA Follow-up

4.2.7.1 Case Analysis of Institutional Framework

The institutional framework for Milnerton was described and analysed in Annexure G1 and G2. It provided for three key elements in the EIA process that eventually resulted in effective follow-up during construction and operational life cycle. These were the establishment of baseline information on pollution, the incorporation of the monitoring programme into a responsive construction contract and ultimately the establishment of an independent property association to implement the operational EMP. The feedback that is critical in the effectiveness of an EIA is thus achieved. One of the key participants in EIA follow-up identified by Morrison-Saunders et al. (2003), the community, was not present in this case study. Although the outcome of the EIA was achieved, the ideal institutional framework should have made provision for community involvement in follow-up.

4.2.7.2 Institutional Support for EIA Follow-up

This EIA follow-up process included many of the aspects Gibson (2002) identified as being part of a fully evolved EIA, thereby indicating a proper institutional response. These included pro-active impact assessment, evaluation of alternatives, monitoring and mitigation and the integration of the EIA in decisions and planning. The EIA and follow-up excluded broader socio-economic issues and public interests and therefore did not fully meet the maturity level of EIA as described by Gibson (2002).

The institutional framework generally supported the proper approach to EIA follow-up. The EIA follow-up did not evaluate the context of social or economic factors beyond the physical EIA of the site and project, so the approach cannot be said to have been comprehensive. There was no evidence of planning and policy integration or integration of government spheres, departments or goals. The approach was, however, strategic to some degree in that it based its feedback on a baseline monitoring programme and understanding of the environment. There was unfortunately no evaluation of the cumulative or regional impact.

4.2.7.2 Evaluation of Research Question 6

The institutional framework did not fully create a comprehensive, integrated and strategic follow-up approach. It was, however, based on a thorough understanding and research study of the environment and included monitoring. The institutional framework showed signs of not being fully developed as envisaged in current EIA follow-up best practice.

4.2.8 Case Study Evaluation

The mitigation measures based on predicted impacts correlated with the actual impacts to a high degree in this case study. The analysis showed a high level of compliance and balance between control and flexible management conditions. The management on site could adapt to the impacts encountered, due to the thorough understanding of the affected environment and the measuring of impact through monitoring. Regular interaction and flexibility in responses during construction built on the success created by proper scoping and the provision of adequate baseline information.

In the Milnerton case study, monitoring was important as proof of success and a performance measure, as the goal of the EIA was not just the realignment of the water course for optimised development space on site, but to remedy the contaminated state of soil and ground water. Due to proper baseline information and a responsive EIA process the remediation of the pollution on the site and construction impacts during rehabilitation on site were both addressed effectively.

In this project, the integration of the national government Department of Water Affairs legislative authorisation process and the environmental management legislative and authorisation processes governed by the provincial Department of Environmental Affairs and Development Planning was achieved by two sets of applications and approvals to two different government departments. This still points towards the lack of comprehensive environmental legislation in South Africa. Air quality for example, is also managed by separate legislation and authorisation process. Sectoral legislation does not contribute to an integrated approach to environmental management.

The legal framework in this case study did not fall short of the requirements. The analysis, however, indicated a possible lack of institutional and financial support for monitoring systems beyond the site itself. This section of river flows through and affects a larger area. It is expensive and not always legally required to establish baseline environmental data before commencing activities. To some degree, authorities at local authority level could apply the knowledge gained from feedback in this EIA to others along the same water course or wetlands system. The project indicates the need for regional level assessment and regular benchmarking of the state of the environment, because it is not the only industrial land use along this water course that could potentially pollute the water. This would indicate an institutional problem, rather than non-application of knowledge.

4.3 Green Point Stadium Development

4.3.1 Case Study Introduction

Erf 1056 Cape Town (GPS coordinates 33° 54' 12.42" South, 18° 24' 40.22" East), otherwise known as the Green Point Stadium and –Common, was selected as the site for the development of the new stadium and ancillary facilities for the 2010 Soccer World Cup hosted by South Africa. The environmental authorisation was issued in 2007 after an appeal against the selected location of the stadium. Residents of Green Point were opposed to the selected site, primarily due to its traffic impact on the Green Point and surrounding Sea Point, De Waterkant and Mouille Point residents and businesses. The visual impact of the stadium against the world famous backdrop of Cape Town city, Signal Hill and the Victoria and Alfred Waterfront was also of great concern. The stadium is visible from across Table Bay and impresses upon the most popular view of Table Mountain, that from Bloubergstrand twenty kilometres away. Apart from the stadium and its immediate facilities and parking, the EIA included separate authorisations for the upgrading of electrical infrastructure, the Granger Bay Boulevard arterial road, the Green Point Urban Park and the golf course on the Green Point Common (Photograph 5).



*Photograph 5: Green Point Stadium - aerial view near completion
(City of Cape Town, 2009)*

4.3.2 Research Question 1: Correlation between Mitigation Measures and Actual Impacts

4.3.2.1 Mitigation and Actual Impacts

According to the analysis of the ECO inspection reports (Annexure A3), the impacts encountered on the site during construction correlated with the mitigation measures in the EMP.

Few impacts occurred that were not already predicted or dealt with in the EMP. Construction phase impacts addressed in the EMP (The Environmental Partnership, 2006b) relate to construction waste, dust control, noise control, restricted (no-go) areas, clearing of vegetation, soil erosion and machinery management. Fines were typically set between 100 South African Rands (R) and R1000 for smaller transgressions and larger fines in the order of R1000 to R10 000 for more serious transgressions resulting in pollution, dust, erosion, loss of vegetation or spills.

Complaints due to the noise emanating from reversing alarms on construction vehicles arose during construction. There was no mitigation for this type of noise contained in the EMP, except what was already implied in the regulation of working hours. The ECO proposed that the reversing alarms on the construction vehicles be turned down to lower volumes audible only on site, but not beyond the site, while remaining within safe specifications for occupational health and safety (Nicolson, 2009). This is an effective response to a predicted problem, but did not correlate with the mitigation measure in the EMP (limiting working hours).

The scoping and evaluation in this EIA did not predict the discovery of soil polluted by railway ash beneath the Green Point Common, despite a heritage impact assessment by an historian (Vidamemoria, 2006) and an archaeologist's investigations (Patrick and Clift, 2006). The Green Point and Mouille Point areas form part of land reclaimed from the sea. The discovery of the polluted soil gave rise to additional costs for a study to evaluate the extent of pollution and resolve disposal methods (WSP Environmental, 2009) and for the contractor to dispose of the zinc- and lead contaminated soil. The EIA follow-up process responded effectively to this unexpected issue.

The ECO appointed on the project stated that for such a large development the typical construction related impacts (controlling cement batching water when trucks are washed, litter, storm water ponding, dust, tree felling and noise) are not unlike impacts for most smaller scale developments where the legislation does not require an EIA, the appointment of an ECO or regular inspections (Sasman, 2009a). In the opinion of the ECO, large or visible projects are often over-managed and the cumulative impacts of many smaller approvals are ignored. The ECO made the statement that the scale of the project did not necessarily imply a more detrimental impact and therefore the need for a more extensive EIA follow-up process. Scale and impact is thus not always directly relational.

4.3.2.2 Appropriateness of the EMP

In this case study, the EMP for such a large scale project was mostly focussed on construction impacts. It nonetheless contained all elements identified by Hill (2000) as necessary being mitigation measures, procedures for inspections, limited monitoring of only the quality of storm water emanating from the site and flowing to the sea, compliance monitoring and external audits of the EIA and follow-up by an independent evaluator.

4.3.2.3 Evaluation of Research Question 1

Although predicted impacts were all addressed by the mitigation measures in the EMP, some unforeseen issues arose that were effectively managed by the ECO on site. There was partial correlation between predicted and actual impacts. Scale was not necessarily an indicator of complexity with this case study being relatively large, but with reasonably minor environmental impact observed by the ECO during construction.

4.3.3 Research Question 2: Compliance with Conditions of Approval during Construction

4.3.3.1 Level of Compliance Achieved

The final approval for the development to proceed (Ministry of Environment, Planning and Economic Development, 2007) in Annexure C contained the conditions of authorisation for this project. Only selected conditions relating to the construction stage and EIA follow-up, were analysed in Annexure B3. From the seven conditions selected for analysis, four achieved full compliance. Two conditions were partially complied with and there was one incident of non-compliance in the analysis.

The conditions of approval not selected for analysis and omitted from Annexure B3, focussed on the design and operation of the facility and contained recommendations, which by their nature cannot be enforced should the applicant choose not to implement these proposals. These included recycling demolished building material, the use of recycled material, undertaking a wind impact study upon completion and using renewable energy sources. These proposals, although not enforceable, were important to set a benchmark for best practice towards environmental sustainability. Achievement thereof would rely on these follow-up requirements being mandatory, not recommendations.

4.3.3.2 Non-Compliance during Construction

The ECO noted instances of non-compliance and the responses were effective in preventing future incidents of the same nature. One example was the disposal of excavated ash historically used to reclaim Green Point Common from the sea. This ash should have been disposed of at the Vissershok hazardous waste disposal site north of Cape Town. Instead, due to high costs associated with the disposal of hazardous waste, the contractor dumped 5 m³ of ash on a Municipal land fill site as building rubble. The incident exposed the City of Cape Town as the client to legal and financial risk. The contractor was fined R25 000. The subsequent insistence sought by the contractor that penalties be excluded from the construction contract, gave rise to slower remedial action on the part of the contractor (Cerff, 2009) and pointed to a flaw in the manner that enforcement was carried through from environmental authorisation to the EMP and into the construction contract. Fines should not be negotiable. Instances of transgression on the part of the contractor were usually addressed within one day, but would sometimes be repeated again, because there was no firm deterrent.

Tree protection was addressed in the EMP, but proved to be a recurring problem on site when the contractor removed trees in demarcated no-go areas. The ECO nonetheless reviewed the method statements together with the contractor and applied influence without the option of recourse to a penalty to resolve this issue (Ecosense, 2009; Sasman, 2009a).

The ECO pointed out storm water in the hazardous store area in an inspection report, but this issue persisted without remedial action for a period of time. Minor detention pond and channel management issues were also sorted out on site. A problematic situation occurred when an oil spill revealed insufficient amounts of correct spill kits on site. The repeated removal of trees without permission highlighted the dynamic nature of site operations against the irregular inspections by the ECO. Thereafter an arrangement was made for a permanent ECO presence at the construction site.

The effectiveness of a permanent ECO presence was confirmed when the recurring problem of dumping of rubble inside no-go areas stopped. All areas of the environmental inspection improved for a period of time. Emphasis was, however, also placed on preventative measures in the EMP in anticipation of problems caused by weather and wind. The external audits revealed minor issues in relation to the duration and scale of this project.

The EIA conditions of approval required an EMS to be implemented by the City of Cape Town. To date no such EMS has been implemented due to a lack of resources in the City of Cape Town to implement and manage such a complex and expensive system. EMS is currently voluntary in South Africa and not legally enforceable other than making it a requirement of an EIA decision.

4.3.3.3 Public Opinion on Compliance

The large scale re-development of the Green Point Stadium, Green Point Common and Granger Bay Boulevard proceeded without major incident or complaint according to the chairman of one of the ratepayers associations involved in initial objections against the stadium location (Furnon-Roberts, 2009). The complaints regarding noise (reversing alarms on construction vehicles for example), traffic disruption and removal of trees were expected and dealt with effectively by the ECO. The various residents associations did, however, feel that the fines were too low for such a large project. The fines were not based on the size of the project, but the severity of the transgression.

4.3.3.4 External Compliance Audit

The stadium construction EMP and site audits included external review audits of the EIA, the first during November 2007 and the last of which was conducted in May 2009 (Cerff, 2009). There was also regular monitoring and laboratory testing of storm water quality samples down Fritz Sonnenberg Road to the sea shore. There was active involvement and integration of the EMP measures and the ECO in the daily construction contract activities.

4.3.3.5 Types of Conditions of Approval

The conditions of approval made provision for flexibility, allowing for the development of method statements, an adaptive EMP that was amended a few times to remain relevant, architectural and landscaping guidelines and an EMS for operation of the facilities on site. Annexure B3 shows four of the seven conditions to be flexible management conditions and three to be control conditions.

4.3.3.6 Evaluation of Research Question 2

There was a good balance between flexible management- and control conditions. Instances of non-compliance with the EMP during construction were addressed by the permanent presence of the ECO and resolved in negotiation and cooperation with the contractor. The ability of the contractor to negotiate with the client to cease the implementation of fines undermines effective compliance management. The requirement for an EMS was imposed, but not fully complied with. This requirement may have been too onerous for the City of Cape Town to implement and is currently not legally required in South Africa. The City of Cape Town implemented a compliance management system which serves some of the purposes of an EMS. An external compliance audit indicated mostly positive outcomes for the EIA process, but this judgement was made on the project-based follow-up.

4.3.4 Research Question 3: Prevalent Challenges with EIA Follow-up

4.3.4.1 Site Selection

The EIA addressed only one site alternative for the project in Cape Town (The Environmental Partnership, 2006a). Not taking alternatives into account defeats the objectives of the current Section 31(2)(i) of the Regulations of the National Environmental Management Act (Department of Environmental Affairs, 2010) requiring the evaluation of alternatives, as well as similar requirements in the prior versions of the environmental legislation and regulations. Informed site selection based on the evaluation of alternative sites during the EIA, is in itself a mitigation measure.

4.3.4.2 Visual Impact

One of the most significant predicted impacts, apart from the divided public opinion on the location of this stadium in Cape Town (Furnon-Roberts, 2009), was the visually intrusive nature of the stadium against the well-known backdrop of Table Mountain and Signal Hill in Cape Town (The Environmental Partnership, 2006a). The mitigation of the visual impact would most effectively have been achieved by the proper evaluation of location alternatives in the Cape Town metropolitan area against well formulated criteria. The decision on the development site was, however, taken prior to the visual impact assessment in the case of the Green Point Stadium (Barbour, 2006).

The visual impact assessment was focused on two alternative layout proposals on the selected Green Point site (CNDV-Africa, 2006). The visual impact mitigation proposed for the stadium development were siting and layout alternatives, small colour breaks, height management and lighting (CNDV-Africa, 2006). These measures were effectively applied during detailed design and construction. The most important visual mitigation measure remains the proper evaluation of alternative locations. This was not achieved. The stadium, whether condoned by Cape Town residents or not, is now an established and even defining feature of the Cape Town sky line (Furnon-Roberts, 2009).

4.3.4.3 Economic Impact

There is no on-going follow-up process to evaluate or monitor the economic impact of the development, despite this impact being identified in the EIA. The assessment of the economic impact of the stadium on the City of Cape Town and its residents was limited to the evaluation of its impact on Green Point, Mouille Point and Sea Point. This formed a total of three pages in the final EIA Report scoping section and four pages in the assessment section (The Environmental Partnership, 2006a). A separate specialist study was undertaken to assess economic impact (van Zyl and Leimann, 2006). This study once again only focussed on the assessment of economic impact for the selected site, Green Point. It did not consider other locations in Cape Town in a comparative analysis. The study made it clear that the development would likely not be financially feasible from a direct operational cost and direct operational income perspective, excluding the construction cost. This means that subsidy from rates and taxes would be required to operate the stadium. The study stated that building the development would require extra-ordinary resources beyond what the City of Cape Town, Provincial Government and National Government could expect to recover.

The benefits were stated to be civic pride, increased tourism and generally long term sustained growth, unlocked by hosting large events and improving sporting infrastructure. Mitigation proposed included the use of local resources, maximised use of local business during the staged World Cup tournament and skills transfer (Van Zyl and Leimann, 2006). It was clear that the cost of development would not be recovered through operating the stadium. This indeed transpired with the World Cup Soccer tournament ending and the proposed leasing deal with an international agent failing due to the financial feasibility indicating negative prospects. The evaluation of detrimental economic impacts could not be mitigated effectively, despite them being understood, anticipated and accepted by the City of Cape Town. The Cape Town rate payers now need to fund a large part of the construction and operations of this development, placing strain on an already strained rates and tax base.

4.3.4.4 Evaluation of Research Question 3

EIA follow-up takes place after the EIA to help bring about the objectives of the EIA through monitoring, enforcement and adaptive management.

Visual and economic impacts were identified and evaluated in the EIA, but no provision was made for EIA follow-up to address these impacts. The EIA made no provision for identifying and comparing site locations for the stadium in Cape Town. In this research, mitigation measures were compared with actual impacts. It is not known how much of a visual or economic impact this stadium could have had, for better or worse, if located elsewhere in Cape Town. The EIA was flawed in this regard.

4.3.5 Research Question 4: Comparison of Case Study and Best Practice Principles

4.3.5.1 Follow-up Comparison with Best Practice

When evaluating this case against the international best practice principles for EIA follow-up (Annexure E3) the case study achieved a score of 73%. An effective project-based feedback process took place, including construction stage follow-up and external audits of EIA performance. The wider requirements for proper EIA follow-up, such as establishing environmental baselines, monitoring, incorporating learning from feedback during- and after project implementation and evaluating cumulative impact, fell short in this case study and prevented a higher effectiveness score.

4.3.5.2 Appropriateness of Follow-up Requirements

In reviewing the Green Point follow-up process, it was found that the process was suitable and appropriate during construction, when seen from the perspective of the urbanised receiving environment and looming World Cup deadline. The imposition of a resource-intensive EMS for stadium operations on the City of Cape Town seems inappropriate for managing this urban events facility when few other significant EIAs are required to implement an EMS. There was, for example, no such requirement placed in the Cape Town International Convention Centre (CTICC) or new international airport, although the CTICC voluntarily developed and implemented an EMS from 2008.

4.3.5.3 Evaluation of Research Question 4

The EIA follow-up was appropriate for this project, but could have achieved more if there was a mechanism to assess and evaluate wider cumulative impact and life cycle management, as envisaged in the conditions of approval requiring an EMS.

4.3.6 Research Question 5: Adaptive EIA Follow-up Process

4.3.6.1 Absence of Clear EIA Objectives

The objectives of the EIA for Green Point Stadium seemed to be aimed collectively at avoiding the combined detrimental impact of the stadium development at the selected location.

The intention was not to evaluate alternative locations or monitor the impact after construction. It is therefore not possible to conclude whether the objective of sustainable development was met, but it can be concluded that the objective of limiting the construction pollution impacts of the stadium development was achieved. When the case is compared with indicators for an adaptive EIA follow-up management process (Noble, 2000; Cantor and Atkinson, 2010) it scores 70% against the criteria (See Annexure F3). There were two shortcomings to note. There was no mechanism for learning from the EIA process with a view to improving future EIA performance. The external audit only focussed on compliance and not the objective of the EIA, which should have been to select the appropriate location by comparing alternatives and to ensure that impacts identified are followed-up during and after construction. The EIA follow-up focussed only on direct construction impacts and not on the wider cumulative, visual or socio-economic impacts from the development of the stadium and its associated infrastructure. The objectives of the EIA were limited and it was not possible to adapt the follow-up to achieve objectives beyond those stated. The public's interests were addressed and there was sufficient follow-up to evaluate whether mitigation was working. In this case study, the institutional framework was not the reason that the EIA compared unfavourably with the requirements for adaptability. The institutional framework made provision for thorough follow-up. The opportunity to integrate the EIA with decisions and planning was not realised. This constrained the follow-up process to merely dealing with pollution.

4.3.6.2 Fixed Delivery Time Frame

Many of the efforts of the ECO were undermined by the strict adherence to the construction programme. This included incidents where the contractor ignored requests for method statements or ignored instructions to resolve problems during audits. The ECO was not able to issue fines for contraventions of the EMP, as fines were excluded from the construction contract by the City of Cape Town. The ECO was still able to respond to- and mediate arising issues on site, but with limited enforcement power and conscious of the consequences of a delay on the construction programme.

4.3.6.3 ECO Interventions to Adapt Implementation

Communication and cooperation were key in managing suspected detrimental impacts (Sasman, 2009a) and attaining the required flexibility through cooperation, rather than through enforcement. Initially the occupational health and safety induction of workers did not include heritage or environmental induction, but this was later addressed at the Green Point Common site to include a standard environmental induction for all workers and visitors to site (Sasman, 2009a). One incident illustrated the vulnerability of the contractor to lawsuits if the EMP is not followed. Diesel spilt from a construction vehicle caused a motorcycle accident that could have resulted in severe consequences for the contractor or his sub-contractors if the motorcyclist was injured. Communication issues on the Green Point Common site emerged when the digging of a detention pond started without informing the archaeologist (Sasman, 2009b).

Important historical artefacts were later discovered on the Green Point Common site. The management of this discovery and subsequent management of the construction process were successful, but could have been problematic, due to the initial problems with communication. The changes made to the EMP showed a flexible contractual process. Some non-enforceable conditions during construction were addressed after deliberation with the contractor. Contaminated soil was uncovered at the Green Point Common site. The rehabilitation and disposal processes were resolved by the ECO and contractor in an efficient manner after it was found that no disposal certificate existed for the first batch disposed. A penalty was issued for this transgression, which was not repeated. Fines were, unfortunately, excluded from the construction contract after this event.

4.3.6.4 Evaluation of Research Question 5

The EIA objectives were not clear. The EIA focussed on the socio-economic and environmental impact of the stadium, but ignored evaluating site alternatives. This did not enable the EIA follow-up to address more than the most basic construction related impacts. The fixed delivery time frame made it difficult for the ECO to enforce the EMP and risk delays. The City of Cape Town removed fines for EMP transgression from the construction contract. The ECO relied on influence, negotiation and cooperation, rather than enforcement to reach adaptive solutions to issues on site.

4.3.7 Research Question 6: Institutional Framework for Effective EIA Follow-up

4.3.7.1 Follow-up Drivers and Facilitation

In Annexure G1 the institutional framework for EIA in this case study was analysed. The applicant in this case was the City of Cape Town, the regulator was the Provincial Department of Environmental Affairs and Development Planning and the affected community was represented by various individuals and organisations. The three drivers of proper EIA follow-up identified by Morrison-Saunders et al. (2003) were all part of this process. The institutional framework facilitated each one of these drivers of follow-up, provided for their needs and for the opportunity to influence and contribute in various ways shown in Annexure G2. The EMP, ECO, external audit ELC and various guidelines documents, agreements and studies that took place after the EIA decision, all facilitated the follow-up for one or more of the three drivers of the EIA follow-up. The integrated traffic management plan for events, for example, was an attempt to respond to the concerns of the community when events are held and traffic and parking disrupts business in the area. The external audit was an attempt from the regulator to understand whether the requirements of the EIA were implemented properly during the project. The concerns of the regulator were allayed by the appointment of an independent ECO to monitor compliance on site. The proponent's concerns were resolved by the cooperation of all parties in an ELC towards negotiated settlement, rather than disruptions to the project schedule.

The Green Point stadium EIA and follow-up process did not fully match Gibson's (2002) description of an evolved process. The EIA included impact assessment and mitigation, socio-economic evaluation and very limited storm water pollution monitoring. It did, however, exclude the evaluation of alternatives and also did not fully integrate the EIA into decision making about the project. In many ways the EIA for Green Point indicated the institutional framework ready to respond to all aspects of environmentally sustainable development, but failing by being constrained by the proponent's intention to expedite the delivery of the project in the intended location.

4.3.7.2 Institutional Peculiarities

In the EIA and development of Green Point Stadium, the local authority was the developer. This resulted in an interesting dynamic of interaction between various parties involved. The City of Cape Town played a prominent role in monitoring and enforcement. The City of Cape Town was the project proponent and would not want to compromise the progress of the stadium construction, which was on a tight schedule ahead of the 2010 Soccer World Cup. This presented a conflict of interest to the City officials from the Environmental Resources Management tasked with overseeing compliance and monitoring on the project.

Apart from the unrealistic requirement to implement an EMS, there was also an inherent conflict of interest in the conditions of approval and operational EMP (OEMP). When the local authority plans events at the stadium in future, a forum of community NGOs must be consulted and plans for event management must be submitted to the local authority for approval of their own planned event by their various Departments (Furnon-Roberts, 2009). The community feels that this self-regulation will result in a lack of oversight and marginalisation of community inputs in decisions in favour of financial gains. This situation will still prevail if the stadium is leased to a private operator, as the local authority will depend on a revenue stream from the successful operation of the stadium.

The operation of the stadium was extensively addressed in the EIA conditions of approval. Managing an EMS properly requires skills and resources that are still being developed in the City of Cape Town. A future issue will be the mandatory implementation of an Environmental Management System (such as ISO 14000) in terms of the conditions of approval of the EIA. The local authority has implemented a Compliance Monitoring System, which serves to achieve some of the objectives of an EMS without the requirement for external accreditation. The local authority already had to take on far wider environmental responsibilities than the approving authority with no legislative mandate on this project.

4.3.7.3 Approach to EIA Follow-up

The EIA was an evaluation of the physical, social and economic context beyond the development site and project impacts. There was a commitment to integrate planning and policy across the City of Cape Town to enable this World Cup stadium delivery by the intended deadline.

The potential strategic value of this EIA and follow-up process was compromised by this very commitment. The regional and cumulative context was not evaluated. There was also no evaluation of alternatives and understanding of the environment beyond the selected site as a measure of appropriate site selection. According to the principles discussed by Hacking and Guthrie (2008) in section 2.3.3.2, the institutional framework supported a comprehensive and reasonably integrated EIA follow-up process, but failed in the construction stage to continue to be comprehensive and strategic in its approach and focussed on the development site and its immediate surroundings and on the mitigation of construction impacts only.

4.3.7.4 Evaluation of Research Question 6

All the role players of EIA follow-up were provided with opportunities to participate in the EIA follow-up. Despite institutional peculiarities, all parties cooperated well within the established institutional framework by means of mechanisms such as the ELC where issues could be discussed and feedback given. The institutional framework was set out clearly in the conditions of approval and was perhaps too onerous to implement immediately, but provided for future implementation of an EMS and energy efficient technologies that will perpetuate the intention of the EIA through flexible management plans, self-regulation and guidelines for future development of infrastructure in the stadium precinct.

4.1.8 Case Study Evaluation

Due to the high profile nature of the development and high level of involvement of the public in this project, auditing of the construction was conducted diligently and most conditions of approval were met. Some decisions of the authorisation, such as implementation of an EMS, are still outstanding. The conditions of approval for this project were substantial and even onerous for a development within an urban environment if compared to requirements currently placed on large or tall buildings in Cape Town. The question remains whether any other type of development, such as a retail centre or hotel, would have had the same stringent requirements imposed, despite their traffic generation, visual impact or footprint size. The City of Cape Town responded to the challenges of implementing an EMS by implementing a Compliance Management System that partially achieves the envisaged objectives of an EMS in compliance with the environmental conditions of approval.

According to Morrison-Saunders and Arts (2005) follow-up in EIA internationally focuses mostly on large projects in vulnerable environments. They propose that all EIAs should be followed up effectively by inter alia allowing for more pro-active remedial action and better documenting of findings and experience to allow for learning from one project to another. Further to their point, it would also be important to assess the impact of projects cumulatively. Some smaller activities would not trigger EIAs, but together their cumulative assessment could reveal significant, unexpected impacts on the environment. The EIA follow-up process served an important construction impact management and public relations purpose during the construction of the stadium.

This project was the subject of comprehensive public scrutiny. Few aspects of the selected location were therefore left un-researched. This apparent thoroughness was less due to a myriad of possible unforeseen impacts, and more due to the public interest, objections and high visibility of the project. The investment in scoping and evaluation prior to the project and especially the wide public participation process and appeal, attempted to ensure that most impacts on the selected site were addressed sufficiently before construction. The EIA process served as a public relations tool, more than an investment in environmentally sustainable development. During this public relations process the decision to locate the stadium had already been taken (Furnon-Roberts, 2009). The EIA served the unusual purpose of mitigating the public perception and -relations impact of the stadium development on this site. It did so effectively, according to a community representative (Furnon-Roberts, 2009) and the ECO (Sasman, 2009a).

The evaluation of alternatives was done unilaterally before an EIA was undertaken to assess impact of the three so-called alternatives, being no stadium development and two layout options within the same site. The EIA was thus not material in decision making, but a motivation or vindicator for the project by the developer, the City of Cape Town. The broader public understood and responded to the EIA as such and this detracted from the validity and credibility of the process (Barbour, 2006).

The risk is relatively low for development in an already urbanised context. The impact of a stadium urban park and road developments on this urban context was not complex. Both of these factors contributed to the EIA follow-up process being effective despite the sizable construction contract.

4.4 Simonstown Naval Submarine Escape Training Building

4.4.1 Case Study Introduction

Simonstown Naval Base is located in the coastal village of Simonstown, 45 kilometres south of the central business district of Cape Town on the False Bay coast of the Cape Peninsula. The EIA for the construction of a submarine escape training building was commissioned by the National Department of Public Works for the South African Navy on government property. The EIA was approved in 2008 and the decision authorised this building, which is a large dive tank with a bell for submarine escape training, offices, changing rooms and storage facilities. An appeal by the community against the location of the building was overturned in 2009. Construction on Erf 3765 and Erf 3767 Simonstown in the West Dockyard (GPS coordinates 34° 11' 31.37" South, 18° 25' 45.28" East) commenced in 2009 and was finalised in 2010.

4.4.2 Research Question 1: Correlation between Mitigation Measures and Actual Impacts

4.4.2.1 Predicted- and Actual Impacts

Annexure A4 reflects the analysis of the mitigation measures based on the predicted impacts from the EMP document and the actual impacts that occurred on site during construction. The EIA predicted typical construction related impacts that correlated fully with actual impacts that occurred on site. These impacts were generally related to storm water, waste management and spill containment (Ninham Shand, 2008). There is a positive correlation between the predicted and actual impacts.

The EMP contained only mitigation and inspection procedures. There was no provision for monitoring or external audits, as recommended by Hill (2000) to be included in proper EMPs.

4.4.2.2 Effectiveness of Visual Impact Mitigation

The EIA revealed that the proposed submarine escape training building had two significant impacts, being construction pollution in the adjacent small craft harbour and beach, and the visual impact of the 25 metre tall structure. The building is in essence a machine or functional building with an industrial façade, between the historic naval buildings in the West Dock Yard (Eitzen, 2008). A small wooden office building adjacent to the existing dive training tank and diver training school was demolished (Photograph 6). The new structure was erected on the harbour edge amidst older historic Naval buildings (Photograph 7).



Photograph 6: Simonstown - View of West Yard Diving School before construction (Eitzen, 2008)



Photograph 7: Simonstown - View of construction in progress (Pillay, 2010)

The visual impact caused particular concern with two local NGOs, the Simonstown Historic Society and the Simonstown Architectural Advisory Committee, arguing that the preferred location should be in the more operations-centred and less historical East Dock Yard (Dommissie et al., 2009). The two NGOs also submitted alternative design proposals to the design consultant team (Erickson, 2008) for building fenestration that is less obtrusive and more in keeping with what was deemed to be appropriate by the community. These proposals were not discussed or given consideration due to project time constraints, indicating that the iterative process of developing designs based on impact assessment, failed (Researcher's own observations, 2009). Furthermore, the responsibility on the project proponent in terms of the environmental legislation to evaluate alternative locations was not enforced. Only the selected site was evaluated in the EIA. This issue was raised by the community when proposing that the facility be located in the East Dockyard, an area of less historic significance (Erickson, 2008) with no resolution.

The visual impact was the only significant impact that required mitigation measures outside of those already in the EMP and method statements addressing the typical construction pollution issues (Ninham Shand, 2008). Due to the visual impact assessment being rejected by the SA Navy and the design team ignoring input from the public and visual specialist, the opportunity for design changes or mitigation was lost (Researcher's own observations during project site meetings, 2009 to 2010). During follow-up, the ECO unsuccessfully attempted to influence the design of the building during final materials selection and detailed interpretation of the construction bill of quantities. The EIA and design process had no iterative component where the design attempted to respond to issues raised during the assessment and public participation process (Researcher's own observation, 2009).

4.4.2.3 Evaluation of Research Question 1

The incidents of pollution that took place in this case study were all predicted, mitigated and resolved using the EMP. The visual impact was predicted, but there was no link established between the impact assessment and design solutions in order to attempt to mitigate through location alternatives, design, height or appearance. In summary, the correlation between predicted and actual impacts was positive, though not all impacts were resolved. An effective EIA prediction process is necessary, but does not always lead to the achievement of the EIA objectives.

4.4.3 Research Question 2: Compliance with Conditions of Approval during Construction

4.4.3.1 Compliance and Type of Conditions

The conditions of approval (Department of Environmental Affairs and Tourism, 2008) in Annexure C and the EMP (Ninham Shand, 2008) formulated and contained standard compliance conditions relating to the prevention of construction site pollution and management of storm water.

According to the analysis of the ECO inspection reports (Annexure B4), satisfactory compliance was achieved, apart from a few isolated pollution incidents noted in the reports (Aurecon, 2009). Some oil spill incidents were recurrently reported, but the ECO gave a compliance rating of 90-100% in the final quarterly audit report for the level compliance achieved.

Only one flexible management condition was included in the conditions of approval for this case study. This condition allowed for the development of an EMP and various method statements after the EIA, when there was more information available about the project design and construction process. All other conditions relating to the construction activities on site were control type conditions. The only incident of on-compliance recorded was a failure to report an incident of pollution into the sea to the Marine and Coastal Management authority. The incident was relatively minor and the ECO resolved the issue with the contractor. Partial compliance was noted by the ECO in two cases when, firstly, method statements were compiled and submitted for approval at a later stage than intended by the conditions of approval. Secondly, it was noted that sand bags placed around the construction site to prevent erosion of the beach and water run-off were not maintained properly.

4.4.3.2 Evaluation of Research Question 2

A high degree of compliance was achieved with minimal detrimental impact to the environment from construction pollution. The conditions of approval made sufficient provision for follow-up procedure, communication, monitoring, public liaison and the formulation of environmental specifications. Monthly inspections were conducted and quarterly reports were submitted to the approving authority by the ECO. Registers were kept on site for incidents and complaints, although this area has no public access and complaints from the community could only reach the register if reported telephonically to the ECO. The ECO ensured that workers were provided with awareness training. After the appeal was turned down, the proponent refused to engage with the community on any issue during construction. The ECO was available and approached by the community, but did not have the legal position in the construction process to resolve possible issues with the proponent or contractor. The legal power given to the ECO in the environmental legislation was not carried through to the construction contract.

4.4.4 Research Question 3: Prevalent challenges with EIA Follow-up

In the Simonstown case study, the EIA was conducted to comply with legislation after the design was already completed and the tender and construction required an environmental authorisation to proceed (Researcher's own observation in 2009). This delay was raised with the EIA consultants in a meeting with the Commanding Officer of the Naval Base Simonstown in 2009, where the environmental consultants were criticised for delivering the legally required EIA public notices to property owners within the visual cone of the proposed building. During this meeting the consultants and visual impact specialist were blamed for the project delays and objections against the project.

They were advised that the cost and feasibility constraints of the project were exacerbated by their actions during the visual impact assessment and public participation exercise. This is an indication that the project proponent viewed the EIA merely as a step before building rather than an iterative process to arrive at a responsible design (Researcher's own observation during 2009 meeting between SA Navy, Department of Public Works, visual impact specialist Bruce Eitzen, representatives from Denell Pty(Ltd), Dr. Bruce Gowans and Ninham Shand Environmental Consultants).

The most prevalent challenge during follow-up in this case study has been the sharing of information between the SA Navy and the enquiring public (Dommissie et al., 2009). Different legislative requirements exist relating to what design and construction related information can be put in the public domain without compromising SA Navy requirements for information security. The design of the built structure housing the submarine escape training simulator is a functional building responding to the mechanical needs and the purpose of the training. It is difficult to allow information about the design aspects to become public knowledge. An iterative process of communication regarding the reasons for certain less sensitive or secretive design decisions, such as whether the staircase outside is enclosed or open or whether the shape of the top section of the building can change, could have been done without sharing sensitive information on the detailed working of the building. The developer and consultants did not find it necessary to establish a relationship based on trust with the NGOs and public commenting on the EIA and the affected parties during construction.

One such example in this case, was the request from the interested and affected parties for written reasons why the building cannot be lower than it is currently, in order to keep it from protruding above the current average building levels in the West Yard. Making it lower would mean that it is less intrusive if seen from the residences above and behind the Dock Yard looking onto the harbour (Department of Environmental Affairs and Tourism, 2008). The inside of the submarine escape training simulator must resemble the actual submarine interior and working equipment to be realistic and relevant to the submariners receiving training. To declare reasons or details for the height of the building and talk to NGOs about the technical aspects of the design could reveal sensitive information and the SA Navy prohibited the release of any such details to the public. With a more facilitative attitude and permission from the SA Navy, some information could have been shared without revealing navy secrets. The ECO was put in an unsatisfactory situation in responding to- and managing public enquiries and opinion on the project (Researcher's own observation during 2009 and 2010). Marginalising some of the follow-up role players for the dubious reason of government secrecy is not directly related to follow-up, but in principle the same challenge impacts on follow-up, because of the breakdown of communication and cooperation if trust cannot be established between the ECO and the community surrounding a development. This trust was critical to avoid an appeal and delay in construction in the Simonstown case and ultimately compromised the feasibility, implementation and delivery schedule of the project (Researcher's own observations during 2009).

4.4.5 Research Question 4: Comparison of Case Study and Best Practice Principles

4.4.5.1 Best Practice Analysis

Annexure E4 shows the analysis of the Simonstown case study against international best practice and principles. The outcome was a score of 58% indicating a relatively poor process when compared to international best practice and principles. The project-based pollution prevention component of the EIA follow-up was moderately successful, but there were issues around transparency, public participation and cooperation. There was a shortcoming in the EIA follow-up with regards to cumulative impact and evaluation of impacts beyond the project. There was also no baseline research and monitoring to establish impacts during construction or operational stage.

4.4.5.2 Poor Cooperation and Participation

The project-based (micro-level) follow-up process during construction was made mandatory by the environmental authorisation (Department of Environmental Affairs and Tourism, 2008). Although the participation of the environmental consultant and ECO during the construction process was contested in more than one site progress meeting by the design team and principal agent, the ECO maintained a regular site inspection schedule (Researcher's own observation in construction progress meetings held in Simonstown during 2009). No monitoring (measuring against a pre-determined benchmark) or external audits have taken place.

The EIA was limited in its transparency, but at least involved the community in a consultative, if not in a participatory capacity (Dommissie et al., 2009). There was, however, no cooperation or involvement with the community during follow-up. Clear role definition and an objective orientated approach to the follow-up provided the ECO with some influence during construction, but the proponent and contractor largely ignored input and proposals from the ECO and excluded the EMP and method statements from the construction contract. Incidents of transgressing the EMP were resolved when pointed out by the ECO, but some oil spill transgressions remained unresolved despite repeated reporting and requests from the ECO.

4.4.5.3 Evaluation of Research Question 4

The EIA follow-up for the project fell short of the requirements of international best practice and principles. Expectations for follow-up beyond the project were not met. The case study could be said to be ineffective when compared to the follow-up expectations in literature on the basis of its failure to address transparency, public participation and follow-up beyond the project boundary and the construction stage.

4.4.6 Research Question 5: Adaptive EIA Follow-up Process

4.4.6.1 Criteria for Adaptive Management

From the analysis in Annexure F4, it was determined that the case study failed the comparison with the criteria set (Noble, 2000; Cantor and Atkinson, 2010) with a score of 20%. The EIA allowed for a measure of flexibility in formulating methods and measures to address impacts during construction and also set clear outcomes for the EIA process. Other requirements for adaptability were not present in this follow-up process: these included an adaptable management response to the follow-up, monitoring against a baseline database of the state of the environment and impact thresholds, a mechanism for learning and feedback to a knowledge database on EIA and the wider environment and finally, collaboration between all parties involved with follow-up.

4.4.6.2 Integrating Compliance with the Construction Contract

The planning and design consultants for the project took little cognisance of the EIA process, which itself was rushed to attain the planned tender date. One of the most significant problems with the construction EMP for this project was that it was excluded from the tender documentation for the contractor, making it impossible to institute the mitigation measures and approved fines in the EMP (Ninham Shand, 2008). On 21 October 2009 the ECO's inspection report indicated that the contractor was pumping the accumulated rain water from the construction site onto the harbour quay and that this polluted water was flowing onto the beach and into the sea, causing erosion of beach sand. No fine could be imposed. The standard construction contract and government tender documents certainly facilitate the environmental management plan in the elementary cost estimates and specifications that are included in the tender and can be costed and the risk assessed by the contractor. This specification was, however, omitted from tender documentation in this case.

A clear channel of communication was established initially between the ECO, architect, project manager and contractor, but subsequently failed when incidents occurred on site warranting action by the ECO against the contractor for compliance to the EMP. The reason for this failure can be attributed to the resistance to the EIA process by the project design team, believing this government project to be too important to be delayed by the environmental impact assessment and management process (Researcher's own observations in 2009).

The environmental awareness training called for in the environmental authorisation of this case study (and most EIAs in South Africa) is expensive and not practical (Researcher's own observations during 2009 construction initiation stage). It is problematic to get the entire contractor's staff and also the sub-contractor's staff on site at the same time and with time to spare. Usually it must be scheduled for a day before works proceed. Some sub-contractors are appointed at later stages of construction and the permanent staff component fluctuates.

The problem was remedied in this case study by making environmental awareness training part of the normal mandatory occupational health and safety induction for all staff that work or visit on site at any given time. The ECO resolved this logistical issue well and achieved compliance with a time and cost saving for the contractor by not demanding separate EIA awareness sessions that disrupt works.

Certain method statements called for by the ECO on this project took time to be submitted by the contractor. The reason for this delay was the approval from the local authority for the proposed method statement for disposal of treated cement water into the municipal storm water system. This delay became apparent when there were delays in the contractor's programme. The contractor transgressed the EIA decision and EMP when work continued with certain mitigation measures still pending approval by the local authority and ECO. Approval of method statements should take place as soon as possible after site hand-over, so as not to place the contractor in a position where he has to work to maintain his schedule, but cannot abide by the mitigation measure. This takes negotiation and timeous intervention from an active and involved ECO and cooperation from all authorities involved with the approval of the method statements.

4.4.6.3 Evaluation of Research Question 5

The EIA follow-up for this case study was not adaptive. Elements required for an adaptive process were omitted from the EIA and conditions of approval. There was no integration of the EIA process and the construction agreements to ensure collaboration between all parties. The ECO did well to resolve a few issues during construction, but in general the follow-up achieved little beyond the most basic pollution prevention. No positive feedback resulted from the EIA or follow-up that influenced the project decisions taken.

4.4.7 Research Question 6: Institutional Framework for Effective EIA Follow-up

4.4.7.1 Institutional Framework Analysis

Annexure G1 showed that the proponent, developer and regulator were all different departments of the national government of South Africa. The Department of Public Works was the developer and property owner, the SA Navy was the client and the Department of Environmental Affairs and Tourism was the regulator. One department regulating another in the same government and at the same level could be seen to constitute de facto self-regulation, because of the inability to refer compliance issues or disputes to the judiciary. The driver of this EIA follow-up process, as defined by Morrison-Saunders et al. (2003), was the regulator. There was no formal ELC structure created or local authority involvement. The proponent did not support the EIA follow-up initiative beyond what was legally forced upon them by the EIA decision. The follow-up was enabled by the requirement for an EMP, method statements and regular audits, but these were not included in the agreements with the contractor.

The Simonstown EIA follow-up process had elements of basic pollution prevention and some level of impact assessment and mitigation, but fell short of Gibson's (2002) evaluation of mature EIA follow-up that addresses broad alternatives, socio-economic impact, and public interest such that these evaluations influence the decisions and integrate with planning of the project.

4.4.7.2 Integration of Follow-up with Construction Agreements

In terms of the construction contract used for this project and common in South Africa, only the principal agent designated in the contract may issue contract instructions or site instructions. This excludes the ECO from the legal contractual flow of instructions to manage the site responsively, as the principal agent is directly responsible for programme management on the project and attaining a positive outcome for the client. The project, contract and legislative framework did not support the follow-up process, due to the ECO having no *locus standi* in terms of the construction contract or having his requirements included in the contract documentation.

The surrounding owners, wider community and local authority were under the impression that, since the project was government initiated, they had no input or rights (Dommissie et al., 2009). The South African legislation (both the National Environmental Management Act 107 of 1998 and the Heritage Resources Act 25 of 1999) stipulates that the State is bound by its legislative requirements. Most of the objecting NGOs and wider Simonstown community accepted the project as a *fait accompli*. This perception that the community had no role to play during the construction phase of this government project is significant to note in this case.

4.4.7.3 Approach to EIA Follow-up

The approach to EIA follow-up in the Simonstown case was limited to the pollution prevention and not comprehensive in evaluating the social, physical or economic impacts. There was no integration of government departments or -spheres, as the local authority was excluded and the regulator was located in another province. The town planning, heritage, tourism planning and any other policy or initiative was ignored. There was no attempt to integrate the project with the community, immediate environment, policies, planning or even bulk infrastructure requirements. The EIA and follow-up was responsive to pollution prevention incidents on site. There was no regional or cumulative impact assessment, baseline study, monitoring or understanding of the sensitivity of the coastal harbour environment within which this facility will function (the building itself acts as a facility for simulation of submarine escape training). The stakeholders beyond the design and construction team were not privy to any part of the project that was not legally required to be made public in the form of public notices, or solicited in issues or complaints registers. In this case, judging by Hacking and Guthrie's (2008) discussion of an institutional framework enabling approach to EIA follow-up, it could be noted that the institutional framework acted to effectively limit the influence of the EIA follow-up in order to avoid delays or design changes in the project.

4.4.7.4 Evaluation of Research Question 6

The institutional framework in this case study did not allow for EIA follow-up to be adequately integrated with the project. There were various institutional anomalies where the requirements for EIA follow-up were ignored so as not to cause delays to the project. Public participation was absent during follow-up, due to the ECO having no power to integrate requests and input from the community with the project decisions. The ECO had power to act on behalf of the regulator in terms of the environmental legislation, but the proponent excluded the contractual commitment to integrate environmental input with the project. One government department basically failed to regulate another, with the public, local authority and NGOs being powerless to influence the EIA or project decisions before- or during construction. The community appealed the EIA decision and this caused a substantial delay in the project and operations of the client. This delay could easily have been avoided, had the client and proponent shared information and used persuasion rather than ignoring the community and trying to avoid the EIA process.

The institutional framework for government projects are a concern in South African EIA. Although the legislation requires the government to be bound by it, this case shows how the integration of environmental input to project decisions is avoided. One department or sphere of government cannot legally act against another. There needs to be an institutional framework in place that is capable of ensuring the effective regulation between the different departments and spheres of government.

4.4.8 Case Study Evaluation

The Simonstown case study is an example of EIA prediction that was accurate and correlated with the impacts on site. Compliance was to a large degree achieved and effective, but with little provision for adaptability in the type of conditions, being mostly control conditions. Compliance was challenging, given the inadequate institutional framework to make the proponent and contractor accountable and to include the community in the follow-up.

The EIA follow-up was effective from a project related impact point of view, but achieved little beyond the project itself in terms of cumulative impact, monitoring against a baseline and learning from the EIA process. There was no provision made in the institutional framework for public participation during follow-up and the ECO could not influence the project decisions during construction. The adaptability of the follow-up was poor when compared with best practice guidelines and principles.

This EIA process could have been successful in unlocking problematic public relations issues in the sensitive historic setting of the Simonstown Harbour West Yard. It could have involved, informed and positively influenced the community's attitude towards the project, rather than mitigate the fairly low risk of pollution or damage to the environment.

The involvement of the community by the project team during the EIA turned out to be tokenism more than sincere and considered participation, leading to a community appeal against the authorisation of the project by the approving authority. This appeal was later overturned by the National Minister of Environmental Affairs and Tourism, but significantly delayed the project. The client was prevented from spending the allocated funding for the project and the implementation of training of submariners was postponed by a year (Researcher's own observation during 2009 community appeal process based on interactions with the project manager and design team).

Although the environmental impact was less significant from an ecological point of view and more visual- and heritage related in nature, the management of relationships between NGOs in the town and the government (developer) and SA Navy in the EIA was important for the timely delivery of this project. The normal building control process of the local authority, the town planning scheme and integrated planning process and other forums do not function properly in Simonstown (Dommissie et al., 2009). The community reported during interviews that the Historic Society and Architectural Advisory Committee inputs are rarely considered by local authority or the provincial government heritage authority. Similarly these authorities reported during interviews that the national government rarely abides by or consult on their requirements for state projects (Greenwood, 2009). The EIA in this case study could have created a conduit to channel and address public concerns and resolve possible delays with the project due to objections, more than preventing pollution or detrimental environmental impacts. This opportunity was, however, not taken up by the developer. The public participation process could have been more important than scoping or prediction of impacts. The resulting public relations process (in essence a consensus-building exercise) is important with problematic projects that draw in-principle objections. The consultant team missed an important opportunity to build consensus with the NGOs. The perception also simultaneously existed with the developer and design team that they could force the project through without consideration of the NGO inputs, because the project is a government project by a government department for the Navy on government property (Researcher's own observation during 2009). This was clearly an incorrect assumption as construction was delayed significantly by the subsequent community appeal against the authorisation granted for the project, although the developer and client was late coincidentally with funding the construction. This decision indicates poor risk management on the part of government where public funds are involved.

5. Consolidated Evaluation of Research Findings

The hypothesis for this research was formulated as follows:

EIA follow-up in the cases analysed is effective in ensuring an adaptive EIA process that bridges the divide between prediction and the environmental reality during construction.

This hypothesis was tested by using the research questions formulated to analyse the case studies and evaluate their consolidated outcome. The research questions relate to observing and analysing:

1. Correlation between predictions and actual impacts
2. Compliance with conditions of approval during construction
3. Prevalent challenges with EIA follow-up
4. Comparison of case studies with best practice and principles
5. Adaptive EIA follow-up process
6. Institutional framework enabling effective EIA follow-up.

Each aspect of follow-up was analysed by means of this analysis through the research questions in order to test the research hypothesis. The analysis of each case study and its summarised evaluation in Chapter 4 must be read together with Annexure H in which the analysis of each case study against the research questions posed is summarised for all four cases together. In Annexure H, the performance of each case against the research questions is expressed in tabular format. Each research question for each case was provided with a symbol indicating either a positive, neutral or negative outcome based on the analysis and evaluation. The evaluations that led to each symbol are discussed in this chapter.

5.1 Correlation between Predictions and Actual Impacts

5.1.1 Correlation as an Indicator of Effectiveness

In the four case studies evaluated, the mitigation of predicted impacts correlated to a high degree with the impacts that arose during construction. The correlation in predicted impacts and actual impacts did not always mean that the goal of EIA was achieved. This was due to the occurrence of unforeseen or cumulative impacts. Although EIA was done in all four case studies, it is shown that this scoping was flawed in at least two cases, for example in the Eden on the Bay case it was illustrated how the major impact of seepage of water onto the beach was not identified in the impact assessment and mitigation. In the Green Point case the soil pollution impact emerged during construction.

In complex natural systems, predicting impacts can never be completely accurate and effective, as discussed in section 2.3.1. Prediction of impacts and formulation of mitigation does, however, form an integral part in assessing and preventing a range of more obvious impacts and creating a framework or culture for conservation through the legal implementation of management plans. The EMP conduit or mechanism cannot be used in isolation, as is currently common practice in South Africa. It needs to be preceded by integrated forward planning (environmental management frameworks, strategic environmental assessments and benchmarking the baseline state of the environment), as well as flexibility and structured incentives for compliance to balance with the control conditions and regulation. The fact that predicted impacts and mitigation measures correlated with arising impacts has been shown to be insufficient to make EIA follow-up effective in achieving the objectives of EIA.

5.1.2 Focus on Receiving Environment

Detrimental impacts can occur from activities that did not trigger an EIA process by being listed in the published regulations. Similarly, relatively little damage can occur from large projects in an urban environment, like the Green Point Stadium, that do require EIAs. EIA should move beyond the use of thresholds and magnitude to assess significance of impacts (Wood, 2008). The type or size of a project is less important than its context. Kaufman (1993) indicated that impacts on natural systems are unpredictable, not proportional to the size of the intervention, and can be irreversible. The sensitivity of the receiving environment should rather be the focus in deciding when EIA is required.

The Eden on the Bay case shows the limitations of triggers and thresholds as initiators of EIA instead of focussing on an analysis of the receiving environment. The need for improved scoping and evaluation and more strategic integration in EIA, and between EIA and planning, is illustrated in this case study. The Duikersvlei case is an example of how follow-up can be effective in the right context – that of determining the baseline of the environment affected, having the correct balance between incentive and control, doing all the required types of follow-up and thus ensuring feedback on all levels, not just focussed on the project itself. All four cases show that EIA assessments generally correlate with the impacts that arise on site, except where the impact is due to cumulative or regional effects that go beyond the project and arise due to other failures in EIA or due to poor scoping and evaluation. There may be too much focus currently on legal triggers and subsequent prediction of impacts, rather than focussing on the analysis and understanding of the receiving environment.

Attempting to achieve the fullest understanding of the environment without over-investing in data-gathering is important, but as Vught (1989) pointed out, it is equally important to invest in an adaptable management system to cope with the reality of not understanding the complexities of the impact on the environment. Follow-up plays an important role to achieve this adaptability. The necessity for an EMP and its level of customisation and on-site management must be dependent on the sensitivity and complexity of the receiving environment. It is evident from the Eden on the Bay case that cumulative impact assessment should inform impact evaluation and mitigation.

In South Africa, EIA is currently initiated based on categorised activities or thresholds in the regulations of the applicable law and regulations. The level of cooperation between the ECO and the design and construction team on site must also depend on the complexity of the environment and not only legal parameters. Integration of the EIA and design in tender and construction stages should be emphasised to empower the ECO and facilitate interaction and cooperation and not exclude the positive influence of the EIA on consent decisions, as was the case in the Green Point and Simonstown cases.

5.1.3 Improving the Quality of Prediction

Effective impact assessment is a prerequisite and direct contributor to effective EIA follow-up. According to the South African EIA effectiveness and efficiency study (DEAT, 2008), the quality of impact assessment reports was found wanting. Similarly, in Portugal and Spain a study of EIA report quality revealed shortcomings in the evaluation of alternatives and description of mitigation measures. In general the quality of reports were found to be below the standards required by the European Union Directive 337/1985 that originally imposed the requirements for EIA on EU member states (Canelas et al., 2005). Learning from other countries, in South Africa this important first EIA phase can be improved to arrive at more meaningful EMP documents and follow-up requirements.

Prediction has been shown to be theoretically and practically flawed and cannot be relied upon to be the sole solution in effective EIA and follow-up. The case studies illustrate that correlation in predicted environmental impact and environmental reality does not necessarily lead to achieving the goal of the EIA. As indicated by Vught (1989) some degree of corroboration can indicate good prediction and if the cautious and pragmatic approach propagated by Van Staal (1989) is adopted, some degree of inductive argument can be made in prediction. Fatmi and Chow (1989) indicated that for systems with a relatively slow rate of change, prediction is more reliable. The quality of the impact assessment process should, therefore, still be improved upon as a first measure to improve EIA follow-up.

In less sensitive receiving environments, an iterative EIA process will lead to design and planning that already mitigates most impacts before construction, because of the positive influence of the impact assessment on the design. Here EMP becomes a tool to prevent pollution or damage and allow for flexibility and unforeseen events. Developers should be allowed to exercise their existing rights without costly EIA and monitoring programmes imposed on them in an environmental context where it is not warranted. New developments should be evaluated carefully, but using the receiving environment as a guide rather than thresholds in the law or attempting to list every possible trigger or activity that will justify an EIA to be done. This could assist in acceptance of EIA and especially follow-up with proponents of projects and activities.

Related to the quality of prediction is the quality of an EMP that forms part of the EIA decision and emanates from the EIA. In the four cases analysed, all included mitigation and inspection procedures.

Hill (2000) suggested that EMPs at least include monitoring of compliance and monitoring against baselines to evaluate impacts during implementation. These requirements were only evident in the Milnerton case study. Hill further proposed the inclusion of external audits, for which provision was made in the Eden on the Bay and Green Point cases only.

5.1.4 Consolidated Evaluation of Research Question 1

In complex natural systems prediction is not always accurate. There should be a focus on the sensitivity of the receiving environment. This must be done keeping in mind that over-investment into the analysis and prediction stage would not necessarily be as effective as properly resourced and structured follow-up that is adaptable, incentivised and balanced with control.

Although correlation between mitigation measures and actual impacts was mostly positive in the cases analysed, it did not necessarily indicate an effective EIA process. The EMP is currently used in isolation to respond to unforeseen impacts. The quality of EIA assessments and the proper alignment and integration of the EIA with the project process can address this issue more effectively on a project-level. On a macro-level it is necessary to focus on adaptive management and cumulative evaluation of impacts beyond the project level. The first research question can thus be answered positively in that correlation exists between mitigation measures for predicted impacts and the actual impacts. This does not necessarily mean that the goal of EIA (being environmentally sustainable development) was achieved. There remains a need for an adaptable and improved EIA process that can deal with unforeseen events and cumulative effects.

5.2 Compliance with Conditions of Approval during Construction

5.2.1 Compliance Management in the Case Studies

The consolidated evaluation of compliance for the four case studies analysed in Annexure B is summarised in Table 4:

Table 4: Consolidated Case Study Compliance Evaluation

Case Study	Types of Conditions	Compliance	Evaluation
Eden on the Bay	Flexible Management (10) Control (10)	Non-compliance (1) Partial Compliance (4) Full Compliance (15)	Flexible Management conditions not taken forward. Regulatory enforcement weak.
Milnerton	Flexible Management (4) Control (4)	Non-compliance (0) Partial Compliance (0) Full Compliance (8)	Incentive-based approach. Good cooperation between parties. Clear objectives based on monitoring.
Green Point	Flexible Management (4) Control (3)	Non-compliance (1) Partial Compliance (2) Full Compliance (4)	Provision for adaptive management approach leading to higher compliance. Weak enforcement due to conflict of interest in regulation of project. Unreasonable (flexible management) condition for EMS not achieved.
Simonstown	Flexible Management (1) Control (10)	Non-compliance (1) Partial Compliance (2) Full Compliance (8)	Non-compliance and partial compliance limited to administrative mis-alignments or recurring, but low threat level pollution.

The following emerged from the analysis and evaluation of compliance with conditions of approval:

- There was a good balance between control conditions and flexible management conditions.
- Non-compliance was limited to singular instances related to administrative actions and not construction related activities (for example, not conducting annual audits at Eden on the Bay, not implementing an EMS at Green Point Stadium and not reporting an incident to the coastal authorities at Simonstown).
- There was a significant incidence (20% in the case of Eden on the Bay, 28% in the case of Green Point Stadium and 18% in the case of Simonstown) of partial compliance, indicating possible shortcomings in the EIA process or institutional framework and not the proponent's willingness to comply. Most instances of partial compliance were related to additional studies, evaluations or methods that were required to be formulated (eg. Eden on the Bay and Green Point) or with the inclusion of these into the contract (eg. Green Point and Simonstown).

Although some non-compliance was related to cost savings, construction time frames or contractual issues around the implementation of the EMP, a significant portion of non-compliance and partial compliance related to the process or institutional framework that could not enable compliance. This indicates that compliance may be improved if the institutional framework and administration process in EIA is improved. The focus on regulatory enforcement alone to control or audit compliance could thus shift towards rather enabling compliance through optimising or incentivising the processes for the proponent.

5.2.2 Types of EIA Conditions of Approval

In all but the Simonstown case study, the EIA conditions of approval allowed for a balance between control by the regulator and a flexible management approach by the proponent. Control conditions are only effective if there is sufficient monitoring and enforcement by the regulator. Control conditions do not allow for unforeseen changes and cannot be adapted after approval, unless a new application is made to the regulator. In the case of flexible management conditions, the proponent is empowered to produce plans and methods that respond to changes or unforeseen eventualities as the project or activity develops. The regulator allows for the submission of these plans and statements while the project or activity takes place. In this way the regulator and proponent are still able to influence decisions and actions after the EIA when new information emerges. The burden of control is alleviated by moving some follow-up responsibility to the proponent.

The South African government's regulation of EIA, like other developing countries, has capacity issues. Nepal's experiences with voluntary EIA originated in the 1980s and developed to fully regulated EIAs around 1996. South African EIA developed along a similar time line. Capacity shortcomings are common in developing countries, but an interesting concern was noted that there was no formal requirement in Nepal to submit findings of post-approval monitoring programmes to the authorities (Uprety, 2007). This applies equally to Mauritius where the lack of environmental management plans (containing mitigation of impacts) for activities, no follow-up monitoring of compliance and no account of cumulative impacts have been raised as weaknesses in the EIA process on this island (Ramjeawon and Beedassy, 2004). Where the capacity of the regulator is low, the burden of control after EIA decisions drains scarce resources. Flexible management conditions and incentives can alleviate the burden on regulation capacity.

In China a basic level of post EIA monitoring is compulsory and the cost is shared between the government and the developer. This makes for more effective EIA compliance after decisions are issued (Wang et al., 2003). The socialist market system in China with a reduced rate of competition in development could be the reason for a more tolerant acceptance of these additional requirements. In South Africa, however, the financial burden placed on developers and contractors will inevitably lead to non-compliance if strict compliance monitoring and follow-up action is not in place. Continued over-reliance on regulation may not be the most effective solution. An incentive-based approach, where proponents can benefit from EIA and follow-up, is an important consideration for governments of emerging or developing countries.

Although the Cape Town case studies had flexible management conditions, none of them took full advantage of the opportunities offered for EIA to influence decisions during construction. In the case of Simonstown, this influence was actively avoided. In the case of Green Point the burden of implementing an EMS was too onerous on the proponent, and in Eden on the Bay the studies and plans allowed for after the EIA were only partially completed.

Although the presence of flexible management conditions in the case studies indicates a positive trend, the practice and process around these conditions still need to be developed further with consultants, proponents and regulators so that their benefits can be optimised. Incentives and flexible management conditions in combination could be the key to overcome capacity shortages in regulation after EIA decisions are taken.

5.2.3 Compliance Management in South Africa

The erstwhile South African Department of Environmental Affairs and Tourism (DEAT) conducted an EIA effectiveness (ability to meet the legislated goal of sustainable development) and efficiency (time implications) study to mark ten years of legislated EIA practice in South Africa (DEAT, 2008). This study assessed EIAs conducted in terms of both the previous (1997 to 2006) and current legislation. The findings of this study were, however, limited to the EIA process up to the decision stage and focussed mainly on the quality of reports, assessment of alternatives, meeting the requirements for public participation and the approving authority's performance in the EIA process up to the decision stage. The DEAT study found that the South African EIA system was only marginally meeting the requirements of the legislation. The study cited many shortcomings in the South African EIA system and made the recommendations for a more strategic approach to EIA, focussing on cumulative assessment, the receiving environment, a package of tools in EIA, and human resource development.

The area of EIA follow-up (limited in the DEAT study to the inclusion of compliance monitoring and enforcement requirements in the decision) was found to be neither effective, nor efficient. A small component of the study and findings related to EIA follow-up. It was found that compliance monitoring and enforcement was poorly incorporated in 74% of all EIAs done in terms of the new legislation and in 71% of all EIAs done in terms of the prior Act (DEAT, 2008). This reference to EIA follow-up in the study merely relates to how well EIA documents and approvals incorporated requirements and content for compliance monitoring and enforcement to take place and is not an indication of how this compliance monitoring and enforcement actually took place during construction. The latter has not been widely researched in South Africa at the time of completion of this dissertation.

In South Africa, the quality of EIA reports was found to be satisfactory by Sandham and Pretorius (2008) due to the fact that there is a long history of voluntary EIA practice (Wood, 2003). This finding differs from the more comprehensive DEAT effectiveness and efficiency study findings that the reports are generally below standard (DEAT, 2008). Neither study was complimentary of EIA report quality. Apart from failing in the areas of post decision monitoring and compliance and the need for a more strategic approach, Sandham and Pretorius (2008) cite the example of a lack of political will, where a cabinet minister criticised EIA for delays in the construction industry and stated that housing delivery cannot wait for so-called butterfly studies. Such a viewpoint held by a previous Minister of Housing, coupled with a lack of enforcement and strategic planning, does not foster a spirit of compliance amongst proponents. In fairness it should be noted that such views are isolated.

There is, however, still controversy in South Africa with regards to mining and prospecting permits where the Department of Mineral Resources and the Department of Environmental Affairs cannot agree on the legal process required or the applicability of zoning requirements, heritage- or water legislation. This lack of coherent governance leaves much to be desired, since environmental priorities are often second priority to development or exploitation value.

In the South African situation, EIA report quality and prediction is poor and primarily focussed on the project or activity rather than the cumulative impact or wider strategic assessment. Government capacity to properly regulate follow-up is constrained.

5.2.4 Compliance Management Internationally

Non-compliance is a universal problem in EIA. It has been shown that regulation capacity is an issue in developing countries like South Africa. Non-compliance with conditions of approval is not a phenomenon unique to developing countries that have inadequate resources for regulating activities. In the Netherlands a study of 376 projects all requiring EIA follow-up to take place revealed that only 16% had in fact complied (Arts and Meijer, 2005). In a study of MENA countries (21 Arab speaking countries in the Middle East and North Africa) it was found that where legislation was enacted, enforcement was weak and that there were inconsistencies between the legal requirements and practices. The approving authorities were highly centralised, understaffed, inexperienced and low on budget (El-Fadl and El Fadl, 2004). In India conditions for more favourable EIAs are emerging, with a good legislative base, increased awareness and specific requirements being made for a work plan, time schedule and cost for implementing mitigation measures. Like South African EIA, monitoring and enforcement is short on resources, technical skills and man power (Paliwal, 2006). There is no effective enforcement of non-compliance. There is also a project level focus and not enough emphasis on broader strategic environmental management (Lohani et al., 1997). Based on international precedent and the cases analysed, an argument could be made that relying only on regulation and control is not leading to effective EIA follow-up.

In South Africa, conditions of approval are rarely enforced and often ignored, as with the case of Eden on the Bay. In the case of Green Point the expectations for an EMS to be implemented were unrealistic, or not aligned with project planning as with the case of Simonstown. Fines or penalties are sometimes seen by the proponent as a less costly or easier alternative to avoid compliance. The control aspect is currently not balanced with an incentive aspect in EIA follow-up. Little evidence of effective incentives for compliance by developers and contractors could be discovered in literature and practice. It is evident from the Milnerton case study that the correct balance of desired outcomes for all parties involved is essential to achieve effective EIA follow-up. This balance must be built upon a foundation of satisfactory consensus and real benefits.

The reasons behind the lack of enforcement have been well documented and include capacity constraints with regulators. The reasons behind non-compliance by proponents are not so obvious. In Turkey a study was conducted of compliance to environmental regulations in one industrial area in Istanbul. The result of the study revealed four distinct reasons for transgressions, being a lack of enforcement, a lack of civic responsibility, a lack of subsidies or incentives for compliance and finally, negligence or financial inability to comply (Yasamis, 2007). The Eden on the Bay case shares at least two of these reasons, being lack of enforcement and the financial burden of compliance on the profit margins and time frames to delivery for the developer, who in this case was also the de facto regulator due to capacity constraints with the de jure regulator. In Simonstown these same issues emerged when the one government department project's EIA follow-up compliance and enforcement rested with another government department.

5.2.5 Consolidated Evaluation of Research Question 2

As in South Africa, compliance monitoring and enforcement is a common problem in EIA both in developed and developing countries. In the four case studies a proper combination of control type and flexible management type of conditions were imposed with the EIA decisions. The control conditions are vulnerable to the issues of poor government regulation during follow-up. The flexible management conditions empower proponents and alleviate the burden on the regulator. They also deal better with changing environmental conditions during construction. Flexible management conditions were, however, not optimised in all four case studies analysed. The recorded non-compliance or partial compliance happened mostly due to additional studies not being conducted, audits not done on time or exclusion of mitigation measures from construction contracts. In some cases method statements or adaptive solutions were delayed by external factors, indicating a possible need to focus on the administrative or institutional framework, rather than enforcement or control to enable compliance.

5.3 Prevalent Challenges with EIA Follow-up

5.3.1 EIA-Project Alignment

In the Simonstown case study the proponent and design team initiated the EIA during the final stages of the project design, when it became clear that they were legally bound to conduct an assessment of the environmental impact. The EIA regulations required an assessment due to the construction site being on the sea shore. The team appointed an environmental consultant and stated in the briefing of this consultant that the EIA must be approved before the proposed tender date and that no delays to the project would be acceptable (Researchers own observation in project meetings, 2008). The team ignored input from the EIA into the design of the project, disregarded and even avoided public participation requirements and excluded the EMP requirements from the construction tender documentation and contracts.

The implications of a delay due to an EIA were not acceptable to the project team or the proponent. Unfortunately the community felt marginalised during the EIA process and appealed the decision, leading to a delay of almost one year until construction could commence.

In the case of Green Point stadium, the EIA was done after the site had already been selected. The visual and economic impact assessment was of little value, as these studies would usually be included in EIA for the sake of responsible and informed site selection. The EIA only evaluated the impact of the proposal as designed at the selected location. It played no role in informing the decisions about the project. Furthermore, the construction contract documentation excluded some requirements of the EIA and EMP, such as the fines that the contractor would need to pay for transgressing the EMP or causing pollution incidents. The time frame for the delivery of the World Cup stadium was too critical to risk delays.

Judging by these case studies, the key factors preventing EIA from influencing project decisions seem to be the problem of alignment and timing between the EIA process and the project process. The Asian Development Bank (1997) identified the single biggest constraint on EIA performance being the timing of the assessment in the project cycle. Environmentally sustainable development is founded upon the principle of an iterative process between the formulation of a project proposal and the assessment of its environmental impact. The timing of the EIAs in the Eden on the Bay, Green Point and Simonstown cases have indicated in each instance that the proposed project was merely being evaluated in order to get the legal approval to construct the project as designed. The goal of EIA has over decades extended far beyond merely preventing pollution, as discussed in section 2.1.2. In these cases, there was little influence from the EIA to the project proposal itself, only attempts to manage compliance and mitigate detrimental impacts during construction.

Zainal (undated) draws an important parallel between the EIA and construction contract process that illuminates the need for alignment of the two processes on a contractual basis. The cost of mitigation measures must be included in the schedules of quantities, contract administration and tender specifications of the project if they are to be effectively implemented. Environmental consultants must be educated towards a deeper understanding of the construction industry. Major problems according to Zainal (undated) during planning and construction appear to be:

- Divide between the formulators and implementers of mitigation
- Consultants do not comprehend the construction industry
- Mitigation does not take the sequence of events on site into account
- Construction activities are scheduled, yet dynamic and unpredictable
- There is a lack of effort from the proponent and contractor to implement mitigation
- Lack of enforcement at the project site
- Lack of communication between parties
- Tenders and bills of quantities not properly integrated with mitigation requirements

- Inadequate resources for developing and implementing mitigation
- *Ad hoc* mitigation that may be required is not budgeted.

In South African construction contract documentation the architect or engineer is the contractual supervisor of the construction contractor and the lead agent of the project during design, budgeting, tender process, construction, payments and quality evaluation. The ECO has the power to influence the project during construction in terms of the conditions of approval and environmental legislation. In South African construction law, however, only the architect or engineer can instruct the contractor on a development site. The ECO has no *locus standi* with respect to the construction process. Unless the construction contractual agreement is aligned in such a manner as to allow the requirements for follow-up to be included, the ECO cannot impose them.

The environmental consultants need to form part of the project design team from an early stage when the project is conceptualised. This is not common practice in South Africa, as observed in three of four case studies, with Milnerton being the exception. In the Milnerton case study the environmental consultant influenced the design of the project primarily because the project was an environmental rehabilitation project. In the cases of Eden on the Bay, Green Point and Simonstown, the EIA was conducted too late, after each project had been conceptualised in its final form.

A prevalent challenge with EIA follow-up is the proper alignment of the project and EIA at the inception stage. Proper alignment will resolve the problem of timing of the EIA so that it adds value to the project, rather than delaying or influencing it at a stage when the project is too far advanced. Furthermore, alignment will integrate the two processes in terms of decisions, designs and contracts.

5.3.2 Cumulative Impact Assessment

Three case studies show how, despite all legal requirements being met, EIA objectives may not all be achieved. In the Eden on the Bay case study, insufficient emphasis was given to the evaluation of cumulative environmental impact. No strategic environmental assessment existed to guide environmentally responsible development beyond a project level. Cumulative assessment is important, because not all impacts can be predicted or resolved during EIA follow-up for a specific project. The unforeseen impact of water seepage onto Big Bay beach was most likely caused not by one development like Eden on the Bay, but by the cumulative impact of the many developments that together constitute the Big Bay township area. None of the four cases analysed made provision for cumulative impact assessment during the scoping and evaluation phases.

5.3.3 Monitoring Impact against Baselines

In Sri Lanka, a developing country with limited government capacity and resources, attempts to protect its valuable biodiversity through EIA are faced with poor quality impact assessment reports.

Sri Lanka's natural habitats are not placed in regional systems context in studies, but only described locally for each project (Samarakoon and Rowan, 2008). Only 11% of EIAs conducted attempted to describe impacts and then also not using formal forecasting techniques with monitoring after development against baseline values or conditions. In the Cape Town case studies, as in Sri Lanka, this challenge may be indicative of a valid concern in the EIA process that detracts from its over-all effectiveness.

If the receiving environment in Big Bay was researched fully and understood, urban planning could have responded with development proposals that achieved conservation targets for critically endangered biodiversity and preservation of the sensitive coastal dune areas. An SEA for the area, together with cumulative assessment of the developmental impact and research on baseline environmental values and conditions, could better have informed planning than the EIA scoping and evaluation which was shown to be of poor quality and focussed only on the development proposal. It was shown in the analysis of the Eden on the Bay case study that the development did not correspond with the urban planning guidelines or conservation policy of the City of Cape Town. The true environmental impact can only be evaluated after implementation, when the impact is measured against a baseline and the cumulative impact emerges (such as the wet beach problem in Big Bay). EIA follow-up cannot effectively respond in lieu of poor EIA, lack of cumulative evaluation of impacts or baseline information, to address these impacts during construction or operation.

5.3.4 Shifts in Regulatory Power

In three of the four cases (Eden on the Bay, Green Point and Milnerton), the municipality took on the role of de facto regulator during construction. This was most likely due to capacity constraints within the regulator. The City of Cape Town took an active part in ELCs, monitoring of sites, providing assistance to ECOs and even enforcement through limited available means, such as withholding occupation clearances in the case of Eden on the Bay. In other cases, such as Simonstown, one government department is unable or unwilling to regulate another, creating the conditions for non-compliance through exemption from legal recourse.

From the cases analysed, the observation can be made that compliance monitoring became the role of the community and local authority and not that of the regulator. The legislation does not provide for formal compliance monitoring or enforcement by these role players. In order for effective follow-up, the institutional framework should take cognisance of the fact that there are capacity constraints with regulators and that other means of compliance monitoring and enforcement should be facilitated through the community, local authority or ELCs. It is also important, based on the case studies analysed, to create incentives for a developer to comply with the requirements of the EIA during construction, rather than relying only on the power of the regulator to control and enforce.

5.3.5 Consolidated Evaluation of Research Question 3

During the research of four EIA follow-up case studies in Cape Town, it was discovered that there are challenges with EIA follow-up. The alignment of the EIA and project life cycle are not integrated in terms of the timing and process, leading to contractual issues and failure of effective EIA follow-up. The lack of cumulative impact assessment makes it difficult for the EIA follow-up to deal with the arising issues on the development sites, when the impact is not limited to the one construction site alone. Proper follow-up relies on sufficient information about the impact that emerges during construction being available to inform decisions and responses. Without baseline information and values, informed by monitoring that shows how the environmental conditions are changing and why, the decisions and responses will not be informed by a clear understanding of the sensitive receiving environment. In a complex development milieu, the decisions and responses can be based on proven methods or professional experience and knowledge. The challenge of resource constraints within the mandated regulator was noted in the analysis of EIA follow-up of more than one case study. In contrast, the local authority in Cape Town has emerged as a contributing regulator during follow-up, albeit without a legal mandate. It is important to use incentives and not rely only on enforcement. In this way the capacity constraints can be overcome with the assistance of the community, the proponent or the local authority.

5.4 Comparison of Case Studies with Best Practice and Principles

5.4.1 Best Practice Analysis

Marshall, Arts and Morrison-Saunders (2005) formulated 17 principles with which effective follow-up can be compared. Each of the four cases was also evaluated against the criteria formulated by Noble and Storey (2005) and Morrison-Saunders and Arts (2004) to determine their general effectiveness based on best practice criteria in literature. The goal in applying the criteria formulated by other researchers to these cases was to evaluate the effectiveness of follow-up in the four Cape Town cases against what is widely accepted to be international best practice in follow-up.

In the analysis, most cases compared well with the principles and best practice for effective EIA follow-up on project level, but poorly when compared with requirements for follow-up beyond the project. Two of the cases met just over half the requirements for proper EIA follow-up, with the other two cases performing marginally better in achieving almost two thirds of the requirements.

Although scores of around 60% or 70% suggest good performance, it is more important to evaluate the scores from the point of view of essential content and strategic content. In the examples of Eden on the Bay and Simonstown, the case studies fell short of essential requirements for the EIA follow-up to respectively enable the outcome of the EIA or be transparent and inclusive.

In the cases of Milnerton and Green Point, the case analyses indicated good scores for project level EIA follow-up with the more strategic requirements falling short, such as cumulative assessment of impact, monitoring against baseline information to observe and evaluate impacts during construction, project EIAs being informed by an SEA and learning from the EIA process.

5.4.2 Appropriate Outcomes-based Follow-up

The current quality of South African EIA reports is not good. Proper and appropriate investment in research to understand the receiving environment is essential. In the case of Eden on the Bay the failure to do this led to detrimental impacts that the follow-up could not mitigate. Green Point illustrated that comprehensive EIA without the use or application of the studies during construction and follow-up, or having this analysis influence the decisions of the project, is not effective either. In the case studies, the cumulative and regional contexts were not integrated with the EIA and decisions for the project, Milnerton being the exception. EIA follow-up must enable the outcomes of the EIA and include monitoring against those outcomes, not just be aimed at preventing impacts that may have been predicted. This approach will make EIA follow-up a goal oriented, influential and accountable process towards environmental sustainability and less focussed on being a responsive pollution prevention mechanism.

5.4.3 Transparency and Participation

The best practice principles call for transparency, participation of all role players, good cooperation and clear definition of roles during follow-up. Only Simonstown failed all of the above criteria, while the other three cases had varying degrees of inclusion and cooperation of all role players. A formal structure to facilitate this interaction is essential, as shown by the contribution the ELCs made in the Eden on the Bay and Green Point cases. This structure must be initiated during the EIA decision, and its implementation and operation must be adequately monitored by the regulator.

5.4.4 Beyond Project Follow-up

Follow-up takes place horizontally in the EIA follow-up process as site inspections, monitoring and auditing of EIA performance. All of the cases included site inspections based on the EMP requirements. Although Eden on the Bay and Green Point had external audits, the other two cases did not. Only the Milnerton case had monitoring against a baseline understanding of the environment, but even this monitoring was limited to the project and there was no feedback into a larger context or knowledge base.

Follow-up takes place vertically, in that it happens over different scales or at different levels. In the cases analysed it was found that feedback and iterative learning during the construction stage of the project took place at the project- or micro-level.

The environment or practice of EIA benefited very little from the experiences of the follow-up on site beyond the project level at a more strategic macro- or meta-level. There was neither feedback of new information on the environment into other projects, nor vice versa from the development follow-up into the larger planning and science of the environment. Current EIA practice has received the following criticism, as summarised below by Harmer (2005) citing various sources (Lee, 1995; McDonald and Brown, 1995; Sadler, 1996; Glasson, 1999; Harrop and Nixon, 1999; Benson, 2003):

- Inadequate evaluation of alternatives
- Inadequate follow-up (compliance verification, monitoring, auditing)
- Cumulative impacts not considered
- Insufficient public participation
- Poor quality of impact assessment reports
- Limited influence on decision making process.

Harmer refers to follow-up in a limited context as compliance verification, audits and monitoring as part of project level EIA. There is an elaborated view held by other authors, such as Noble and Storey (2005) and Morrison-Saunders and Arts (2004), who see follow-up as an adaptive and highly involved process guiding the EIA between scoping and assessment and the environmental reality on site during construction or project implementation. These authors also envisage follow-up as a process of feedback beyond the project level to legislation and best practice, and towards the ultimate goal of environmental management, that of environmentally sustainable development.

Upon applying the further test of the degree of comprehensiveness, integratedness and strategicness that Hacking and Guthrie (2008) refer to, it was clear that all the cases fell short. The Big Bay township's EIA was not comprehensive enough in its approach to cumulative impacts and investigation of an obviously sensitive receiving environment within which the Eden on the Bay precinct was developed. The EIA and follow-up process was well integrated in the sense that socio-economic, infrastructural and institutional issues were addressed in the EIA and could be managed during follow-up. It was attempted to position the environmental assessment for Big Bay within a layered approach of planning from strategic level down to precinct and plan level, but this failed due to the local authority's inconsistent application of existing strategic planning guidelines, as well as the lack of a wider strategic assessment to guide spatial planning decisions.

The Milnerton case achieved a remarkable degree of comprehensiveness where there was a baseline environmental state monitored during- and after construction without over-analysis and data gathering beyond reasonable limits. Although socio-economic impact assessment was limited, the infrastructure solutions and institutional framework set up for follow-up achieved its purpose. There was no strategic layering of this assessment and monitoring programme into wider programmes for this remediation project as part of a larger initiative, which represents a lost opportunity.

The Green Point case was an example of a comprehensive approach. There are questions about how suited the EIA was to the scale and impact of the project or in taking into account socio-economic, institutional and physical planning aspects. The EIA could not resolve all the identified issues, but during follow-up most direct pollution related impacts were resolved. There was, however, neither a layered approach in strategic planning, nor the evaluation of alternative locations present in this EIA.

The Simonstown case revealed an EIA that was not fit for the level of comprehensiveness required. It focussed on the legal triggers for EIA (the activity being within 100 metres of the high water mark) and not analysing the sensitive receiving heritage and coastal environment. The integration of the follow-up with the project and the level of integration of the project with its socio-economic, institutional and physical environment was possibly viewed as less important, being within an operational naval base. In South Africa, however, the government is bound by environmental and heritage legislation and should follow the same best practices and principles for sustainable development; in fact government projects should set the example. There was also no strategic contextual analysis or layering of policy or plans.

5.4.5 Consolidated Evaluation of Research Question 4

In general the case studies revealed that on a project basis, these EIAs and their follow-up achieved a degree of acceptable effectiveness, but fell short in the context of a more integrated or strategic feedback, principles and practices. There is not enough learning taking place from the lessons of EIA follow-up. Audit reports and external audits are either not done or not paid the necessary attention by the approving authority, except where public opinion and the media creates a sense of priority with government. EIA follow-up does not sufficiently influence implementation decisions and management during follow-up. The ELC is an example of an essential mechanism to enable this influence, negotiation, transparency and cooperation during follow-up. Follow-up is currently driven by the aim of managing impacts rather than enabling the objectives or outcomes of EIAs. It can achieve the latter by taking a more strategic, integrated and comprehensive approach, and placing institutional mechanisms in place to reach beyond only the project.

5.5 Adaptive EIA Follow-up Process

5.5.1 Case Study Analysis of Adaptability

The measure of adaptability observed in the EIA follow-up process was determined by comparing the case studies with the criteria defined by Cantor and Atkinson (2010:290-293) and Noble (2000). The analysis is reflected in Annexure F in tabular format. Although each case study was unique, there were certain conclusions that could be made from the analysis that applied to all 4 case studies.

5.5.2 Flexible Management Objectives

Some management objectives remained flexible in response to the EIA follow-up outcomes in all four of the case studies. This was achieved by incorporating flexible management conditions into the conditions of approval for each EIA. This made provision for the EIA process to respond to changes or the formulation of detailed project proposals after the EIA decision was provided. It also provided for flexibility in addressing arising issues during the execution of the projects. Unfortunately this opportunity was not always realised, as was the case with Green Point and Simonstown case studies.

Noble (2000) noted the requirement of monitoring mitigation interventions to evaluate effectiveness as being an essential part of adaptive management. Noble did not mean mere compliance inspections and external auditing, but actually understanding the environment through baseline research and then monitoring impacts to understand the actual impacts during construction. This would facilitate an adaptive management response that is also effective. Unfortunately this could only be found in one case study, being Milnerton.

5.5.3 Management Objectives Influenced by EIA Follow-up

Cantor and Atkinson (2010) envisaged a follow-up process where the EIA influences decision making and actions during construction, based on the outcome of the EIA follow-up process. This was indeed the case with Eden on the Bay and Milnerton, but the flexibility created with the conditions of approval was not taken forward in the Green Point and Simonstown cases. If there was a good understanding of the receiving environment, EIA follow-up could influence management objectives based on this prior research and benchmarks or targets for the EIA outcomes. In the case of the Green Point stadium the elaborate EIA did not have clear objectives or outcomes, leaving the EIA follow-up unable to influence decisions beyond merely preventing pollution from the construction process.

No evidence was found in any of the case studies of the 'decision-scoping' referred to by Brown and Hill (1995), indicating that there is an opportunity to improve alignment between projects and EIA during the pre-decision stage. Decision-scoping is the iterative impact evaluation and design process. This aspect of EIA was not included in the case study research questions, as this dissertation focuses on follow-up and not assessment. Decision-scoping is not an institutional solution to integrate the EIA and project, but has the same effect of integration during project design stage. Decision-scoping is, however, important in the context of follow-up, because it can address the issue of alignment between EIA and projects that is mentioned earlier as a challenge. In the Simonstown case study high levels of conflict from within the design team prevented follow-up from making a contribution to the project.

At least the follow-up actions can lead to the enforcement of the EMP to prevent pollution. The Milnerton case study was an example of the environmental and project process aligning to enable the

EIA outcome. Eden on the Bay and Green Point could not achieve the same integration and alignment, because there was no iterative process decision scoping during the EIA and project design.

5.5.4 Monitoring of Affected Environment

Cantor and Atkinson (2010) stipulated the use of baseline information and targets as a starting point to measure the impact of construction activities on the receiving environment. Monitoring was included in the follow-up process of the Milnerton and Green Point case studies. The Green Point monitoring was, however, only a small component of the impact, measuring only the pollution levels of water flowing from the construction site to the sea. There was also no baseline value, but thresholds were at least applied to the measurements. There was no provision for monitoring impact against baselines in the Eden on the Bay or Simonstown case studies.

5.5.5 Monitoring and Follow-up of EIA Outcomes

Noble (2000) noted one requirement for adaptive management being how well the interests of all stakeholders are accommodated. In some cases such as Eden on the Bay, a collaborative structure was set up to facilitate this monitoring and follow-up, such as an ELC. In all four cases, the EIA follow-up pursued the intentions of the EMP well and prevented damage from construction activities. Only the Milnerton case had a monitoring programme in place to accurately evaluate actual impact, providing a reasonable level of information for decisions and adaptive responses to arising issues.

The task of monitoring and follow-up of the EIA outcomes was left to the ECO in all four case studies. The EIA follow-up managed to achieve an acceptable degree of effective and adaptable EIA processes at project level. This can largely be ascribed to the important role that the ECO played in coordinating follow-up within the project structures and finding solutions to arising issues. Project level EIA follow-up, when implemented and resourced properly, does result in adaptive EIAs. Projects and construction activities that are under strict contract and on tight schedules cannot be expected to adapt to follow-up if the follow-up does not add value and is not aligned and integrated from the start with the project.

In the case of Green Point, an unrealistic condition for an operational stage EMS was imposed as part of the authorisation, due to the visibility and perceived impact of this, mostly benign urban stadium development. The adaptive management of construction impacts proved to be sufficient in itself in achieving the goal of the EIA without implementing an EMS. In the case of Eden on the Bay, the Big Bay development area could have benefited from an EMS.

In the current legislative environment and reality of insufficient resources, skills capacity or cooperation to implement an EMS (especially given the emerging nature of EMS in developing countries), the EMP and ECO can make a large contribution towards life cycle management, as elaborated by Slinger et al. (2005).

5.5.6 Mechanism for Learning from Feedback

None of the four case studies had any mechanisms for feedback or learning that could be used to improve EIA as a tool or provide information into an environmental database of knowledge for a region or area.

5.5.7 Collaborative Structure for Participation

Two of the four cases (Eden on the Bay and Green Point) had formal structures in the form of ELCs that provided a platform for collaboration between all role players. In these cases the existence and operation of the ELC contributed directly to the effectiveness of the EIA follow-up. In the case of Simonstown there was a malignant intent and in Milnerton a benign intent not to accommodate all stakeholders or more notably the general public.

5.5.8 Consolidated Evaluation of Research Question 5

An adaptable process must have provision for feedback that influences decisions and actions during construction. This process is referred to as an adaptive management approach. This adaptive management approach is enabled by including flexible management conditions into EIA decisions and setting up mechanisms for monitoring the effectiveness of the EIA objectives and impact mitigation. There must also be sufficient facilitative structures for collaboration and negotiation between parties to solve problems and give effect to an adaptive management approach.

Most of the case studies analysed in this research indicated that the EIA follow-up process could adapt to the changing conditions, largely due to the coordinating and facilitating role of the ECO. The researchers of a case study in South Africa (the Great Brak estuary) reviewed the EIA follow-up done on this project over a period of a decade and found that the follow-up is not simply a project or activity step between the EIA towards an integrated environmental management system (EMS) for life cycle management, but in itself proved to be an effective and adaptive management process incorporating a growing circle of participants to solve environmental concerns (Slinger et al., 2005). Other authors have found that the effectiveness of mitigation measures cannot be predicted at the decision stage of EIA (Tinker et al., 2005), making an adaptive process important.

Finally, the adaptive approach should be carried through in contractual agreements and practice.

Cooperation between the developer, authority, community, design team and contractor (such as in the Milnerton case) should be promoted. Exclusion of the EMP and ECO from adaptive responses during construction, as in the Simonstown case and to a degree the Green Point stadium and –common development should be avoided. The elements of enforcement and incentives must form part of this adaptable approach to be effective.

5.6 Institutional Framework Enabling Effective EIA Follow-up

5.6.1 Institutional Framework Analysis of Case Studies

The selected case studies illustrate some of the norms and exceptions to the typical institutional roles and responsibilities in EIA. Usually there is a private client with private property applying to a provincial authority for environmental authorisation for development within a local authority planning context. Exceptions to this typical institutional model can complicate the authorisation and follow-up process. An example was the Simonstown case where a government department applied to another government department for authorisation on government property and excluded the local planning authority and community. Another unusual case was Green Point where the local planning authority was also the developer applying for authorisation on its own property. Finally, in the case of Eden on the Bay, the local authority initiated the development of a large new township area and after authorisation of this large scale plan by the provincial authority, it proceeded to sell precincts to private developers for phased development and took on the role of the environmental regulator. The Milnerton case study resembled the more usual model of a private applicant applying to a provincial authority with more direct input and cooperation of the local planning authority. In this case, however, there was no community participation, but unlike Simonstown, this did not detract from the credibility or effectiveness of the EIA follow-up process.

As summarised in Annexure G1, the following was found in an analysis of the role players in the EIA follow-up process and the institutional framework to facilitate cooperation and decision making:

- In the Eden on the Bay case study, the local authority was proponent, acted as environmental regulator within an effective and formalised ELC structure, and the absence of the provincial environmental regulator during follow-up was noteworthy.
- In the Milnerton case study, a typical institutional framework existed; there was no community participation during follow-up and no ELC, but there were regular role player meetings and the establishment of a MPOA to take operational monitoring and follow-up forward.
- In the Green Point case study, the local authority was the proponent, acted as contributing environmental regulator within the ELC, which was effective as a negotiation platform.

- In the Simonstown case study, the government was the proponent and environmental regulator represented by two government departments, the community and local planning authority were excluded during follow-up, and no ELC or other community structure existed.

Morrison-Saunders et al. (2003) suggested that there are three drivers for follow-up, being the regulator, the proponent and the community. An ideal approach would have all three drivers facilitated and made part of follow-up in order to provide for their respective needs or outcomes. The presence of the drivers and mechanisms to enable or facilitate the objectives of each driver was analysed in Annexure G2. In only the Green Point case could it be said that follow-up was driven by all three parties (the regulator, community and proponent). In this case, the presence of all drivers did not ensure effectiveness of the follow-up process. It was clear where certain parties were excluded in the ELC or from participating in follow-up, or where their concerns and objectives were not facilitated, that the EIA was not fully effective. Annexure G2 reveals that having an ECO and site audit of an EMP is insufficient to enable the outcomes of the EIA. The quality and effectiveness of EIA follow-up was increased by the formation of effective ELCs, external audits and project and contractual alignment with the EIA. These aspects contributed to an effective follow-up process beyond just having an ECO to prevent pollution from construction. The institutional framework facilitated these aspects of follow-up well in the Eden on the Bay and Milnerton cases, with Green Point almost as effective, save for the issues around including the EMP requirements in the construction contract.

Gibson (2002) described a fully matured or evolved EIA follow-up process going beyond mere pollution control, impact assessment and mitigation. He stated that the level of maturity in the EIA follow-up process indicates how well the institutional framework enabled the EIA outcomes. In most cases analysed, the EIA follow-up went beyond pollution control to pro-active impact assessment and mitigation. In the Eden on the Bay and Milnerton cases the EIAs contributed to decisions and were integrated into planning decisions. In the case of Green Point and Simonstown, however, the institutional framework fell short of integrating the EIA into the decisions, evaluating wider alternatives or impacts and considering the EIA outcomes when planning or designing the project. The level of institutional enabling of mature evolved EIA follow-up did not reach the fullest potential in any of the four case studies.

5.6.2 Institutional Capacity

It has been found that the EIA regulator did not fulfil their follow-up responsibilities in all four cases analysed. The local authority took over de facto regulation in the cases of Eden on the Bay, Milnerton and Green Point, with the ELC being an important mechanism to facilitate this role. The capacity of government to support the institutional roles and responsibilities are critical, especially since some authorities lack capacity and skills to accomplish the goals set out for them by the environmental authorisations. EIA follow-up should be adaptive enough to deal with unusual institutional arrangements or capacity constraints.

Where the government is also the project proponent, or where there is internal conflict in decisions on follow-up, the process becomes strained if the institutional framework and legislation is not adaptable.

5.6.3 Independence of the Regulator

The Eden on the Bay and Milnerton cases illustrated the need for base line data prior to EIA and also a degree of independence or distance from the project when monitoring and managing impacts. In Pakistan the legislation interestingly and commendably places equal emphasis on firstly the assessment of the project in detail and secondly the assessment of the receiving environment. Such a good base of information for EIAs originates from the influence of many donor agencies like the World Bank and Asian Development Bank (Riffat and Khan, 2006). In many cases globally, EIAs are commissioned and paid for by the proponents of the activity and the reports and studies generated (although claiming to be objective) aim to motivate and mitigate the activity. Pakistan's Environmental Protection Agency's Regulations of 2000 promote investigating alternatives and the cumulative impacts on the receiving environment. It is unfortunate that this is not applied widely in the country, thus raising critique (Aslam, 2006). The EIA consultants are sometimes inexperienced and the approving authority does not allow for wide consultation and the quality of reports is weak (Nadeem and Hameed, 2006). In short, the practice falls short of its good intentions.

Despite failures in practice, it remains necessary to assess the baseline state of the receiving environment before scoping, evaluation and development. Proponents may produce scientific studies on a project basis, but it is critical for independent institutions or government to have information about the wider receiving environment to be able to make informed decisions that will be more acceptable to the community and affected role players than the proponent's studies and lead to consensus rather than disputes. A good example is the Cape Town Metropolitan Biodiversity Map that delineates sensitive areas and informs EIA and life cycle management decisions. The application thereof was, however, ineffective in the case of Eden on the Bay. Eden on the Bay falls within an area of critical biodiversity and yet its EIAs failed to achieve the goal of protecting biodiversity and reaching the metropolitan wide targets of either conservation or off sets.

In Nigeria, Ogunba (2004) noted a problem where various government departments ignored the requirements set by the EIA legislation upon them, indicating conflict between the spheres of government. EIA is prevalent in private sector developments, but there is a lack of EIA compliance enforcement. The various agencies and legislative requirements have also been noted to be a constraint in effectively applying EIA in Nigeria. These constraints were observed in three of the four cases analysed in Cape Town and was especially noteworthy, because of the unusual roles of proponent, regulator and facilitator in EIA follow-up in these three cases.

The independence of monitoring during construction is a principle required by legislation, but not yet integrated into the project management contracts in law. Currently the ECO or environmental consultant cannot issue site instructions as part of the design team, but the recommendations of site inspections are given to the principal agent or site engineer to execute with the contractor. Legally the process is not robust enough and tends to depend on the relationship between the design team members and how well the environmental consultant or ECO is integrated into this team. In cases where the project time frame, cost or design can be influenced by the environmental consultant or ECO, this relationship is strained, due to the fact that the participation of the environmental consultant and ECO in design and planning has not yet become common practice in South Africa. At the very least in Cape Town this strained relationship is an indicator that the construction inspections are indeed independent. The integration of EIA and empowerment of the ECO can be useful in the future development of contract documentation in the built industry.

5.6.4 Role of the Environmental Liaison Committee

In the analysis of the institutional framework for EIA follow-up in four Cape Town cases, the issues that arose included self-regulation, integration between government planning and EIA, and the alignment of the project and EIA. Each project had an ECO and EMP, but the most value seemed to have been derived from a forum such as the ELC, where negotiations could take place around arising issues. If all parties are involved in this forum, delays to the project can be avoided and environmental issues addressed effectively. This was the situation in the Green Point case study, albeit limited to the construction impact of the project. Eden on the Bay was shown to be problematic with regards to EIA follow-up. This case study, however, revealed how the ELC should operate to drive follow-up, even in the absence of the regulator and proponent.

5.6.5 Institutional Approach to EIA Follow-up

Hacking and Guthrie's (2008) proposals on the approach to EIA follow-up and how the institutional framework should support and enable it, were used to analyse and evaluate follow-up in each case study. In most cases there was insufficient cognisance of the comprehensive approach proposed, where social, physical, economic and political aspects are all taken into account in the EIA and follow-up for the project. True environmental sustainability cannot be pursued in the absence of comprehensive analysis, evaluation and follow-up of activities and projects. In most cases the integration of the EIA with other planning, infrastructure or conservation plans and policies were insufficient or lacking. There were also indications that integration in government spheres, departments and priorities were problematic and in some cases, like Eden on the Bay, in conflict. The integration of processes was also discussed in the alignment of the EIA and project. In three of the four cases this alignment did not exist and as a result the EIAs and projects were not integrated in terms of their contracts, time frames and legislative processes.

Most follow-up processes responded to site specific issues, but few made provision for regional- or cumulative evaluation of impacts. Baseline research was conducted in the Milnerton case to understand the environment before intervening or implementing. Monitoring was done to evaluate whether mitigation was appropriate or to manage the project responsively and adaptively. The other cases did not have this strategic approach to EIA follow-up.

5.6.6. Consolidated Evaluation of Research Question 6

The institutional framework for EIA follow-up in the four cases analysed left remarkable opportunity for failure and did not provide flexibility when the more typical roles changed between different spheres of government, private proponents and the approving authority. The integration required according to Carly (1989) and Rabe (1986) is currently not present in the sectoral division of legislation and governance. This filters through to the actual practices and environmental management reality on site during construction, as shown in the case of Eden on the Bay and Simonstown.

Ideally the institutional framework should enable the cooperation of the three drivers of EIA follow-up, being the proponent, regulator and community. The institutional framework can be a good indicator of how mature the EIA process is in terms of its scope in addressing issues beyond the traditional pollution prevention and responsive approach to identified project impacts. It should allow for independence of evaluation and monitoring. This independence should be facilitated by the contracts and a mechanism such as the ELC for negotiations around arising issues in order to facilitate an adaptable process.

5.7 Evaluation of Research Hypothesis

The main research question that the preceding six research questions were attempting to analyse is:

Did the EIA follow-up in the cases investigated lead to an effective EIA process that facilitated adaptive management in moving between predicted impacts, conditions of approval and the actual environmental reality on site during construction?

To provide an answer for this question, reference is made to the table of consolidated findings across the four case studies for each of the research questions and analysed in Annexure H:

1. Correlation between the predicted impacts/ mitigation measures and actual impacts did not indicate an effective EIA follow-up process or lead to the achievement of EIA objectives
2. Constraints in the capacity and approach to regulation led to ineffective compliance and enforcement. Opportunities provided for a flexible management approach were not fully optimised.

3. Challenges emerged from the analysis of the cases that could indicate possible areas of improvement. These included the alignment of the EIA and project, an approach that is more focussed on the receiving environment, inclusion of cumulative impact assessment, regional evaluation of impact, the opportunity to use incentives and facilitating all three drivers of EIA follow-up.
4. Best practice analysis indicated reasonably effective project-based EIA follow-up, but poorly developed follow-up beyond project level across the horizontal and vertical feedback scope of EIA follow-up.
5. Adaptability is currently the most prominent detractor from effective EIA follow-up, which is based on a flexible management approach, including monitoring, influence on decisions and actions and collaborative opportunities for all role players.
6. The institutional framework for EIA follow-up in the cases analysed does not support effectiveness and is an indication of an EIA follow-up process that has not been enabled beyond responsive pollution prevention and project-based impact mitigation.

From the analysis of the four case studies, it was found that the EIA follow-up process currently applied only partially contributed to an adaptive and effective EIA process at the project level. It has not contributed to a mature and evolved EIA process that is comprehensive, strategic and integrated and promotes environmentally sustainable development.

6. Conclusions

6.1 Research Goal and Methodology

The aim of this research was to contribute to the many investigations into the effectiveness of EIA by researching EIA follow-up during construction as one indicator of effectiveness. There is global debate around the effectiveness of EIA as it is currently practiced and its role in achieving sustainable development (Lee et al., 1994; Sadler, 1996; Glasson, 1999; Cashmore et al., 2004). The concept of sustainable development is not an absolute, making judgements about EIA effectiveness to achieve sustainable development difficult (Cashmore, 2004). The degree of post-decision follow-up in EIA is currently an important shortcoming (Sadler, 1996; Arts et al., 2001; Noble and Storey, 2005). The theory of integration, complex systems and prediction lie at the heart of EIA, mitigating detrimental impacts of development and arriving at a meaningful EMP. Follow-up is an important indicator of EIA effectiveness. In order to understand how to research and evaluate EIA follow-up, international best practice was investigated. This literature study clarified and summarised what EIA follow-up is and should be, based on various aspects that informs its best practice, such as the approach, institutional framework required, alignment with projects and public participation.

A conceptual framework was prepared, with which to evaluate feedback across the project level and also to provide feedback about the practice and theory of EIA. A conceptual framework for research of follow-up effectiveness needed to incorporate certain key aspects to be credibly founded in the theory of EIA and arrive at appropriately grounded research questions. Follow-up was investigated across project level, regional scale and meta-scale. It was valuable to investigate whether follow-up led to adaptation and formulation of solutions to unforeseen issues that arise during construction of a project. The link between quality of inputs (baseline studies, assessment and predictions) and the eventual outcomes or outputs was evaluated by establishing the degree of compliance and correlation between the inputs and conditions. Finally, the structure and functioning of the institutional framework for follow-up was investigated to ascertain whether there was a dynamic iterative process of adaptive management in the organisational structures that responded to the needs of the follow-up tools and practices. These aspects were all addressed in the conceptual framework for this research.

The hypothesis for this research was the positive assumption that EIA follow-up helped to bridge the divide between prediction and reality and was effective in ensuring an adaptive EIA process towards sustainable development. This hypothesis was explored through the investigation of six research questions in four case studies, as well as various interviews with follow-up role players. The research questions were formulated from the conceptual framework to cover a range of issues that inform effective EIA follow-up, from theory to best practice. The case study approach, coupled with a literature review and interviews formed a sufficiently robust analysis method to probe EIA effectiveness in the selected EIA case studies in Cape Town.

In each of the four cases the project EIA approval documentation, inspection reports during construction and minutes of meetings were sourced from the relevant approving authority or consultants involved and analysed to answer the research questions. Interviews were conducted with the different role players involved in the EIA during construction to clarify the document analysis and further probe the different experiences, perceptions and knowledge of those involved in the cases.

6.2 Introduction to EIA

EIA evolved mainly as a predictive exercise to identify and estimate impacts of development (Wood, 2000). The EIA process is divided into two main stages, consisting of the pre-decision and post-decision stages. The pre-decision stage is used to determine the scope of the project and the sensitivity of the receiving environment in the scoping phase and then attempting to predict as accurately as possible what the impact of the activity will be on the environment (UNEP, 1988). The post-decision or implementation stage follows in which the activity or project is implemented, where the predictions made and where mitigation measures that were proposed, are realised (UNEP, 1988). The EIA role players include the proponent, regulator and interested and the affected community. The EMP is a part of the EIA containing detail on implementing the findings of the EIA and preventing detrimental impacts of development through mitigation measures.

6.3 Purpose of EIA

One of the primary goals of EIA is to promote sustainable development (Sadler, 1996; Barker and Wood, 1999). *“Sustainable development means the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations (Department of Environmental Affairs and Tourism, 2006a:18).”* There is no clear agreement, apart from the broad definitions, on the exact meaning of sustainable development (O’ Riordan, 2000). The best approach in its pursuit would be to set integrated targets and measure how much each project proposal incrementally contributes towards- or impacts negatively on a vision for sustainability (Pope et al., 2004:606).

6.4 Theoretical Basis of EIA

There are complex linkages between the social, economic and physical aspects of the environment. The economic pressure in cities or regions drives environmental change. These economic pressures are in turn driven by social needs and demands in layered geographical patterns established by what aspect of it is measured (Ravetz, 2000:43). Integrated assessment of environmental sustainability could take place in various forms.

Authors agree that EIA can contribute to sustainability if social and economic considerations are assessed with the environmental and physical ones by horizontally integrating assessment tools (Pope et al., 2004). A further integration requirement is to combine and align the EIA and project processes in order to be more iterative. It is also important to vertically integrate government planning and management institutions in order to set predetermined targets for sustainable development that inform assessment of environmental sustainability in projects or programmes on a wide scale as envisaged by Pope et al. (2004). To achieve the horizontal and vertical integration necessary, it is important to understand the complexity of the environment.

The natural environment shows system-like characteristics of complexity, and was referred to as natural complex systems by Perez-Trejo (1989). Achieving or predicting an outcome in a complex system is a difficult task and the mere act of measuring or observing a system can in itself cause a reaction in the system. Since complete knowledge of any complex natural system and all its sub-systems and inter-related systems can never be achieved, it can be argued that an impact can never be reliably predicted beforehand.

The risk is present in EIA that vast amounts of expensive and time consuming information could be assimilated in the hope that it is relevant and that the full history or current situation will shed light on the future impacts (Vught, 1989). With complex systems, some of these resources should possibly rather be used for adaptive management purposes which could yield a greater likelihood of addressing unforeseen impacts. This does not negate the need to gather baseline information where warranted, but baselines can never ensure accurate adaptive management in future, as humans can never understand all possible externalities that affect those baselines and baselines may also distort the understanding of the full system themselves.

6.5 Introduction to EIA Follow-up

Follow-up is a term used to describe activities after the EIA decision stage during implementation (Ahammed and Nixon, 2006). According to Noble and Storey (2005), follow-up, monitoring and auditing are all activities that relate to feedback, which develops understanding of the real impacts of development on a complex environment. It can be argued that without proper feedback, the real impacts of development will not be known, making follow-up a critical aspect of EIA. In brief, follow-up is feedback on many different aspects and -levels of the EIA during implementation of a project or activity.

Noble (2000) outlines three requirements of adaptive management related to the effectiveness of EIA follow-up. Firstly, management should be able to deal reasonably accurately with the uncertainty of predicting impacts in complex systems. Secondly, it needs to deal with how well the mitigation measures are working to regain a stable state in these systems.

Thirdly, it needs to accommodate the interests of all stakeholders. Effective EIA follow-up will therefore need to be based on a comprehensive and integrated assessment approach, applied within a pro-active, strategic framework of governance.

Morrison-Saunders and Arts (2004) identified three distinct approaches to follow-up based on the scale at which it takes place. The first level is project-based follow-up, which relates to compliance monitoring, mitigation monitoring and improvements to the EMP during construction or operation. This feedback ensures responsible development on site by adapting the original EIA assessment based on observed outcomes. The second level of follow-up should take place at a macro-level where the general effectiveness of EIA is assessed based on feedback from the various project level EIAs. This feedback aims to improve the EIA tool by adapting the legislation and policies that guide its application. The third level identified by these authors is meta scale feedback of whether EIA in theory and practice is achieving its goal of environmentally sustainable development.

Monitoring programmes are required by some EIA decisions and present an opportunity to observe developmental impacts in real time. These important micro- and macro-level feedback loops can influence areas of EIA theory and application at the meta-level.

6.6 Research Findings Summary

In the four case studies evaluated, the predicted impacts and mitigation correlate to a high degree with arising impacts at project level. The correlation in predicted impacts and actual impacts did not always mean that the goal of EIA was achieved. In complex natural systems, predicting impacts can never be completely accurate and effective. The focus in deciding when EIA is required should therefore rather be the sensitivity of the receiving environment. It was found that it is important to establish the baseline condition of the affected environment and have the correct balance between incentive and control. All the required types of follow-up must be in place and feedback should happen on all levels, not just focussed on the project itself. In an attempt to achieve the fullest understanding of an environment, over-investing in data-gathering should be avoided. It is important to also invest in an adaptable management system to cope with the reality of not understanding the complexity of the impact on the environment.

Integration of the EIA and project design in tender and construction stages should be emphasised to facilitate interaction and cooperation, to empower the ECO and not to exclude the positive influence of the EIA on implementation decisions. There is an important iterative process between the formulation of a project proposal and the assessment of its environmental impact. The alignment of the EIA and project processes should also take place on a contractual basis. In the case studies, the ECO had limited locus standi with respect to the construction process.

Decision-scoping (the iterative process of design and impact evaluation) is important in the context of follow-up, because it can address the issue of alignment between EIA and projects, found to be a challenge in EIA follow-up. There should be a balance between control conditions and flexible management conditions in EIA decisions. In the case of flexible management conditions, it was found that the proponent was empowered to produce plans and methods that responded to changes or unforeseen eventualities as a project developed. Where environmental regulation is poorly capacitated, the burden of control after EIA decisions strains the limited resources of these regulators. Flexible management conditions and incentives can alleviate this burden. Although the presence of flexible management conditions in the case studies was a positive finding, the practice and process around these conditions still required development with consultants, proponents and regulators to optimise their benefits.

In all four of the case studies, some management objectives remained flexible in response to the EIA follow-up outcomes. This was achieved by incorporating flexible management conditions into the conditions of approval for each EIA. There was a requirement to monitor mitigation interventions to evaluate their effectiveness. This indicated whether the follow-up process achieved the outcome of the EIA and whether the EIA influenced the decision making and actions during construction.

Other researchers have found that South African EIA report quality and prediction is poor and primarily focussed on the activity, rather than the cumulative impact or wider strategic assessment. Judging from the four case studies, the key factors preventing EIA from influencing project decisions seem to be the problem of alignment and timing between the EIA process and the project process.

None of the four cases analysed made provision for cumulative impact assessment during the scoping and evaluation phase. In lieu of poor EIA, including the lack of cumulative evaluation of impacts or baseline information, EIA follow-up cannot effectively address these cumulative impacts during construction or operation. In three of the four cases (Eden on the Bay, Green Point and Milnerton), the municipality took on the role of de facto regulator during construction. The institutional framework should take cognisance of the fact that there were capacity constraints with the regulator and that other means of compliance monitoring and enforcement should have been facilitated through the community, local authority or ELCs.

In the case study analyses, most cases compared well with the principles and best practice of EIA follow-up at the project level, but poorly when compared with requirements for follow-up on a regional- or cumulative impact basis. The strategic requirements for EIA were identified as a weakness in the four cases. This included a lack of cumulative assessment of impact, monitoring against baseline information to observe and evaluate actual impact during construction, a regional SEA informed by the various project EIAs, and learning from the EIA outcomes. A more strategic approach will make EIA follow-up a goal orientated, influential and accountable process towards environmental sustainability and less focussed on being a reactive pollution prevention mechanism.

Formal structures to facilitate interaction between role players in the follow-up process are essential, as shown by the contribution the ELCs made in the Eden on the Bay and Green Point cases. These structures must be initiated during the EIA decision and their implementation and operation must be adequately monitored by the regulator. In all four cases analysed, it was found that the EIA regulator did not fulfil its follow-up responsibilities. The local authority took over de facto regulation. A degree of independence or distance from the project when monitoring and managing impacts is important. The independence of monitoring during construction is a principle required by legislation, but not yet integrated into project management contracts or law. Each project had an ECO and EMP, but the most value seemed to have been derived from a forum such as the ELC, where negotiations around arising issues could take place between role players during construction.

Exceptions to the typical institutional model were found to complicate the EIA follow-up process. An ideal approach would be to have all three drivers facilitated and made part of follow-up in order to provide for their respective needs or outcomes. The level of maturity in the EIA follow-up process was an indicator of how well the institutional framework enabled the EIA outcomes. The level of institutional enabling towards mature, evolved EIA follow-up did not reach the fullest potential in any of the four case studies.

6.7 Discussion on the Improvement of EIA Follow-up

6.7.1 Equal Emphasis on Post-Decision Stage of EIA

Accurate prediction and conditions of approval, albeit important, were found to be insufficient for effective EIA follow-up. Although not evident from the research findings in this dissertation, other studies have shown that actual impacts often differ from predictions (Tennoy et al., 2006). Intensive resources allocated to more accurate and specialised scoping and assessment to predict impacts and propose mitigation can still be flawed if there is no follow-up. The failure to have EIA follow-up could lead to the goal of EIA, which is environmentally sustainable development, not being achieved despite the large resource investment in pre-decision EIA.

In the case studies analysed, follow-up had the potential to leverage the effectiveness of EIA by allocating resources to the post-decision phase where impacts actually occur. This could be achieved with a proper feedback system from singular activities, by measuring the collective performance and effectiveness of EIA and learning from this measuring and management process. It has been shown in literature that these proposed interventions are not new or even recent. More than a decade ago, a World Bank study proposed clear performance benchmarks for EIA, effective monitoring, supervision of mitigation, translating requirements for mitigation through into tender documents and assigning a cost component to them (Rees, 1999). The research findings for the four Cape Town cases recognised the same need.

The World Bank also proposed involving local communities in monitoring and promoting self-regulation, such as EMS. The proposal put forward in this dissertation based on four cases, is that effective follow-up in EIA should be developed further in theory and practice towards the goal of more environmentally sustainable development practice. Follow-up should supplement proper pre-implementation impact assessment and be equally well resourced.

6.7.2 Understanding the Receiving Environment

The correlation in predicted impacts and actual impacts did not always mean that the goal of EIA was achieved in the Cape Town cases analysed. In complex natural systems, predicting impacts can never be completely accurate and effective. The sensitivity of the receiving environment should guide the decision of when EIA is required and at what level of comprehensiveness. The cases analysed neither drew on an SEA, nor made provision for cumulative impact assessment or baseline studies during the scoping and evaluation phase to understand the environment beyond the project site.

6.7.3 Effective Regulation

Pro-active governance can yield effective EIA follow-up and should take place through various means such as:

- Setting reasonable control- and flexible management conditions
- Conducting integrated strategic planning for an area
- Establishing the baseline state of the environment against which impacts can be measured
- Balancing various approaches to control (legislative, social, judicial) with incentives.

Governance must be accompanied by clear roles and responsibilities defined in legislation and protected in mandates for various spheres of government. It was shown that there is currently little or no incentive for developers to comply with conditions of approval.

In a study on South Australian EIA monitoring, Ahammed and Nixon (2006) stated that without monitoring impacts after EIA approval, the whole EIA process may lose credibility. This monitoring was lacking in Southern Australia due to the fact that it was not a legislated requirement in 2006. In another Australian study around Sydney Harbour tunnel, the public and Municipality were in disagreement with the Ministry of Roads around the feasibility of the tunnel development proposal. Due to the fact that the determining authority was the government, the project already had a bias towards the approval of the development proposal (Beder, 1997). Over-reliance on regulation to ensure compliance or solutions to new impacts during follow-up can thus be problematic where the proponent and regulator are both from the spheres of government, or be totally omitted where it is not legally required.

The Eden on the Bay, Simonstown and Green Point Stadium cases all have elements of this conflict of power when regulation between departments take place. Strategic planning can assist to harmonise government planning from various perspectives, such as conservation and infrastructure. Eden on the Bay illustrated the issues that arise where the planning authority had a development need that was in conflict with the urban design and conservation objectives for the area. The solution to the problem of balance between developmental pressure and control is based on coordinated and strategic regulation through a process of mutual adjustment. Hill (2004) argues that both planning and EIA represent an interventionist theory of the state to protect the rights of individuals from the activity of others. EIA is focused more on flexible control than prescription. This flexibility is further expressed in what Hill refers to as the synergy of rationality and mutual adjustment. Another factor in this duality of the nature of EIA is introduced by Hill as a balance of power between the technical knowledge of project proponents able to manipulate a decision making process and that of the heterogeneity of voices. This is referred to by Hill as a distancing of EIA from the corruption of rationality by power. Power then has a role to play where consensus fails and a decision has to be imposed, but always based on the principles of critical rationality that remain open to challenge.

Sanchez and Gallardo (2005) remarked that despite commitment from proponents and communities, the combination of applying the various components of control by government is critical. They differentiate between four types of control, being administrative-, judicial-, public- and instrumental control, which are all crucial for effective follow-up at different times. One type of control may be less effective than the combination of control approaches. In South Africa the focus should be on creating and strengthening capacity for all of these four controls required in order for them to function together more effectively. The approving environmental authorities, of which Western Cape Province is probably the best capacitated and involved in the Republic of South Africa, are still short of capacity and skills. In the case studies the role of the local authority in assisting to create capacity for control and incentives in the EIA process emerged strongly and should be embraced.

The role of the local authority, based on the case studies investigated, seemed to fill the capacity vacuum of planning, enforcement and project-level involvement left by the approving environmental authority. This practice has evolved where a metropolitan authority is sufficiently capacitated, such as in Cape Town. No EIA decisions are issued by the approving provincial authority in Cape Town metropolitan area without prior input from the local authority. The local authority supports the approving authority in monitoring the activity during construction and stays involved in the community structures that manage the environment during operation long after completion. Projects are dependent on the provision of engineering services and various clearances from the local authority. Without a funded and legislated mandate, the local authority can only resort to applying whatever power it can in other mandated areas (such as planning approvals, building approvals, provision of engineering services, clearances, occupancy or health and safety). Besides the EIA process, the local authority can contribute to regulation and enforcement of the EIA conditions and monitor compliance.

The division of responsibilities in EIA for the different spheres of government in the Cape Town case studies is reflected in Table 5:

Table 5: Authority Involvement in Cape Town Case Studies

	Strategic Planning	Impact Assessment	Construction Monitoring	Community Structures	Life Cycle Monitoring
Local	✓	✓	✓	✓	✓
Provincial	✓	✓	-	-	-
National	-	✓	-	-	-

In three of the four case studies analysed, the local authorities (with no funded legislative mandate in EIA) had the largest involvement and investment of personnel and resources compared to the mandated regulator. The role of the local authority should be made more prominent during planning and prior to decision in EIA through changes to the current legislation. This would ensure that projects align with, inter alia, its spatial and infrastructure planning. Local authorities should be allowed to develop bylaws that can support the national and provincial service delivery mandate in EIA. Capacity will, however, remain a constraint, especially with smaller municipalities in South Africa.

6.7.4 Role of the ECO

The one common factor that can mediate and solve the challenges of institutional failure or reform that face follow-up is the activities of an ECO. The role of the ECO has emerged in recent years from being a small part of the environmental practitioner's inspection responsibility after authorisation to becoming a profession and skill in its own right. It requires an intimate knowledge of the building industry, natural environment and relationship management. The allocation of EIA resources for projects or activities should balance more over time to bolster the post authorisation stage, making the ECO role more important as an omnipresent, independent and reconciliatory party to the EIA. Where ecologically or culturally sensitive environments are concerned, the ECO role can be more demanding, focussing on monitoring programmes and adaptive responses after authorisation, often incorporating the requirements of formal and complex environmental management systems (EMS) and reporting mechanisms. Either way, work defined in both contracts and undefined responding to the flexibility required in managing environmental impact, will gravitate towards an involved ECO. There is already evidence in the case studies that the ECO and local authority responsibilities after authorisation overlap, build on each other and operate in synergy. This localised- and decentralised management trend should be strengthened in amendments to current environmental and local authority legislation.

6.7.5 Coordination and Collaboration Structures

A formal structure to facilitate interaction between role players in the follow-up process is essential, as shown by the contribution the ELCs made in the Eden on the Bay and Green Point cases.

These structures must be initiated during the EIA decision and their implementation and operation must be adequately monitored by the regulator. In all four cases analysed, it was found that the EIA regulator did not fulfil its follow-up responsibilities. The local authority took over de facto regulation. Each project had an ECO and EMP, but the most value seemed to have been derived from a forum such as the ELC, where negotiations could take place around arising issues. An ideal approach would ensure that all three follow-up drivers are facilitated and made part of follow-up in order to provide for their respective needs or outcomes.

The level of institutional enabling of a mature, evolved EIA follow-up did not reach the fullest potential in any of the four case studies. Project priorities undermined the intention in conditions of approval to implement a proper management approach and -framework. In lieu of poor regulation, the ELC can ensure that the intention of EIA follow-up realises during construction.

6.7.6 Incentive-Based Approach to Compliance Management

There should be a balance between control conditions and flexible management conditions in EIA decisions. In the case of flexible management conditions, the proponent is empowered to produce plans and methods that respond to changes or unforeseen eventualities as the project or activity develops. Where regulation is not capacitated, the burden of control after EIA decisions drains scarce resources in government. Flexible management conditions and incentives can alleviate this burden.

Earlier in this dissertation Marshall (2005) was cited stating that EIA follow-up can benefit any industry by empowering the developer or operator to have demonstrable and measurable control over activities that may impact on the environment. This is achieved by building trust with the interested and affected parties around the development and in doing so reducing the resistance to projects and also decreasing liability on the part of the developer. Marshall's argument in literature for the benefit of pro-active follow-up to industry, was not visible in practice in the case studies analysed.

Control and the legal requirement for enforcement and follow-up must be balanced with incentives. The relationship with contractors must not only be based on enforcement and control, but rather on introducing incentives, creating awareness and integrating a grading- or scoring system to encourage and reward best practice. An example of such a grading or scoring system could be the voluntary grading awarded by a relevant body in South Africa, the Construction Industry Development Board (CIDB) that reflects the size of a project that a certain level of contractor may bid to undertake. Currently contractors can apply to improve this grading with the CIDB and qualify to bid for larger projects, but before proceeding from one CIDB grading to a higher one, they have to comply with certain criteria. One of these could be to attain a positive score on environmental compliance on previously executed projects. A planning- and design process must take due cognisance of the EIA and also tender documentation that allows for the implementation of the EMP and audits.

The construction industry should develop more responsible practices through incentives. The South African government should lead the way by promoting environmental scoring for contractors and proponents, since all government construction is already undertaken by CIDB-graded contractors and constitute by far the largest portfolio of construction work in this country.

Self-regulation is yet another step towards improved EIA follow-up and improved compliance through incentive rather than control. Legislation requiring constant enforcement is an indication of poor regulation (Oposa, 1998). In a developing country with limited resources such as South Africa, the government priority will focus on economic development rather than compliance regulation. This leaves the refining of collaborations, partnerships and self-regulation as essential vehicles in sustainable environmental management and development. The long term goal is a change of culture towards accepting responsibility, self-regulation and custodianship for the environment.

In the meantime, the environmental regulator at all levels of government could start developing mechanisms of incentive that can either be based on expenditure, providing for savings, or other incentives. Where funding is available, environmental rehabilitation could be undertaken during follow-up by public works projects that create opportunities for employment and skills development. These projects could also focus on development through conservation, for example logging, riparian management or agriculture funded by a trust fund in partnership with a community that is provided with access to property and resources by the government. One such example is found in Uganda in the form of the Bwindi Impenetrable and Mughahinga Trust Fund that supports community projects, governing structures, as well as research in a three-tiered approach to ensure sustainability of the projects (Kajura, 1994). Further types of government incentive to promote environmentally responsible practice could be in the form of grants for baseline research or strategic environmental impact studies. The government could also provide loans, sponsorship or joint ventures for skills transfer towards environmental awareness or environmentally sustainable technological development.

Where government resources are scarce, income from tax and penalties can be ring-fenced for application in these trust funds that aim to improve the environment. This principle fines the transgressor and rewards compliance. Funds from such a trust could even provide input resources for start-up ventures or community projects with demonstrable environmentally-responsible practice or technology. Where government funding is limited, tax rebates or preferential procurement can be offered to projects, companies or activities that demonstrate environmentally responsible practice. It has already been mentioned earlier how scoring mechanisms in government procurement can be utilised in the construction industry as functional criteria for tenders in supply chain management. Government can further utilise deregulation, technical assistance programmes, reduced fines and relaxed control to those developments or activities that assume responsibility voluntarily. The use of off-sets, albeit problematic when seen as a tool to motivate otherwise detrimental impacts, can help to achieve an overall positive outcome for the environment as a mitigation measure in itself (Hayes and Morrison-Saunders, 2007).

Off-sets can be problematic when the same corrective action as the impact is sought. It is not always possible to establish new wetlands to replace lost wetland areas as an example. It also takes considerable time and investment to rehabilitate or replace a sensitive environment that is lost relatively quickly due to development impact.

6.7.7 Sharing Responsibility for Cumulative Impact Assessment

In Canadian community-based monitoring networks, the government's capacity to conduct monitoring is augmented by community programmes (Whitelaw et al., 2003). These authors note that the government can initiate programmes and involve the community in a particular problem to create awareness and learning. In another approach, the communities take the initiative themselves to concentrate on an environmental issue. The latter approach is usually less successful due to the extensive monitoring resources and expertise required, but when there are no resources or expertise available, limited monitoring by these communities is better than no monitoring.

The challenge with cumulative assessment in South Africa is that there is no high level government reporting mechanism to identify, evaluate, report and intervene in cumulative impact where it occurs. The Department of Environmental Affairs is attempting to formulate concrete indicators to measure and report on sustainable development (McCourt, 2010). Similarly an integrated evaluating mechanism should be introduced to identify the threat of cumulative impact on local, provincial and national level.

One example of a cumulative impact is the erection of fences in the Cape Province. Fences in agricultural areas (such as the Cape winelands) rarely require environmental approval, but severely impede the movement of animals. There is currently no tracking mechanism to determine how many fences are erected and where they have an impact on the movement of animals such as otters, gazelle, rabbits or jackal. Expecting each farmer in the rural areas to apply for a permit to erect a fence is unrealistic, but independently monitoring the impact of fences in a region could be a more effective and pro-active approach to solving a potentially cumulative impact. Similarly the Western Cape Leopard toad is threatened by residential boundary fences and walls inhibiting its migration across the Cape Peninsula where sub-urban development is located adjacent to natural areas. In the case of the Leopard Toad, making available information such as design criteria for fences combined with a public awareness campaign and road signs are starting to yield results.

A fundamental principle in environmental management in South Africa is that the polluter 'pays' to restore or off-set the damage. This means the proponent of a project or activity can only be held responsible for the impact of that specific project or activity, and not for cumulative impacts. The Chief Director: Environmental Impact Management at the national Department of Environmental Affairs (McCourt, 2010) gave an example of a power station. The power station can be held responsible for direct impact of the construction and operation of the power station itself.

The mining of the coal to supply the increasing demand of all the power stations in the country has dire environmental impacts, but the power station making an application or conducting an EIA, which is the direct cause for this demand and the related mining activity, cannot be held accountable for the impacts of mining on the environment. The mine has to account for those impacts. This principle does not negate the need for cumulative impact assessment and management. There is, however, a disjuncture between the process to alleviate the environmental damage in the two activities (mining and electricity generation) causing the perception that there is no cumulative assessment and mitigation taking place.

6.7.8 Re-Focus on Sustainable Development

Much emphasis has been placed on making EIA more effective by improving its practice and procedures such as increasing capacity in government and improving EIA follow up (Jay et al., 2007). These improvements will no doubt result in improved EIA practice, but may not be sufficient. According to Jay et al. (2007) the real focus should be on EIA's role to influence decisions in its current form and establishing (or re-establishing) the real goal of EIA, which is environmentally sustainable development. This should be done by utilising more concepts linked to sustainability, such as climate change, cumulative impact assessment and biodiversity management in environmental management and applying the precautionary principle of avoiding risk where risk cannot reasonably be estimated. The fundamental reason for doing EIA has to be brought back into the practice of EIA and that is environmental sustainability. This goal, and not the mitigation of impact, should drive EIA follow-up.

The Department of Environmental Affairs developed the Framework for Sustainable Development for South Africa (Department of Environmental Affairs and Tourism, 2006a). This document brings together the existing context of sustainable development in South Africa from its Constitution and principles in law, with a strategic course of action towards more integrated and measured outcomes to meet the United Nations Millennium Development Goals (United Nations, 2008). South Africa has many existing strategies to address biodiversity loss and developmental pressure, as well as spatial planning and rural development. Some examples include the National Biodiversity Strategy and Action Plan, the National Water Resources Strategy and Energy Efficiency Strategy. These strategies translate into planning and action through provincial planning and development strategies and local municipality's integrated planning. One example of this action-based result is the Department of Water Affairs' successful Working for Water Programme. This programme gives action and measurable success on the ground to high level policy and strategy.

The challenge remains to bridge capacity constraints, policy tensions and institutional failures and reach a situation in South Africa where these policies and strategies are monitored, evaluated and reported on by the national government in one comprehensive sustainable development reporting mechanism across all spheres and sectors.

An example is the accelerated growth strategies to alleviate poverty through mining, industry and agriculture, being in conflict with the resources required for protecting biodiversity, ecosystems and natural resources (Department of Environmental Affairs and Tourism, 2006a). This is especially prevalent in the Western Cape Province where the prime agricultural regions overlap with the high value biodiversity areas (Department of Environmental Affairs and Development Planning, 2005a).

The Strategic Framework for Sustainable Development (Department of Environmental Affairs and Tourism, 2006a) identifies critical priority areas to address the governance and institutional challenges above. The first priority area proposes the establishment of a Cabinet Cluster of government departments that can influence sustainable development outcomes and have them report to a similar Portfolio Committee in Parliament. It further proposes aligning sustainability goals with strategic and spatial planning initiatives such as Spatial Development Frameworks at various levels. This is already taking place to a large degree in South Africa. It will be necessary to monitor a set of indicators and report on these frequently. The result of this measuring and reporting can be fed back into policy making and decisions by Cabinet and Parliament in the South African government to drive decisions.

6.7.9 New Approach to EIA Follow-up

In Canada the utility of follow-up in EIA was addressed in a study by Noble and Storey (2005). The Canadian Environmental Assessment Act of 2003 requires both the accuracy and effectiveness of the mitigation measures of EIA to be addressed. An important distinction between the two requirements becomes clear here:

- Verifying the accuracy of the original assessment, which could be a once off audit or 'score' for the project or activity
- Determining the effectiveness of the measures taken to mitigate adverse impacts, which could be a monitoring programme over a period of time against benchmarks.

This circular learning approach is also in line with the approach to sustainable development being a process rather than product. Noble and Storey (2005) reinforced the need to move away from the emphasis on determining predictive accuracy to one that focuses on objectives in follow-up.

Uncertainty is a key consideration in determining the need for follow-up, but the IEM review process is politically designed to discourage discussion of uncertainty, which in turn may distort the resources allocated to follow-up. The priority of the proponent is to get their project approved. Accordingly, they may also be reluctant to concede any uncertainty associated with a project to decision-makers. The regulator may also be unwilling to acknowledge uncertainty, because it could detract from the credibility of its decisions.

Proponents of development are not always willing to pay for long and costly baseline research or monitoring programmes to understand the receiving environment or cumulative regional impacts.

A more realistic expectation can yield 'early warning' results to alert to long term predictive inaccuracies and satisfy all parties involved in the EIA process. There should be a clear focus on combining monitoring with measuring the effectiveness of mitigation measures proposed for a specific project. It is a positive result when follow-up generates information that can be used scientifically to increase knowledge, but developers should not be expected to become scientific researchers. The authorities should contribute in part to the process of environmental management (Noble and Storey, 2005) to alleviate the burden from proponents for the part that contributes to a wider understanding of the environment or learning beyond their project.

The various challenges of EIA follow-up discussed in this section present clues for improvement. The problems need to be accepted as genuine and there needs to be a common vision and political goal towards addressing them in South Africa. Eventually a re-foundation, re-conceptualisation or re-think of EIA must take place to adjust the focus of the environmental management process towards environmentally sustainable development. By analysing EIA follow-up in literature and in the Cape Town case studies, it could be stated that EIA follow-up is not effective overall as it is currently practiced in the case studies. The EIA process could already incorporate the following valuable improvements based on this limited research of EIA follow-up:

- EIA screening and scoping with emphasis on strategic planning and cumulative impact, establishing a database of baseline information on the sensitivity of the receiving environment, rather than quantified thresholds or categorisation of activities in legislation.
- Predictions are fallible and the focus should be on an adaptive, flexible approach during construction, carried through in contractual agreements and cooperative committees.
- There should be equal emphasis on the various forms of control and incentives in balanced proportions during follow-up and these controls and incentives should be applied first of all by strategic governance and planning.
- Contractors should be graded and scored on environmental performance scorecards so that good performers can be given preference in future tenders.
- The role and resources of local authorities in EIA should be strengthened.
- EIA practice should be improved by using follow-up as a feedback loop into EIA and SEA.

The EIA process can no longer be allowed to take place in a vacuum, isolated from strategic environmental planning, planning approvals integration, fragmented government policies and practices and a lack of general capacity. EIA follow-up was used as an indicator to evaluate the success of the prediction and mitigation process in construction in selected EIAs in Cape Town. EIA follow-up itself was only partly effective as far as the project level construction impacts are concerned. It was shown that effective follow-up currently relies heavily on prediction and requires a fundamental change in approach away from prediction-based mitigation to adaptive management.

While it could take considerable resources and time to improve the EIA process and shift fundamentally from a prediction-based science to an environmentally sustainable science, follow-up presents an immediate opportunity to improve the effectiveness of EIA. There is an opportunity to use EIA follow-up to promote change in EIA practice as it is currently implemented. It also creates an important feedback loop for learning by experience. Effective follow-up can, for the interim at least and in abeyance of more fundamental changes, leverage the effectiveness of the EIA process as a whole. Improving EIA follow-up will create a paradigm shift towards measuring the outcome of the EIA process and improving its feedback loop. It will force EIA to become more adaptable and less focussed on the pre-decision phase in terms of its resource allocation.

Follow-up can leverage the overall performance of the EIA process, as illustrated in Figure 3. Improving some aspects of the EIA process could have a larger positive effect than others, as illustrated in Figure 3 with the slim and broad influence arrows. This is due to the compounding value their improvement can have across the board.

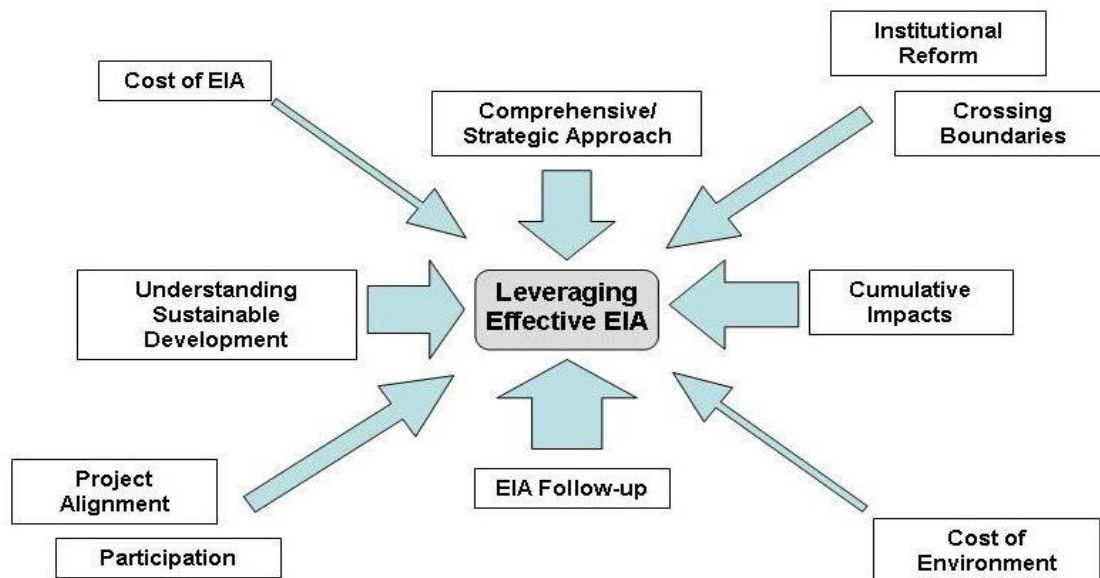


Figure 3: Leveraging EIA Effectiveness

Simply making EIA cheaper will not solve the effectiveness problem, albeit that smaller businesses and proponents will find it more accessible. Quality may deteriorate as a result. This intervention will not pay dividend to the whole process. Understanding the cost or value of the natural environment as an asset and proper participation can inform an effectively structured and executed process. Some of the more effective follow-up processes in the case studies attempted to understand the natural environment in order to measure impact of projects against the predictions made during EIA. Based on the research findings, a proper follow-up process will require the institutional framework of EIA to adapt to allow for impact assessment beyond boundaries of project sites, townships or administration jurisdictions.

The natural environment does not follow these boundaries. This reform of the institutional framework should also facilitate the alignment of EIA and project design decisions, as suggested from the research findings of the cases analysed in this thesis.

An improvement of the understanding of sustainable development and environmentally sustainable development will assist greatly in the EIA process. Detailed measured indices and reporting is not currently possible due to the complexity of the natural environment and science's limited understanding of its working, as previously elaborated.

The focus to leverage EIA effectiveness should therefore rather combine cumulative impact assessment, a strategic comprehensive approach and more effective follow-up. The focus of this research was on the latter.

The proposals put forward in this study are that effective follow-up in EIA should be developed further in theory and practice towards the goal of more environmentally sustainable development practices, while a more strategic and cumulative assessment approach should be formulated in legislation and practice.

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7. References

- Aaron S. (2009), *Evaluating the Role of Spatial Planning and Environmental Impact Assessment in Facilitating Environmentally Appropriate Development: The Case of Big Bay Development in Blaauwberg*, Masters Dissertation, Cape Town: University of Cape Town.
- Ahammed A.K.M.R. and Nixon B.M. (2006), "Environmental Impact Monitoring in the EIA Process of South Australia", *Environmental Impact Assessment Review*, 26, 426-447.
- Allen CD. (2009), "Monitoring Environmental Impact in the Upper Sonoran Lifestyle: A New Tool for Rapid Ecological Assessment", *Environmental Management*, 43(2), 346-356.
- Allen JL. (2004), "The Global Environment: An Emergent World View", *Environment*, 23(1).
- Arts J. and Meijer J. (2004), "Designing for EIA Follow-up: Experiences from The Netherlands", in: Morrison-Saunders, A. and J. Arts (eds) *Assessing Impact: Handbook of EIA and SEA Follow-up*, Earthscan, London, 63-96.
- Arts J., Caldwell P. and Morris-Saunders A. (2001), "Environmental Impact Assessment Follow-up: Good Practice and Future Directions," *Impact Assessment and Project Appraisal*, 19(3), 175-185.
- Arts J. (2007) "The Importance of EIA Follow-up", In: Fischer TB, Gazzola P, Jha-Thakur U, Belcakova I and Aschemann R. (2007), *Environmental Assessment Lecturer's Handbook*, Chapter 12, European Commission PENTA Erasmus Mundus Programme, Brussels.
- Ashby W.R. (1956), *Introduction to Cybernetics*, London: Chapman and Hall.
- Asian Development Bank (1997), *EIA for Developing Countries in Asia*, Manila: Asian Development Bank.
- Aslam F. (2006), *Environmental Impact Assessment in Pakistan – Overview, Implementation and Effectiveness*, Masters Dissertation, Stockholm: Royal Institute of Technology.
- Aurecon (2009), *EMP Compliance Checklists - Construction and Installation of a Submarine Escape Training Simulator for a Class 209 Submarine*, Audit reports from September 2009 to March 2010, Cape Town.
- Ball J. (2009), Director of Environmental Department at Arcus Gibb Pty(Ltd) Consulting Engineers, Personal interview, 2 December 2010, Cape Town.

- Barbour T., van der Merwe S. and Goldberg K. (2006), *Social Assessment – Final Report Green Point Stadium and Associated Developments*, Report prepared for Enviropartnership Consultants, September 2006, Cape Town.
- Barker A. and Wood C. (1999), "An Evaluation of EIA Systems Performance in Eight EU Countries", *Environmental Impact Assessment Review*, 19, 387-404.
- Bateman (1995), in O' Riordan T. (ed.), *Environmental Science for Environmental Managers*, England: Longman Scientific and Technical.
- Beanlands G.E. and Duinker P.N. (1984), "An Ecological Framework for Environmental Impact Assessment", *Journal of Management*, 18, 267-277.
- Becker E. and Jahn T. (1999), *Sustainability and the Social Sciences: A Cross-Disciplinary Approach to Integrating Environmental Considerations into Theoretical Reorientation*, Paris: UNESCO, ISOE and Zed Books.
- Beder S. (1997), "Environmental Impact Assessment", *Ecodate*, July, 3-8.
- Benson J.F. (2003), "What is the Alternative? Impact Assessment Tools and Sustainable Planning", *Impact Assessment and Project Appraisal*, 21(4), 261-280.
- Big Bay Beach Estates (2010), Photograph Gallery – Eden on the Bay, Online at www.bigbay.bz/gallery.php, last accessed 2 July 2011.
- Branis M. and Christopoulos S. (2004), "Mandated Monitoring of Post Project Impacts in the Czech EIA", *Environmental Impact Assessment Review*, 25, 227-238.
- Brown A.L. and Hill R.C. (1995), "Decision Scoping: Making EA learn how the Design Process works", *Project Appraisal*, 10(4), 219-228.
- Canelas L., Almansa P., Merchan M. and Cifuentes P. (2005), "Quality of Environmental Impact Statements in Portugal and Spain", *Environmental Impact Assessment Review*, 25(4), 217-225.
- Canter L. and Atkinson S.F. (2010), "Adaptive management with integrated decision making: an emerging tool for cumulative effects management," *Impact Assessment and Project Appraisal*, 28(4), 287-297.
- Capra F. (1982), *The Turning Point*, London: Flamingo.

- Carley M. (1989), "Challenges in the Implementation of Environmental Policy", in Van der Staal PM. and Vught FA. (ed.), *Impact Forecasting and Assessment*, Chapter 7, Netherlands: Delft University Press.
- Cashmore M. (2004), "The Role of Science in Environmental Impact Assessment: Process and Procedures versus Purpose in Development of Theory", *Environmental Impact Assessment Review*, 24, 403-426.
- Cerff E. (2007), *Internal Environmental Audit of Big Bay*, Report prepared for the City of Cape Town, October 2007, Cape Town.
- Cerff E. (2009), *Environmental Compliance Audit of Green Point Stadium, Granger Bay Boulevard and Green Point Common*, Report prepared for the City of Cape Town, May 2009, Cape Town.
- Cilliers P. (2004), "Complexity, Ethics and Justice", *Humanistiek*, 19(5).
- Cilliers P. (2000a), "What can we learn from a Theory on Complexity", *Emergence*, 2(1), 23-33.
- Cilliers P. (2000b), "Knowledge, Complexity and Understanding", *Emergence*, 2(4), 7-13.
- City of Cape Town (2006), *Interim Transport Impact Assessment*, Report prepared for City of Cape Town in conjunction with Green Point Transportation Team, September 2006, Cape Town.
- City of Cape Town (2008), *City of Cape Town Biodiversity Report*, Cape Town.
- City of Cape Town (2009), Aerial Photograph of Cape Town CBD and Green Point Stadium, Directorate Corporate Services, Communications Branch, Cape Town.
- City of Cape Town vs. Macsand (Pty)Ltd and others (2010), Judgement in the High Court of South Africa, Case number 4217/2009 and 5932/2009, Issued on 20 August 2010, Cape Town.
- CNDV-Africa (2006), *Visual Impact Assessment of the Proposed Green Point Stadium Urban Park Granger Bay Boulevard and Upgrade of Electrical Infrastructure*, Report prepared for the City of Cape Town, Cape Town.
- Cooper L.M. and Sheate W.R. (2002), "Cumulative effects assessment: A review of UK environmental impact statements," *Environmental Impact Assessment Review*, 22, 415-439.
- Cormier S.M. and Suter G.W. (2008), "A Framework for fully Integrating Environmental Assessment," *Environmental Management*, 42, 543-556.

- Couffignal L. (1958), "Essai d' une definition générale de la cybernétique", *The First International Congress on Cybernetics*, June 26–29, Namur, Belgium.
- Department of Environmental Affairs (2010), *National Environmental Management Act, 1998 (Act no. 107 of 1998) Environmental Impact Assessment Regulations*, Regulation 543, Government Gazette 33306, 18 June 2010.
- Department of Environmental Affairs (2008), *Review of the Effectiveness and Efficiency of the Environmental Impact Assessment (EIA) System in South Africa*, Mosakong Management Pty(Ltd), Pretoria.
- Department of Environmental Affairs and Development Planning (2002), *Record of Decision as Amended by the Minister on Appeal, Application: Re-Development of the Existing Big Bay Resort as well as the establishment of Urban Development Erven 2,3,4, 384, 263, 267, 442, 461, 452, 460, 492, 493, 494, 495, 496 and 650 Identified activities in terms of Section 21 of the Environmental Conservation Act 73 of 1989*, Correspondence issued 25 March 2002, Cape Town.
- Department of Environmental Affairs and Development Planning (2006), *The Proposed Realignment of the Duikersvlei Stream as Part of the Groundwater Contamination Remediation Strategy for the Old Kynoch Factory Site, Milnerton*, Correspondence Reference E12/2/1-22/Ptn of Erf 10778 & Erf 6220 Milnerton dated 13 March 2006, Cape Town.
- Department of Environmental Affairs and Tourism (2006a), *Strategic Framework for Sustainable Development in South Africa*, Draft Report for Public Comment, Pretoria.
- Department of Environmental Affairs and Tourism (2006b), *Regulations in terms of Chapter 5 of the National Environmental Management Act 1998*, Regulation 385, Government Notice 28753, 21 April 2006, Pretoria.
- Department of Environmental Affairs and Tourism (2008), *Environmental Authorisation: Proposed Construction of the South African Navy's Submarine Escape Simulator, Simonstown*, Correspondence dated 10 November 2008, Pretoria.
- Decleris M. (2000), *The Law of Sustainable Development General Principles*, Report for European Commission, Luxembourg: Office for the Official Publication of the EC.
- Denzin N. (1984), *The Research Act*, New Jersey: Prentice Hall.

- Dik H. and Morrison-Saunders A. (2002), "The Influence of EIA Approval Conditions on Environmental Practices," Paper presented at IAIA *Assessing the Impact of Impact Assessment* conference, 15-21 June 2002, The Hague, Netherlands.
- Dommissie B., Erickson D., Mawhinny E. and Korsten T. (2009), Interview and personal communication with Simonstown Historic Society and Architectural Advisory Committee, 4 December 2009, Simonstown.
- Doug Jeffreys Environmental Consultants (2006), *Scoping Report for the Proposed Realignment of the Duikersvlei Stream*, Report prepared for client, Cape Town.
- EU (1985), *European Union Council Directive*, Reference number 85/337/EEC.
- Ecosense cc. (2003), *Big Bay Construction Environmental Management Plan*, Report prepared for City of Cape Town, June 2003, Cape Town.
- Ecosense cc. (2005), *Big Bay Environmental Management Plan*, Report prepared for City of Cape Town, May 2005.
- Ecosense cc. (2007), *Big Bay Operational Environmental Management Plan*, Report prepared for City of Cape Town, March 2007, Cape Town.
- Ecosense cc. (2009), *Environmental Site Inspection Report*, Report prepared for City of Cape Town, March 2009, Cape Town.
- Eitzen B. (2008), *Visual Impact Statement for Simonstown Submarine Escape Training Simulator*, Photograph of West Yard Dive School at SA Naval Base Simonstown, Report prepared for Department of Public Works, 17 July 2008, Cape Town.
- El-Fadi K. and El-Fadi M. (2004), "Comparative Assessment of EIA Systems in MENA Countries: Challenges and Prospects", *Environmental Impact Assessment Review*, 24(6), 553-593
- Erickson D. (2008), Letter addressed to Carin Smuts Architects and the Department of Public Works, 14 August 2008, Simonstown.
- Fatmi H.A. and Chow C.H. (1989), "Methodological Weakness in Forecasting Impacts", in Van der Staal and Vught (ed), *Impact Forecasting and Assessment*, Chapter 3, Netherlands: Delft University Press.

Fowler F.G (ed.), Fowler H.W (ed.) and Thomson D.F. (ed.), (2000), *The Oxford Pocket Dictionary of Current English*, 8th edition, Oxford University Press.

Fujikura R. and Nakayama M. (2001), "Factors leading to an erroneous impact assessment – A post project review of the Calaca power plant, unit two," *Environmental Impact Assessment Review*, 21, 181-200.

Furnon-Roberts N. (2009), Erstwhile chairperson of the Green Point Ratepayers Association, Personal interview, 1 December 2010, Cape Town.

George C. (1999), "Testing for Sustainable Development through Environmental Assessment", *Environmental Impact Assessment Review*, 19(2), 175-200.

Ghanbarpour M.R. and Hipel K.W. (2007), "Sustainable Development Conflict over Freeway Construction", *Environment, Development and Sustainability*, Springer Science and Business Media, 11(2), 241-253.

Gibson RB. (2002), "From Wreck Cove to Voisey's Bay: The Evolution of Federal Environmental Assessment in Canada", *Impact Assessment and Project Appraisal*, 20(3), 151-159.

Glasson J. (1999), "The First 10 Years of the UK EIA System: Strengths, Weaknesses, Opportunities and Threats", *Planning Practice and Research*, 14(3), 363-375.

Google (2011), Aerial photograph from Google Maps online mapping and photography public resource, <http://maps.google.com>

Greenwood A. (2009), Acting District Head, City of Cape Town District Environment and Heritage Management Branch, South Peninsula Office, Personal communication, December 2010, Plumbstead, Cape Town.

Hacking T. and Guthrie P. (2008), "A Framework for Clarifying the Meaning of Triple Bottom-Line, Integrated and Sustainability Assessment", *Environmental Impact Assessment Review*, 28(2-3), 73-89.

Hardi P. and Zdan T. (1997), *Assessing Sustainable Development Principles in Practice*, Winnipeg: International Institute for Sustainable Development.

Harmer C. (2005), *Is Improving the Effectiveness of EIA in the UK Dependant on the Use of Follow-up?*, Masters Dissertation, Norwich: University of East Anglia.

- Harrop D.O. and Nixon J.A. (1999), *Environmental Impact Assessment in Practice*, London: Routledge.
- Harvey K. (2006), "Monitoring Change: Citizen Science and International Environmental Treaty Regimes", in Moomaw WR. and Suskind LE. (eds), *Papers on International Environmental Negotiations*, Volume 15, Massachusetts: Harvard University Press, 77-90.
- Hayes N. and Morrison-Saunders A. (2007), "Effectiveness of environmental offsets in environmental impact assessment: practitioner perspectives from Western Australia," *Impact Assessment and Project Appraisal*, 25(3), 209-218.
- Hickie D. and Wade M. (1998), "Development of Guidelines for Improving the Effectiveness of Environmental Assessment", *Environmental Impact Assessment Review*, 18(3), 267-287.
- Hill R.C. (2000), "Integrated Environmental Management Systems in the Implementation of Projects", *South African Journal of Science*, 96.
- Hill R.C. (2004), *Theory for the Practice of Environmental Assessment: Mutual Adjustment, Critical Rationality and Power in Planning and Decision Making*, Doctoral Thesis, Cape Town: University of Cape Town.
- Hill R.C. (2005), "Theoretical Models of Why and How EA Works: Are We Legislating for the Right Objectives." In proceedings Legislating for Sustainability: pp.198-212, Thaba'Nchu, 29-31 August. South African Affiliation of the International Association for Impact Assessment, IAIA Free State Branch.
- Hjort P. and Bagheri A. (2006), "Navigating Towards Sustainable Development: A System Dynamics Approach", *Futures*, 38(1), 74-92.
- Hunsberger C.A., Gibson R.B. and Wismer S.K. (2005), "Citizen involvement in sustainability-centred environmental assessment follow-up," *Environmental Impact Assessment Review*, 25, 609-627.
- IAIA (1999), *Principles of Environmental Impact Assessment Best Practice*, North Dakota: IAIA.
- ICC (1991), *Effective Environmental Auditing*, Paris: ICC Publishing SA.
- IUCN (2007), "African Experts Workshop on Effectiveness of Environmental Impact Assessment Systems," Report of Conference Proceedings from 12-13 April 2007 in Addis Ababa, Ethiopia.
- IUCN/ UNEP/ WWF (1991), *Caring for the Earth: A Strategy for Sustainable Living*, Switzerland: Gland.

- Jasanoff S. (1990), *The Fifth Branch: Advisors as Policy Makers*, Cambridge: Harvard University Press.
- Jay S., Jones C., Slinn P. and Wood C. (2007), "Environmental Impact Assessment: Retrospect and prospect", *Environmental Impact Assessment Review*, 27(4), 287-300.
- Johnson D. (1994), *Research Methods in Educational Management*, Essex: Longman Group.
- Kantor P. (2003), *Big Bay Conditions of Approval relating to Storm Water Pipelines*, Legal Opinion Report by Kantor Legal Services cc, Cape Town.
- Kajura H.M. (1994), "Promoting Voluntary Compliance: Environmental Auditing, Outreach and Incentive Programme," Paper in Proceedings of Third International Conference on Environmental Enforcement, Volume 1, International Network for Environmental Compliance and Enforcement, Washinton DC, 517-526.
- Kaufman S. (1993), *The Origins of Order, Self-Organisation and Selection in Evolution*, Oxford University Press.
- Khosla A. (1995), Foreword in Tryzna TC. (ed.), *A Sustainable World*, Sacramento: IUCN.
- Kolhoff A.J., Runhaar H.A.C. and Driessen P.P.J. (2009), "The contribution of capacities and context to EIA system performance and effectiveness in developing countries: towards a better understanding," *Impact Assessment and Project Appraisal*, 27(4), 271-282.
- Lawrence D.P. (1997), "The Need for EIA Theory Building," *Environmental Impact Assessment Review*, 17, 79-107.
- Lawrence D.P. (2000), "Planning theories and environmental impact assessment," *Environmental Impact Assessment Review*, 20, 607-625.
- Lee N. (1995), "Environmental Impact Assessment in the European Union: A Tenth Anniversary", *Project Appraisal*, 10(2), 77-90.
- Lee N., Walsh F. and Rheeder G. (1994), "Assessing the Performance of the EIA Process", *Project Appraisal*, 9(3), 161-172.

- Lochner P. (2005), *Guideline for Environmental Management Plans*, Report number Env-S-C 2005-053 prepared for the Western Cape Provincial Department of Environmental Affairs and Development Planning by the CSIR, Republic of South Africa, Western Cape Provincial Department of Environmental Affairs and Development Planning.
- Lohani B., Evans J.W., Ludwig H., Evritt R.R., Carpenter R.A. and Tu S.L. (1997), *Environmental Impact Assessment for Developing Countries in Asia*, Overview in Final Report, Volume 1, Manila: Asian Development Bank.
- Loucks D.P. (1994), "Sustainability Implications for Water Resources Planning and Management", *Natural Resources Forum*, 18(4), 263-274.
- Lovelock J.E. (1979), *GAIA: A New Look at Life on Earth*, Oxford University Press.
- Low A.B. (2007), "Revegetation of Duikersvlei Stream: First Botanical Monitoring," Coastec Environmental Consultants, Cape Town.
- Marshall R. (2005), "Environmental impact assessment follow-up and its benefits for industry", *Impact Assessment and Project Appraisal*, 23(3), 191-196.
- Marshall R., Arts J. and Morrison-Saunders A. (2005), "International principles for best practice EIA follow-up", *Impact Assessment and Project Appraisal*, 23(3), 175-181.
- Masden E.A., Fox A.D., Furness R.W., Bullman R. and Haydon D.T. (2010), "Cumulative impact assessment and bird/wind farm interactions: Developing a conceptual framework," *Environmental Impact Assessment Review*, 30, 1-7.
- McCourt L. (2010), Chief Director Integrated Environmental Management, Department of Environmental Affairs, Review of this draft thesis and personal communications, Pretoria.
- McDonald G.T. and Brown A.L. (1995), "Going Beyond Environmental Impact Assessment: Environmental Input to Planning and Design", *Environmental Impact Assessment Review*, 15(6), 483-495.
- McKelvey B. (2001), "Energising Order Creating Networks of Distributed Intelligence: Improving the Corporate Brain", *International Journal of Innovation Management*, 5(2), 181-212.
- Mebratu D. (1998), "Sustainability and Sustainable Development - Historical and conceptual review", *Environmental Impact Assessment Review*, 18(6), 493-520.

- MEGA (2008), "Groundwater Monitoring at the Milnerton Site," Report J-164-08 compiled by Morris Environmental and Groundwater Alliance, Hout Bay.
- Merriam S. (1988), *Case Study Research in Education: A Qualitative Approach*, California: Jossey-Bass Publishers.
- Ministry of Environment, Planning and Economic Development (2007), *Record of Decision on Appeal: Environmental Authorisation for Proposed new Green Point Stadium, Green Point Common, Cape Town*, Correspondence issued to the City of Cape Town by Western Cape Provincial Minister Tasneem Essop, 5 January 2007, Cape Town.
- Mitroff I.I. and Linstone H.A. (1993), *The Unbounded Mind: Breaking the Chains of Traditional Business Thinking*, New York: Oxford University Press.
- Moduying V.J. (2001), *Environmental Impact Assessment (EIA) Systems in Sabah*, Paper delivered at 6th Sabah Inter-Agency Tropical Ecosystems (SITE) Research Seminar, Sabah, Malaysia.
- Morgan G. (1997), *Images of Organisation*, Thousand Oaks, California: SAGE Publications.
- Morrison-Saunders A. and Bailey J. (2000), "Exploring the EIA/Environmental Management Relationship: Follow-up for Performance Evaluation," Paper presented at *IAIA 2000 Back to the Future* conference, 23 June 2000, Hong Kong.
- Morrison-Saunders A., Annandale D. and Cappelluti J. (2001), "Practitioner perspectives on what influences EIA quality," *Impact Assessment and Project Appraisal*, 19(4), 321-325.
- Morrison- Saunders A., Arts J., Caldwell P. and Baker J. (2001a), *EIA Follow-Up: Outcomes and Improvements Discussion Paper*, Paper delivered at IAIA Conference on Impact Assessment in the Urban Context 27 May – 2 June 2001, Cartagena, Colombia.
- Morrison-Saunders A., Arts J., Baker J. and Caldwell P. (2001b), "Roles and stakes in environmental impact assessment follow-up," *Impact Assessment and Project Appraisal*, 19(4), 289-296.
- Morrison-Saunders A., Baker J. and Arts J. (2003), "Lessons from practice: Towards successful follow-up," *Impact Assessment and Project Appraisal*, 21(1), 43-56.
- Morrison-Saunders A. and Arts J. (2004), (eds.) *Assessing Impact: Handbook for EIA and SEA Follow-up*, London: Earthscan James and James.

- Morrison-Saunders A. and Arts J. (2005), "Learning from Experience: Emerging trends in environmental impact assessment follow-up", *Impact Assessment and Project Appraisal*, 23(3), 170-174.
- Myers N. and Kent J. (2005), *The New GAIA Atlas of Planet Management*, Gaia Books.
- Nadeem O. and Hameed R. (2006), *A Critical Review of the Adequacy of EIA Reports-Evidence from Pakistan*, Paper Published in the Proceedings of the World Academy of Science, Engineering and Technology, December 2006, Volume 17.
- Nath B. (2003), "Education for Sustainable Development: The Johannesburg Summit and Beyond", *Environment, Development and Sustainability*, 5(1-2), 231-254.
- Nicolson R. (2009), E-mail correspondence between Environmental Compliance Officer Mark Sasman and Health and Safety Manager Russel Nicolson, 21 May 2009, Cape Town.
- Nieslony C. (2004), *An Evaluation of the Effectiveness of Environmental Impact Assessment in Promoting Sustainable Development – Case Study Germany*, Masters Dissertation, Norwich: University of East Anglia.
- Ninham Shand (2008), *Project Specific Construction Environmental Management Plan*, Report Prepared for the Department of Public Works, Cape Town.
- Noble B.F. (2000), "Strengthening EIA through Adaptive Management: A Systems Perspective", *Environmental Impact Assessment Review*, 20(1), 99-113.
- Noble B. and Storey K. (2005), "Towards Increasing the Utility of Follow-Up in Canadian EIA", *Environmental Impact Assessment Review*, 25(2), 163-180.
- Noble B. and Birk J. (2011), "Comfort monitoring? Environmental assessment follow-up under community-industry negotiated environmental agreements," *Environmental Impact Assessment Review*, 31, 17-24.
- Noor K.B.M. (2008), "Case Study: A Strategic Research Methodology", *American Journal of Applied Sciences*, 5(11), 1602-1604.
- Nooteboom S. (2007), "Impact Assessment Procedures for Sustainable Development: A Complexity Theory Perspective", *Environmental Impact Assessment Review*, 27(4), 645-665.

- O' Riordan T. (2000), "The Sustainability Debate", *Environmental Science for Environmental Managers 2nd edition*, London: Prentice Hall.
- Ogunba O.A. (2004), "EIA Systems in Nigeria: Evolution, Current Practice and Shortcomings", *Environmental Impact Assessment Review*, 24(6), 643-660.
- Oposa A.A. (1998), "A Socio-Cultural Approach to Environmental Law Compliance: A Phillipine Scenario," Paper in Proceedings of Fifth International Conference on Environmental Enforcement, Volume 1, International Network for Environmental Compliance and Enforcement, Washington DC, 313-332.
- Paliwal R. (2006), "EIA Practice in India and its Evaluation using SWOT Analysis", *Environmental Impact Assessment Review*, 26(5), 492-510.
- Patrick M. and Clift H. (2006), *Final Report on Erf 1059 Green Point Common: Archaeological Impact Assessment*, Report prepared for erstwhile Cape Town Metropolitan Council, Cape Town
- Patridge E. (2003), "In Search of Sustainable Values", *International Journal of Sustainable Development*, 6(1), 25-41.
- Peet J. and Bossel H. (2000), "An Ethics Based Systems Approach to Indicators of Sustainable Development", *International Journal of Sustainable Development*, 3(3), 221-238.
- Perez-Trejo F. (1989), "Impact Assessment Methodology for Complex Natural Systems", in Van der Staal and Vught (ed.), *Impact Forecasting and Assessment*, Chapter 8, Netherlands: Delft University Press.
- Pillay M. (2010), Photograph of Submarine Escape Training Simulator Building Development Site, AureconPty(Ltd) Environmental Consultants, Cape Town.
- Polonen I., Hokkanen P. and Jalava K. (2001), "The effectiveness of the Finnish EIA system – What works, What doesn't, and What could be improved?" *Environmental Impact Assessment Review*, 31, 120-128.
- Pope J., Annandale D. and Morrison-Saunders A. (2004), "Conceptualising sustainability assessment," *Environmental Impact Assessment Review*, 24, 595-616.
- Rabe B.G. (1986), *Fragmentation and Integration in State Environmental Management*, Washington DC: The Conservation Foundation.

- Rabie C. (2009), Environmental consultant at Ecosense cc Environmental Consultants, Personal communication and interviews, 3December 2009, Stellenbosch.
- Rabie C. (2008), *Environmental Audit Reports*, Reports to Department of Environmental Affairs and Development Planning, April 2006 to October 2008, Ecosense cc. Environmental Consultants, Cape Town.
- Rabie C. (2006), Duikersvlei Site Photography, Ecosense cc. Environmental Consultants, Cape Town.
- Rabie C. (2006b), Closure Report October 2006, Ecosense cc. Environmental Consultants, Cape Town, 2.
- Ramjeawon T. and Beedassy R. (2004), "Evaluation of the EIA System on the Island of Mauritius and Development of an Environmental Monitoring Plan Framework", *Environmental Impact Assessment Review*, 24, 537-549.
- Raubenheimer L. (2009), Erstwhile chairman of the Bloubergstrand Ratepayers Association, Personal Interview, December 2009, Cape Town.
- Ravetz J. (2000), "Integrated assessment for sustainability appraisal in cities and regions," *Environmental Impact Assessment Review*, 20, 31-64.
- Redclift M. and Benton T. (1994), *Social Theory and the Global Environment*, London: Routledge.
- Rees C. (1999), "Improving the Effectiveness of Environmental Impact Assessment in the World Bank", *Environmental Impact Assessment Review*, 19(3), 333-339.
- Retief F. (2007) "Environmental Assessment Effectiveness – What does it mean?", In:Fischer TB, Gazzola P, Jha-Thakur U, Belcakova I and Aschemann R. (2007), *Environmental Assessment Lecturer's Handbook*, Chapter 12, European Commission PENTA Erasmus Mundus Programme, Brussels.
- Retief F., Jones C. and Jay S. (2008), "The emperor's new clothes – Reflections on strategic environmental assessment (SEA) practice in South Africa," *Environmental Impact Assessment Review*, 28, 504-514.
- Riffat R. and Khan D. (2006), "A Review and Evaluation of the Environmental Impact Assessment Process in Pakistan", *Journal of Applied Sciences in Environmental Sanitation*, 1, Indonesia: Department of Environmental Engineering, Sepuluh Nopembar Instsitude of Technology in Surabaya.

- Rossouw N. and Wiseman K. (2004), "Learning from the implementation of environmental public policy instruments after the first ten years of democracy in South Africa," *Impact Assessment and Project Appraisal*, 22(2), 131-140.
- SAIEA (2003), "Improving the Effectiveness of Environmental Impact Assessment and Strategic Environmental Assessment in Southern Africa," Report on Workshop Proceedings from 13-16 May 2003 in Windhoek, Namibia.
- Sadler B. (1996), "Environmental Assessment in a Changing World", *International Study of the Effectiveness of Environmental Assessment*, Canberra: Canadian Environmental Assessment Agency.
- Sadler B. (2004), "On evaluating the success of EIA and SEA", In: Morrison-Saunders, M. and Arts, J. (eds), *Assessing impact: Handbook of EIA and SEA follow-up*, London: Earthscan.
- Sadler B. and Jacobs P. (1990), *Sustainable Development and Environmental Assessment: Perspectives on Planning for a Better Future*, Quebec: Canadian Environmental Assessment Research Council.
- Samarakoon M. and Rowan J.S. (2008), "A Critical Review of Environmental Impact Assessment in Sri Lanka with Particular Reference to Ecological Impact Assessment", *Environmental Management*, 41(3), 441-460.
- Sanchez L.E. and Gallardo A.L.C.F. (2005), "On the successful implementation of mitigation measures", *Impact Assessment and Project Appraisal*, 23(3), 182-190.
- Sandham L.A. and Pretorius H.M. (2008), "A Review of EIA Report Quality in the North West Province of South Africa", *Environmental Impact Assessment Review*, 28(4-5), 229-240.
- Sarang A., Vahedi A. and Shamsai A. (2007), "How to Quantify Sustainable Development: A Risk Based Approach to Water Quality Management", *Environmental Management*, 41(2), 200-220.
- Sasman M. (2009a), Manager of Ecosense cc. Environmental Consultants, Personal communication, site visits and interviews, Various dates 2009 – 2010, Cape Town and Stellenbosch.
- Sasman M. (2009b), E-mail correspondence between Ecosense cc. Environmental Consultants Environmental Compliance Officer Mark Sasman and colleague Charlotte Pienaar, 28 May 2009, Cape Town.

- Senner R. (2011), "Appraising the sustainability of project alternatives: An increasing role for cumulative effects assessment," *Environmental Impact Assessment Review*, 31, 502-505.
- Schumacher E.F. (1989), *Small is Beautiful*, London: Harper Perennial.
- Shippey K. (2009), AureconPty(Ltd) Manager of Environmental Unit, Personal interview, 14 December 2009, Cape Town.
- Sillito A. (2009), Manager of Sillito Environmental Consultants, Personal Communication, 8 December 2009, Cape Town.
- Slinger J.H., Huizinga P., Taljaard S., van Niekerk L. and Enserink B. (2005), "From Impact Assessment to Effective Management Plans: Learning from the Great Brak Estuary in South Africa", *Impact Assessment and Project Appraisal*, 23(3), 197-204.
- Soy S.K. (1997), *The Case Study as a Research Method*, Unpublished paper, Austin: University of Texas.
- Starke R. (1995), *The Art of Case Research*, California: Sage Publishing.
- Tellis W. (1997), "Application of a Case Study Methodology", *The Qualitative Report*, 3(3), online journal at www.nova.edu/ssss/qr, accessed November 2009, last updated 1 July 2011, Fort Lauderdale, Florida.
- Tennoy A., Kvaerner J. and Gjerstad K.I. (2006), "Uncertainty in environmental impact assessment predictions: the need for better communication and more transparency", *Impact Assessment and Project Appraisal*, 24(1), 45-56.
- The Environmental Partnership (2006a), *Environmental Impact Assessment: Final Environmental Impact Report – Proposed Re-Development of Green Point Stadium and Associated Infrastructure*, Report prepared for the City of Cape Town, Cape Town.
- The Environmental Partnership (2006b), *Environmental Management Plan - Construction Phase*, Report prepared for the City of Cape Town, Cape Town.
- Therivel R. and Ross B. (2007), "Cumulative Impact Assessment: Does scale matter?" *Environmental Impact Assessment Review*, 27, 365-385.

- Tinker L. (2003), *Mitigation is the Heart of the EIA Process (Wood, 2003), but is the English EIA System Effective at Ensuring that Mitigation Measures are Put in Place? An Assessment using EIAs from 5 Counties*, Masters Dissertation, Norwich: University of East Anglia.
- Tinker L., Cobb D., Bond A. and Cashmore M. (2005), "Impact mitigation in environmental impact assessment: paper promises or the basis of consent conditions?" *Impact Assessment and Project Appraisal*, 23(4), 265-280.
- Titmuss P. (2009a), District Head of Environmental and Heritage Management, City of Cape Town, Personal communications and interviews, Various dates 2009-2010, Cape Town.
- Titmuss P. (2009b), Big Bay Environmental Liaison Committee, Various minutes of committee meetings 2009-2010, Cape Town.
- Toeffy Z. (2009), Deputy Director of Integrated Environmental Management, Western Cape Provincial Department of Environmental Affairs and Development Planning, Personal Interview, 2 December 2009, Cape Town.
- Toffler A. (1980), *The Third Wave*, London: Pan.
- Trochim W. (2000), *The Research Methods Knowledge Base*, Second edition, Online publication at www.socialresearchmethods.net/kb, Ohio: Atomic Dog Publishing.
- Tukker A. (2000), "Life Cycle Assessment as a Tool in Environmental Impact Assessment", *Environmental Impact Assessment Review*, 20, 435-456.
- Turner R.K. and Pearce D.W. (1990), *The Ethical Foundations for Sustainable Development*, LEEC Paper 90-01, London: International Institute for Environment and Development.
- UNEP (1988), *Environmental Impact Assessment: Basic Procedures for Developing Countries*, Bangkok: United Nations Environmental Program Regional Office for Asia and the Pacific.
- United Nations (1992), *Report on the UN Conference on Environment and Development*, Revision 1, UNCED Report A, Conference 151/5, Rio de Janeiro.
- United Nations (2008), *United Nations Millennium Development Goals*, online at www.un.org/millenniumgoals, as reviewed on 24 March 2010.
- Uprety B. (2007), *Effectiveness of EA in Decisionmaking: Nepal's Experience*, Paper delivered at PENTA-WII Workshop, September 2007, Dehradun, India.

- Van Staal P.M. (1989), "Inferences in Forecasting", in *Van der Staal P.M. and Vught FA. (ed), Impact Forecasting and Assessment Ch 2*, Netherlands: Delft University Press.
- Van Zyl H. and Leimann A. (2006), *Economic Specialist Study – Green Point Stadium and Associated Developments*, Report prepared for The Environmental Partnership, 7 September 2006, Cape Town.
- Vidamemoria Heritage Consultants (2006), *Proposed Re-Development of Green Point Stadium and Associated Infrastructure: Heritage Impact Assessment*, Report prepared for City of Cape Town, July 2006, Cape Town.
- Vught F.A. (1989), "Methodological Foundations of Impact Assessment", in *Van der Staal P.M. and Vught FA (ed), Impact Forecasting and Assessment*, Chapter 1, Netherlands: Delft University Press.
- WCED (1987), *Our Common Future*, London: Oxford Press.
- WSP Environmental (2009), *Green Point Common –Contaminated Land Risk Assessment*, Report prepared for the City of Cape Town, February 2009, Cape Town.
- Wall D. (1994), *Green History*, London: Routledge.
- Wang Y., Morgan R.K. and Cashmore M. (2003), "Environmental Impact Assessment in the People's Republic of China: New Law, Old Problems", *Environmental Impact Assessment Review*, 23(5), 543-579.
- Weaver A., Pope J., Morris-Saunders A. and Lochner P. (2008), "Contributing to Sustainability as an Environmental Impact Practitioner", *Impact Assessment and Project Appraisal*, 26(2), 91-98.
- Weston J. (ed.) (1997), *Planning and Environmental Impact Assessment in Practice*, England: Longman.
- Whitelaw G.S., Vaughan H., Craig B. and Atkinson D. (2003), "Establishing the Canadian Community Monitoring Network", *Environmental Monitoring and Assessment*, 88(1-3), 409-418.
- Wood C. (2003), *Environmental Impact Assessment: A Comparative Review 2nd ed*, Harlowe: Prentice Hall.

- Wood G. (2000), "Is What You See What You Get? Post- Development Auditing of Methods Used for Predicting the Zone of Visual Influence in EIA", *Environmental Impact Assessment Review*, 20(5), 537-556.
- Wood G. (2008), "Thresholds and criteria for evaluating and communicating impact significance in environmental statements - See no evil, hear no evil, speak no evil", *Environmental Impact Assessment Review*, 28, 22-38.
- World Bank (1999), *Environmental Management Plans*, Washington DC: World Bank Environment Department.
- Yasamis F.D. (2007), "Assessment of Compliance Performance of Environmental Regulations of Industries in Tuzla (Istanbul, Turkey)", *Environmental Management*, 39(4), 575-586.
- Yin R. (1994), *Case Study Research: Design and Methods*, 2nded, California: Sage Publishing.
- Yin R. (1993), *Applications of Case Study Research*, California: Sage Publishing.
- Zainal R.N.A.R. (undated), *Environmental Management for Road Construction: A Consultant's View Point*, Online Paper 28, Public Works Department, Malaysia, <http://rakan1.jkr.gov.my/cjalan/editor/files/environmental%20mgmt.pdf>, last accessed 2 July 2011.

ANNEXURE A
EMP FOCUS AREAS AND ACTUAL IMPACTS

Annexure A1: Fines issued for EMP transgressions – Eden on the Bay

EMP Mitigation Measures	Fines for Construction Impacts
Materials Handling (Stock piles, hazardous substances)	2008/12/03 – Incorrect paint disposal 2009/02/18 - Incorrect paint disposal 2009/02/26 - Incorrect paint disposal 2009/03/04 - Incorrect paint disposal 2009/03/11 – Incorrect paint disposal 2009/05/08 – Incorrect paint disposal
Plant and Equipment (Fuel operations, ablution, solid waste, contaminated water, structures, lights, noise, dust)	No contraventions recorded
Construction Pollution (Methods statements, awareness training, site demarcation, access management, emergency procedures, community relations, fauna and flora protection, erosion control, aesthetics, temporary site closure, archaeological and palaeontological remains, special environments, storm water management, cement batching, asphalt, pipelines, crane operation, sumping, trenching)	2008/12/03 – Cement handling causing pollution 2008/12/03 - Commencing without authorisation 2009/01/12 – Construction material outside site boundaries 2009/01/20 - Construction material outside site boundaries 2009/02/04 – Cement handling causing pollution 2009/02/06 - Construction material outside site boundaries 2009/02/18 – Failure to clear storm water drains as per ECO 2009/02/18 - Construction material outside site boundaries 2009/02/18 – Cement handling causing pollution 2009/03/01 – Cement handling causing pollution 2009/03/03 – Not using ablution facility 2009/03/04 - Construction material outside site boundaries 2009/03/11 - Construction material outside site boundaries 2009/03/18 – Cement handling causing pollution 2009/03/18 - Construction material outside site boundaries 2009/04/01 – Cement handling causing pollution 2009/04/01 - Construction material outside site boundaries 2009/04/08 – Cement handling causing pollution 2009/04/07 - Construction material outside site boundaries 2009/04/23 – Cement handling causing pollution 2009/04/30 – Cement handling causing pollution 2009/05/08 – Cement handling causing pollution 2009/05/14 – Cement handling causing pollution 2009/05/21 – Cement handling causing pollution 2009/05/29 – Cement handling causing pollution 2009/06/04 - Cement handling causing pollution 2009/06/11 - Cement handling causing pollution 2009/06/22 – Precinct occupation without permission 2009/06/29 - Precinct occupation without permission 2009/07/06 - Precinct occupation without permission 2009/07/13 - Precinct occupation without permission

Annexure A2: EMP focus areas and Actual impacts – Milnerton

EMP Mitigation Measures	Construction Impacts
<p>A. Communications protocols included, appointment of ECO required, all communication with contractor via engineer, environmental register to be kept on site and method statements required:</p> <ul style="list-style-type: none"> • Refuelling on site • Site camp establishment • Trenching • Control of site debris • Dust control • Noise control • Demarcation of no-go areas • Fire prevention • Storage of hazardous materials • De-watering trenches • Environmental awareness training • Spill treatment on site • Mixing of concrete on site • Silt trapping • Vegetation clearing • Earthworks 	<p>Full compliance;</p> <p>ECO appointed, environmental register kept on site, method statements all compiled, submitted and approved on time</p>
<p>C. Pre-construction requirements required engineering services on site to be located, no-go areas to be identified, site layout to be established and working hours to be confirmed</p>	<p>No contraventions recorded</p>
<p>D2. Appropriate machinery to be used correctly to minimise environmental damage</p>	<p>No contraventions recorded;</p> <p>Excavators reported to be moving through stream bed (June 2006) addressed by ECO</p>
<p>D4. Storm water collecting in excavated trenches and water from de-watering operations will be pumped to a sump</p>	<p>One overflow incident with problematic valve</p>
<p>D5. Excavated material should be watered, screened and covered to prevent erosion and soil movement</p>	<p>No contraventions recorded</p>
<p>D6. Fires only allowed outside construction site, welding and cutting only in permitted areas with working fire fighting equipment in place</p>	<p>No contraventions recorded;</p> <p>ECO reported fires by contractor crew and instruction to cease making fires issues (June 2006)</p>
<p>D9. Dust control required by means of water bowsers and wind screens</p>	<p>No contraventions recorded;</p> <p>Dust problem reported by ECO (June 2006) and addressed with contractor</p>
<p>D10. Traffic disruption must be minimised, especially adjacent business properties</p>	<p>No contraventions recorded</p>
<p>D11.1 Hazardous substances stored in appropriate</p>	<p>No contraventions recorded;</p>

demarcated store area with spill containment measures and bunds in place; Spill treatment kits must be readily available	Asbestos pipes uncovered during excavation on site, stockpiled and disposed of properly (July 2006)
D11.2 Material Safety Data Sheets must be kept on site for potentially hazardous substances	No contraventions recorded
D11.3 Material handling must take place in such a way that prevents pollution	No contraventions recorded; Fuel handling incident reported by ECO (June 2006)
D11.6 Concrete work in defined mixing areas only. Cement contaminated water to be fed to a container, neutralised and suitably disposed of; Where possibly, ready mixed concrete should be used; Cement bags must be suitably stored and disposed of; Concrete spills must be disposed of	No contraventions recorded
D12.1 Waste should be categorised, recycled where possible and recorded on the waste register; Suitable waste containers must be provided and frequently removed	No contraventions recorded
D12.2 Netting should be used to cover waste containers and prevent wind-blown litter	No contraventions recorded
D12.3 Chemical toilets should be provided as agreed by ECO and at a ratio of 1 per 15 persons on site	No contraventions recorded
D13.1 Waste water must be fed to sedimentation pond	No contraventions recorded; City of Cape Town (Pat Titmuss) requests rock weir for settling out solids (August 2006)
D13.2 No construction fluid should be allowed to enter the waste water system	No contraventions recorded
D13.3 No waste water should be disposed of to soil	No contraventions recorded
D13.4 Storm water should be managed so that no overland flow to the construction site is possible from outside the site	No contraventions recorded
D14.1 Machinery leaks should be prevented and provided with drips trays	No contraventions recorded
D14.2 Spills should be recorded in the Environmental Register	No contraventions recorded
D15.1-3 Noise impact must be managed on site and no noise generating work may take place after 8pm and before 7am; Longer working hours only after agreement with ECO	No contraventions recorded; Pumps and machines reported as requiring measurement to confirm below 85dB (July 2006)
D16.1 All ground water must be considered contaminated and where removed, pumped to storm water dam	One overflow incident with problematic valve
D16.2 Polluted soil categorised by specialist as medium contamination (1500 to 15 000 ppm ammonium nitrate) loaded onto trucks and stockpiled	No contraventions recorded; Nitrogen levels in water moving from the site reduced from average 500ppm to less than 8ppm

<p>to be stored and later mixed with back fill material at 1:10 ratio and compacted as prescribed; High contamination (>15 000 ppm) sealed and disposed of appropriately off site.</p>	
<p>E1-2 Post-construction clearing and cleaning of site and rehabilitation of soil, embankments and vegetation</p>	<p>No contraventions recorded; More detail in OEMP</p>

Annexure A3: EMP focus areas and Actual impacts – Green point Stadium and Common

EMP Mitigation Measures	Construction Impacts
Demarcation of areas	No-go areas infringed upon (May 2008) Labour camp located next to hazardous store (June 2008) Construction material in no-go areas (Aug 2008) Fence around hazardous stores down (Nov 2008 – Feb 2009) Damage to trees in no-go areas (March 2009) Materials stored in no-go area (April 2009) Stock pile areas not approved (April 2009)
Environmental awareness training	No contraventions recorded
Demolition	No contraventions recorded
Working hours	No repeated offences or complaints noted
Clearing and stabilising	No contraventions recorded
Erosion	No contraventions recorded
Concrete batching	Cement polluted water entering municipal storm water system (Feb 2008, new sump system installed, cement water used for construction purposes instead); Cement batching on ground (April 2008)
Equipment servicing and cleaning	Wheel washing areas insufficient (May 2008)
Hazardous material storage	Fuel spills near tankers (May 2008); Fuel storage facility not satisfactory (June 2008); Oil spill from crane revealed insufficient spill kits on site (Aug 2008); Flammables stores contained contaminated water (Nov 2008)
Solid waste management	Refuse problems noted (Dec 2008); No receipt available for legal hazardous waste disposal (May 2009)
Water pollution prevention	Polluted soil exposed during excavation (May 2009)
Storm water management	Sump system not cleaned (Aug 2008); Public complaint of heavy silt run-off into ocean (June 2009)
Ablution facilities	Overflow of ablutions periodically noted
Water resources management	No contraventions recorded.
Dust control	Repeated dust complaints received (Feb 2008, March 2008) Straw stabilisation for cleared areas not attended to, Dustex palliatives used instead; Regular watering of roads not taking place (Nov 2008)
Noise control	Complaint of reverse alarms received from community (various)
Light control	No contraventions recorded
Fire prevention	No contraventions recorded
Cleanliness of public roads	No contraventions recorded
Traffic control and safety	No contraventions recorded
Access	No contraventions recorded
Cultural resources	No contraventions recorded
Surrounding land use	No contraventions recorded
Method statements	Storm water management method statement outstanding (March – June 2009)

Annexure A4: EMP focus areas and Actual impacts – Simons Town

EMP Mitigation Measures	Construction Impacts
<p><i>Materials handling, use and storage.</i></p> <ul style="list-style-type: none"> • Stockpiling in correct allocated areas approved by Architect and SA Navy • Loads protected from spilling during transit 	Vehicle loads not protected (Oct 2009)
<p><i>Hazardous substances</i></p> <ul style="list-style-type: none"> • Stored in an enclosed and bunded area; or • Secondary container staff aware of emergency procedure in case of spillage • Material Safety Data Sheets available on site 	No contraventions recorded
<p><i>Shutter oil and curing compound</i></p> <ul style="list-style-type: none"> • Containers stored within the fuel bund • No leakage/ spills • Proper dispensing equipment used (no tipping of container) • Dispensing equipment stored in waterproof container • Oiling not occurring on bare ground 	Minor oil spills (Oct 2009) Minor oil spills (Jan 2010) Minor oil spills (Feb 2010) Minor oil spills (Apr 2010)
<p><i>Fuel and oil</i></p> <ul style="list-style-type: none"> • Fuel storage area located at specified location • Fuel stored in facility complying with specifications i.e. in tanks with lids or bowsers • Bund undamaged • Bunded area covered • Dispensing equipment not leaking • Fire-fighting equipment at the fuel stores • Refuelling taking place at site, with drip trays present. • Supply of absorbent material readily available to absorb/ to encapsulate minor hydrocarbon spillage • Proper dispensing equipment used when >200L drum. 	No contraventions recorded
<p><i>Ablution facilities</i></p> <ul style="list-style-type: none"> • Sufficient number of toilets (20:1) provided and secured to the ground • Cleaned or emptied regularly, with no spillage; and removal of contents off site 	No contraventions recorded
<p><i>Eating areas</i></p> <ul style="list-style-type: none"> • Designated eating areas provided • Bins with lids provided 	No contraventions recorded
<p><i>Solid waste</i></p> <ul style="list-style-type: none"> • No on site burying or dumping of any waste materials, vegetation, litter or refuse • Bins emptied regularly and contents removed from site 	Littering (Sep 2009)
<p><i>Contaminated water</i></p> <ul style="list-style-type: none"> • No discharge of contaminated water (cement, chemicals etc) 	Construction site water pumped into harbour/sea (Oct 2009)

<p><i>into the harbour</i></p> <ul style="list-style-type: none"> • <i>No discharge of water used in cleaning the equipment into the harbour.</i> • <i>Drip trays inspected and emptied daily, and serviced when necessary</i> • <i>Relevant approval obtained prior to discharge of contaminated water into Municipal sewer system</i> 	
<p><i>Dust</i></p> <ul style="list-style-type: none"> • <i>Dust-suppression measures in place</i> • <i>Stockpiles protected against erosion</i> 	No contraventions recorded
<p><i>Workshop, equipment maintenance and storage</i></p> <ul style="list-style-type: none"> • <i>Maintenance performed in the workshop</i> • <i>Architect approved maintenance work outside the workshop</i> • <i>On site plant in good working order and serviced regularly</i> • <i>Drip trays provided in construction areas for all stationary plant</i> • <i>Workshop complies with specifications (impermeable, bunded).</i> • <i>Drip trays used during servicing of equipment</i> • <i>Leaking equipment repaired immediately or removed from Site (spill cleaned up).</i> • <i>Washing undertaken for urgent maintenance only.</i> 	No contraventions recorded
<p><i>Noise</i></p> <ul style="list-style-type: none"> • <i>Appropriate silencers installed on equipment</i> • <i>Appropriate directional and intensity settings maintained on all hooters and sirens</i> • <i>No amplified music on site</i> • <i>Activities generating noise levels in excess of 85 dB confined to 08h00 to 17h00 Monday to Friday</i> 	No contraventions recorded
<p><i>Method Statements</i></p> <ul style="list-style-type: none"> • <i>Received at least 7 days before new activity commenced</i> • <i>Method statements approved</i> • <i>Method statements communicated to all personnel and readily available on site</i> 	Method statements outstanding (Sep 2009)
<p><i>Environmental awareness training</i></p> <ul style="list-style-type: none"> • <i>All employees attended an Environmental Awareness Training course</i> • <i>New course conducted when necessary</i> 	Training not yet done (Sep 2009, Oct 2009)
<p><i>Site clearing</i></p> <ul style="list-style-type: none"> • <i>Limited to the area required to facilitate works</i> • <i>No burning of vegetation</i> 	No contraventions recorded
<p><i>No go areas</i></p> <ul style="list-style-type: none"> • <i>No go areas marked</i> • <i>Workers informed of no go areas</i> 	No contraventions recorded
<p><i>Protection of flora/fauna/ archaeological remains</i></p>	No contraventions recorded

<ul style="list-style-type: none"> • <i>No trapping, poisoning or shooting of animals</i> • <i>Reasonable precautions taken to prevent damage to archaeological remains discovered.</i> 	
<p><i>Access routes/ haul roads</i></p> <ul style="list-style-type: none"> • <i>Movement of all vehicles restricted to designated routes</i> • <i>Signage and signalmen where required</i> • <i>Speed limit not exceeded</i> • <i>Roads cleared of dust and sand daily</i> 	No contraventions recorded
<p><i>Community relations</i></p> <ul style="list-style-type: none"> • <i>Reasonable measures to ensure site and equipment off-limits to non-construction personnel.</i> • <i>Information board/s erected.</i> • <i>Complaints being noted/ register kept</i> 	No contraventions recorded
<p><i>Fire control</i></p> <ul style="list-style-type: none"> • <i>Fire officer appointed and his duties explained</i> • <i>No fires on site.</i> • <i>Smoking not allowed in areas where it is a fire hazard</i> • <i>Employees aware of procedures to follow in case of a fire</i> • <i>Basic fire fighting equipment available on site</i> 	No contraventions recorded
<p><i>Erosion and sedimentation control</i></p> <ul style="list-style-type: none"> • <i>Measures to control erosion in place</i> 	Sand bags not maintained (Jan 2010)
<p><i>Earthworks</i></p> <ul style="list-style-type: none"> • <i>Extent of earth works minimised</i> • <i>Appropriate dust suppression measures (as defined in specification) employed</i> • <i>Soil stockpiles protected against wind erosion</i> 	No contraventions recorded
<p><i>Stockpiling</i></p> <ul style="list-style-type: none"> • <i>Located at approved/ suitable site</i> • <i>Not exceed 2m in height</i> • <i>Precautions taken to prevent erosion and limit compaction</i> • <i>No damming of water or run off</i> • <i>Topsoil stockpiled, protected and monitored as per specification</i> 	No contraventions recorded
<p><i>Pumping</i></p> <ul style="list-style-type: none"> • <i>Pumps placed over a drip tray</i> • <i>Leaks fixed and polluted areas cleaned appropriately</i> • <i>No pumped water released into any water body</i> 	Drip trays (Oct 2009); Water pumped to harbour/sea (Oct 2009)
<p><i>Bitumen</i></p> <ul style="list-style-type: none"> • <i>Over spray of bitumen products prevented</i> • <i>Bitumen drums/ products stored as per specification</i> • <i>Stone chip / gravel excess swept / raked into piles and removed to an area approved by the Architect.</i> • <i>Water quality runoff from new/ fresh bitumen surfaces</i> 	No contraventions recorded

<p><i>monitored by contractor.</i></p> <ul style="list-style-type: none"> • <i>Bunds monitored regularly as per specification</i> • <i>Fire risk controls considered during heating of bitumen products</i> • <i>Bitumen products heated using LPG or other zero emission fuels</i> 	
<p><i>Crane operations</i></p> <ul style="list-style-type: none"> • <i>Drip trays in use and no over greasing of crane cables occurring</i> 	
<p><i>Cement and concrete batching</i></p> <ul style="list-style-type: none"> • <i>Location of batching area approved by Architect.</i> • <i>Batching activities not directly on the ground</i> • <i>Batching activities located on smooth, impermeable, banded surface, sloping towards a sump.</i> • <i>Wastewater from concrete batching disposed of via wastewater management system.</i> • <i>Used concrete bags stored in weatherproof containers and disposed of via the solid waste management system.</i> • <i>Unused cement bags stored in closed steel or other weatherproof containers.</i> • <i>Cement-contaminated water collected, and disposed of according to Water and Sanitation department conditions of approval.</i> • <i>Contaminated water storage not allowed to overflow, and protected from rain and flooding.</i> • <i>All visible remains of excess concrete and aggregate physically removed and appropriately disposed of.</i> 	<p>Cement batching in area with no sump/bund (Sep 2009)</p> <p>Cement water run-off (Sep 2009)</p> <p>Cement mixing in unsuitable area (Jan 2010)</p> <p>Cement bags not disposed of properly (April 2010)</p>

ANNEXURE B
ANALYSIS OF CONDITIONS OF APPROVAL

Annexure B1: Compliance with Conditions of Approval – Big Bay (includes Eden on the Bay precinct)

Conditions of Approval (selected conditions relating only to construction phase and EIA follow-up)	(a) Type of Condition and (b) Compliance
<p>1.5 The impact of roads and services (water, electricity and any other services) beyond the boundary of the development site, must be assessed through an Environmental Impact Assessment process. The planning thereof, i.e. the final route selection must be based on the findings of such an assessment and must be submitted to this Directorate for authorisation.</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Partial Compliance.</p> <p>An additional EIA was conducted for a pipe line and detention pond, but not for subsequent bulk infrastructure. It is clear that the broad EIA approval raised the need for more detailed studies for each precinct and for bulk infrastructure. This was not done by the initial developer, the City of Cape Town, or subsequent private developers.</p>
<p>1.6 The impact of coastal erosion on the beach and its management implications for recreational facilities must be re-assessed before design of the coastal recreational facilities is finalised. A specialist investigation must be commissioned by the applicant. This study must be carried out by a suitably qualified specialist in coastal processes. The study must be completed before the planning of the coastal node is finalised, to the satisfaction of the City of Cape Town. Proof of compliance with this condition must be forwarded to this Directorate one week prior to the submission of precinct plans for the coastal node to the Blaauwberg Administration. A letter from the CSIR, confirming that the findings of its study on coastal processes at Big Bay, which formed the basis of the site sensitivity analysis undertaken by the specialist consultant, remain valid, will suffice to effect compliance with this condition.</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance was achieved.</p> <p>This study envisaged was, however, aimed at recreational facilities as part of the landscaping for the development and the Blaauwberg Conservation Area further north. The impact of coastal erosion from the development of Eden on the Bay itself was never subject to such study. This may have raised the issue of storm water management and pollution on the beach much earlier.</p>
<p>1.7 Re-development of the area west of the existing alignment of Otto du Plessis Drive is subject to the compilation of the concept precinct plan that takes cognisance of the recommendations of the Big Bay Development Framework as approved by the City of Cape Town in 2001, maintaining the option to expand extensive recreational facilities northwards. The precinct plan must be approved by the City of Cape Town and a copy thereof forwarded to this Directorate and to the Department of Planning, Local Government and Housing.</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Partial Compliance.</p> <p>A concept precinct plan for Eden on the Bay was done, but deviated from the Big Bay framework plan with respect to fencing, the seaward buffer area, underground parking and its entrance, as well as the repositioning of the sewer pump station.</p>
<p>1.8 No development may be undertaken within the Conservation and Dune Management Areas except for the crossing of necessary linear infrastructure such as roads, pipelines and power lines through the central dune area at the three designated areas as indicated on the</p>	<p>CONTROL CONDITION</p> <p>Compliance was achieved.</p> <p>This condition of approval was introduced to limited development in the</p>

<p><i>revised figure 21, amended 20 September 2001. All infrastructure must be located within these road reserves. Construction of the roads through the central dune area must be done in such a way as to reduce environmental disturbance of the dune areas to a minimum. Two of the three roads crossing the central dune must be constructed in such a way as to follow the dune profile as far as possible. Detail design of cuttings through the central dune area must be approved by the City of Cape Town and a copy thereof forwarded to this Directorate prior to the construction of the said roads.</i></p>	<p>coastal dunes after allowing the development proposal for Eden on the Bay to be executed within the coastal dune system.</p> <p>There was one additional EIA conducted for a storm water pipe line in 2003.</p>
<p><i>1.9 All development in future must ensure a gradual or soft interface with dune management and conservation areas. Development may not be designed in such that it isolates open space areas through the erection of high fences, solid walls or similar structures. Only boundary fences to the satisfaction of the City of Cape Town are permitted along the boundaries of properties abutting open spaces. A contract agreement may be signed between the applicant and the development whereby it is agreed between them that the developer or his successor in title, must enter into contract agreements with the owners of individual erven to ensure that properties abutting open spaces are managed in an acceptable manner. This may inter alia include a list of requirements that the property owner of individual erven must adhere to during construction of dwellings, access control to the sensitive open spaces, dumping of refuse, site management</i></p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance was achieved.</p> <p>Management contracts are in place. The EIA allowed the agreements to be negotiated and formulated at a later stage when the Big Bay precincts are developed. EIA conditions are carried forward in sales agreements and through property owner associations.</p>
<p><i>1.12 Conservation worthy indigenous species of plants and animals (as identified by the Environmental Control Officer or specialist) must be removed prior to construction and translocated to conservation areas. Relevant permits must be obtained prior to removal of plants and animals.</i></p>	<p>CONTROL CONDITION</p> <p>Compliance was achieved.</p> <p>Species listed and removed by sub-contractor ESM.</p>
<p><i>1.13 A more detailed archaeological survey must be done during every development phase once vegetation has been removed for development purposes and the findings thereof reported to the South African Heritage Resources Agency.</i></p>	<p>CONTROL CONDITION</p> <p>Compliance was achieved.</p> <p>ECO liaison with Jonathan Kaplan (archaeologist) on record.</p>
<p><i>1.14 All human remains, burial sites and other archaeological artefacts uncovered during earthworks must be reported to the South African Heritage Resources Agency and must be subject to inspection by a professional archaeologist.</i></p>	<p>CONTROL CONDITION</p> <p>Compliance was achieved.</p> <p>ECO and archaeologist audited construction site</p>
<p><i>1.15 Given the permeable substrate and unconsolidated deposits that cover much of the general area, adequate provision must be made for the onsite handling of stormwater within future developments. If not adequately addressed to the satisfaction of the City of Cape Town, a specialist Hydrogeological Investigation must be commissioned by the local authority, Blaauwberg Administration. This study must be carried out by a suitably qualified hydrogeologist as determined by the City of Cape Town. This study must identify and</i></p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance was achieved.</p> <p>The specialist hydrogeological study was completed August 2002, but did not prevent the beach pollution and storm water problem on Big Bay beach. The condition was complied with, but</p>

<p>assess the existing groundwater resource (quantity and quality) in the area and provide recommendations for future management of this resource in light of the proposed developments. The findings of the study must be addressed in future phases of the Big Bay Development, to the satisfaction of the City of Cape Town.</p>	<p>did not achieve the objective it was intending to achieve.</p>
<p>1.16 No stormwater outlet to the sea or stormwater detention facilities outside of the development area may be constructed without assessing its environmental implications. If any of these proposals constitute an activity listed in terms of Schedule 1 of the EIA Regulations, (Government Notice No. 1182 of 5 September 1999, as amended), then application for authorisation must be made to this Directorate in terms of Section 22(1) of ECA.</p>	<p>CONTROL CONDITION</p> <p>Compliance was achieved.</p> <p>A detention pond was built further north and a pipeline constructed to remove storm water from the development area in a controlled way. A separate EIA was approved for this project.</p> <p>This measure did not prevent the storm water problem on Big Bay beach. The EIA for the pipeline focussed on its impact instead of whether it would achieve its purpose.</p>
<p>1.17 A network of walkways must be designed and constructed through the open spaces, to the satisfaction of the City of Cape Town. These walkways must be constructed as part of every construction phase of the development (where each development phase abuts open spaces). The design of walkways must be submitted as part of the precinct plans for all the open spaces to be approved by the Blaauwberg Administration.</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance was achieved.</p> <p>Walkways were constructed and approved by the City of Cape Town.</p>
<p>1.18 The City of Cape Town must notify this Directorate immediately of any incidence of non-compliance with any condition stated in this authorisation.</p>	<p>CONTROL CONDITION</p> <p>Compliance was achieved.</p> <p>There was, however, no response from the Department of Environmental Affairs and Development Planning to these notifications of non-compliance to the EMP and conditions of approval by the developer.</p>
<p>2.2. The construction Environmental Management Programmes (“the EMPs”) must be compiled separately for every individual phase of the development. The EMPs will contain generic principles as well as elements pertaining specifically to sensitive natural areas including natural vegetation remnants, the conservation and dune management areas and ecological corridors. The Environmental Liaison Committee must be consulted in regard to and advised of the EMPs. The EMPs must be approved by this Directorate prior to the commencement of any land clearing and construction. The construction EMPs must inter alia contain the following elements:</p> <p>2.2.1. An adequate description of the different stages of each construction phase of the development with adequate detail on the</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance was achieved.</p> <p>Separate EMPs and method statements were formulated and approved before and during construction. Environmental contracts were signed for the development of each separate development parcel</p>

<p><i>various environmental aspects, allocation of resources, responsibilities and time. It is emphasised that this phase include the establishment of major services (roads, water sewage and electricity), but exclude construction of dwellings of individual erven.</i></p> <p><i>2.2.2. Appropriate environmental control measures and procedures must be put in place to ensure that adequate environmental protection is exercised during the construction phase (e.g. demarcation and access control into sensitive areas, pollution control measures, plant rescue measures, treatment of topsoil, penalties).</i></p> <p><i>2.2.3. These procedures (environmental conditions) must be formalised by means of a legal environmental contract and be included as environmental specifications as part of the tender call documents to contractors. This will enable contractors to adequately budget (finances, time and other resources) for the project, and provide a better legal standing in handling inappropriate action by contractors.</i></p> <p><i>2.2.4. A landscaping and rehabilitation programme for the Dune Management Areas must be compiled, ensuring that locally occurring indigenous plant species are used for re-vegetation and rehabilitation;</i></p>	
<p><i>2.3. The operational phase EMP for all sensitive natural areas including natural vegetation remnants, the conservation and dune management areas, open spaces, recreation areas and ecological corridors must be prepared. The Environmental Liaison Committee (ELC) must be consulted in regard to and advised of the EMPs. The EMPs must be approved by this Directorate, before any of the units may be occupied. The operational EMP must inter alia contain the following elements:</i></p> <p><i>2.3.1. Management recommendations to identify, manage and address environmental aspects in these areas e.g. alien eradication, rehabilitation, refuse dumping, vagrancy, fires, access control, etc;</i></p> <p><i>2.3.2. outline an organisational structure which clearly identifies and allocates responsible parties for implementing the EMS. This must clearly outline how budgets are going to be provided and allocated;</i></p> <p><i>2.3.3. ensure that locally occurring indigenous plant species are used for re-vegetation/rehabilitation in these areas during ongoing management thereof;</i></p> <p><i>2.3.4. enable a positive interaction between local residents / users and sensitive environmental areas, including maintenance of trails and walkways and the development of additional walkways where applicable;</i></p> <p><i>2.3.5. Make provision for mechanisms to allow for regular feedback to residents associations or similar forums that exist at the time, regarding the management of all sensitive natural areas including</i></p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance was achieved.</p> <p>The operational EMP was submitted and approved.</p>

<p>natural vegetation remnants, the Conservation Areas and Dune Management Areas, Open Spaces, and recreation areas.</p>	
<p>2.4. An Environmental Liaison Committee (“ELC”) must be established. Members of the ELC must include, but are not limited to representatives of Blaauwberg Administration, local residents and local environmental NGOs. The ELC must play an advisory role to this Directorate and the Local Authority reviewing future detailed development proposals to ensure that they comply with the conditions of this authorisation. Secondly, the ELC must play an advisory role in environmental management of the area during the entire construction phase of the phases of the phases Big Bay Development. The ELC must be established within two month of the date of issue of this authorisation. The applicant is to cover all reasonable expenses incurred by members of the ELC.</p>	<p>FLEXIBLE MANAGEMENT CONDITION Compliance was achieved. ELC was established and to date continues to function well.</p>
<p>2.5. The applicant is to appoint a qualified Environment Control Officer, in consultation with the Environmental Officer: Blaauwberg Administration for the full construction period of the project:</p> <p>2.5.1. The Environment Control Officer must oversee the mitigating/rehabilitation measures and recommendations referred to above, and to ensure compliance with the conditions of authorisation and the Environmental Management Programmes for all construction phases;</p> <p>2.5.2. The ECO will be responsible to the Environmental Officer: Blaauwberg Administration in consultation with the Environmental Liaison Committee;</p> <p>2.5.3. The Environmental Officer: Blaauwberg Administration in consultation with the ELC, shall determine the role, powers and function of the ECO at the earliest opportunity, but prior to commencement of any construction.</p>	<p>FLEXIBLE MANAGEMENT CONDITION Partial Compliance. ECOs were appointed for separate development parcels. No ECO was appointed to oversee Public Open Space, as noted by external audit of EIA process in 2007.</p>
<p>2.6. The developer will be responsible for the rehabilitation and management of all areas for a period of one year after construction has been completed. Thereafter the responsibility of management of these areas shall revert to the City of Cape Town.</p>	<p>CONTROL CONDITION Compliance was achieved. Road verges and other communal areas well maintained.</p>
<p>2.7. The applicant must ensure that each phase must undertake an environmental audit every six months and submit the audit report to be endorsed by the ELC and to be accepted by the Environmental Officer: Blaauwberg Administration. This must include the plan to undertake corrective action based on the audit findings.</p>	<p>CONTROL CONDITION Partial Compliance. Audits were not all conducted in time frames prescribed. Some audits did not take place.</p>
<p>2.8. After construction phases have been completed, the applicant must undertake an environmental audit annually. The audit report must be made available to the public (a copy must specifically submitted to residential and/or community forums). This must include the plan to undertake corrective action based on the audit findings.</p>	<p>CONTROL CONDITION No Compliance. Annual audits have not taken place since 2009 when construction was completed.</p>

<p>2.9. This authorisation does not constitute any right to commence site clearance, construction or to occupy the land/sites forming part of this application. These activities can only commence once the following actions have taken place:</p> <p>2.9.1. The Environmental Control Officer has been appointed;</p> <p>2.9.2. The construction phase Environmental Management Programme for the relevant development phase has been approved;</p> <p>2.9.3. An Environmental Liaison Committee has been appointed;</p> <p>2.9.4. The Environmental Contracts have been approved and signed.</p> <p>Proof of compliance with this condition must be stated in writing and forwarded to this Directorate one week prior the site clearance.</p>	<p>CONTROL CONDITION</p> <p>Compliance was achieved.</p> <p>Despite incidents where ECO was not appointed for certain periods of time during construction, the ECO was present for most of the Eden on the Bay precinct construction.</p>
<p>Flexible Management Conditions – 10; Control Conditions – 10</p>	

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Annexure B2: Compliance with Conditions of Approval - Milnerton

Conditions of Approval (selected conditions relating only to construction phase and EIA follow-up)	(a) Type of Condition and (b) Compliance
<p>2. The requirements of the Department of Water Affairs and Forestry (DWAF) ... must be implemented. These include:</p> <p>2.1. Applying for authorisation from DWAF for the diversion of the Duikersvlei stream in terms of the National Water Act, 36 of 1998</p> <p>2.2. Submitting a proposed programme to DWAF for the decommissioning, clean-up and remediation of the site as a whole</p> <p>2.3. Submitting a Storm Water Management Plan to DWAF for the site that takes into account concerns raised by the City of Cape Town</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance achieved.</p> <p>DWAF requirements met before construction commenced.</p>
<p>3. The realigned portion of the Duikersvlei Stream ... must be contained within a compound, cascading channel and allowed to meander.</p> <p>3.1. Flow velocities along the straight reaches of the canal may not exceed 1.0 m/s and the appropriate engineering solutions including, but not limited to gabion step-down weirs or similar stepped energy dissipaters must be implemented to address this.</p> <p>3.2. The outer portion of the canal bend is to have its entire slope lined with a renomatress and the inner bend stabilised with groynes.</p> <p>3.3. Buried groynes must be installed along the full length of the canal ...</p> <p>3.4. The floors of the proposed road culverts ... must be sunk to below the sandy floor of the realigned stream to allow for continuity of the stream bed.</p>	<p>CONTROL CONDITION</p> <p>Compliance achieved.</p> <p>Conditions incorporated into design of new stream embankments, lining and weirs.</p>
<p>3. Should any heritage remains be exposed during any excavations or related activities, these must immediately be reported to Heritage Western Cape. Heritage remains uncovered during earthworks must not be disturbed until inspected and verified by a professional archaeologist.</p>	<p>CONTROL CONDITION</p> <p>Compliance achieved.</p> <p>No record of heritage remains uncovered in ECO audit reports.</p>
<p>5. A Property Owner's Association (POA) with a constitution must be established for the property with the intention being that any and all owners of the property ... are legally obliged and responsible for the ongoing implementation and auditing of the EMP through the POA ... The POA will be legally responsible for the implementation and the auditing of the EMP</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance achieved.</p> <p>POA still in operation after completion of project.</p>
<p>6. The applicant must compile and submit an acceptable construction phase Environmental Management Plan (CEMP), as well as a code of conduct for building contractors</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance achieved.</p> <p>EMP and various detailed method statements compiled and submitted.</p>
<p>7. The applicant must appoint a suitably experienced Environmental Control Officer ... before commencement of any land clearing or construction activities ...</p>	<p>CONTROL CONDITION</p> <p>Compliance achieved.</p>

	Audits by ECO conducted during construction in 2006 and after construction from 2007 to 2008.
<p>8. <i>The applicant must compile and submit an acceptable Operational Environmental Management Plan (OEMP). The OEMP must address and make provision for...[inter alia]</i></p> <p>8.4. <i>The rehabilitation and maintenance of natural and introduced riparian and surrounding vegetation</i></p> <p>8.5. <i>Maintenance of the stream and water quality exiting the stream through strict and audited monitoring programmes</i></p> <p>8.6. <i>The maintenance of stream superstructure...</i></p> <p>8.7. <i>Ongoing mitigation measures for erosion...</i></p> <p>8.8 <i>The removal of alien invasive plants...</i></p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Compliance achieved.</p> <p>OEMP compiled and implemented. Audits conducted during 2007 and 2008 to ensure compliance and effectiveness.</p>
<p>9. <i>...Any solid waste including but not limited to contaminated sediment shall be disposed of at a landfill licensed in terms of Section 20 of the Environmental Conservation Act, 73 of 1989.</i></p>	<p>CONTROL CONDITION</p> <p>Compliance achieved.</p> <p>Proof produced by contractor and referred to in audit reports by ECO.</p>
Flexible Management Conditions - 4; Control Conditions – 4;	

Annexure B3: Compliance with Conditions of Approval – Green Point Stadium

Conditions of Approval (selected)	(a) Type of Condition and (b) Compliance
<p>6. <i>Architectural and Landscaping Guidelines and Site Development Plans for the stadium precinct and the urban park to cater for the 2010 FIFA World Cup tournament ('the tournament') as well as for the period after the tournament ('post 2010'), must be compiled....</i></p>	<p>FLEXIBLE MANAGEMENT CONDITION Compliance was achieved. City of Cape Town has plans on record.</p>
<p>7. <i>The design and operation of the stadium and urban park must provide for energy and water efficiency...</i></p>	<p>FLEXIBLE MANAGEMENT CONDITION Compliance was achieved. Achieved during construction stage by adhering to EMP measures for water resource conservation (design and operations not applicable to this research).</p>
<p>8. <i>The requirements related to the storage of fuel, oil and other chemicals on the site must be implemented and adhered to</i></p> <p>8.1 <i>All storage must be confined to demarcated and secured areas with an impervious base which are adequately bunded (at least 110% of the total capacity of all tanks in the area)</i></p> <p>8.2 <i>Any temporary storage tanks must be designed and installed in accordance with the relevant oil industry and South African National Standards</i></p> <p>8.3 <i>Any temporary storage tanks and associated infrastructure must be removed at the expense of the applicant after the relevant construction activities have been completed</i></p> <p>8.4 <i>All tanker drivers and adequately qualified staff must be present at all times during offloading. An emergency cut-off switch must be installed to immediately stop delivery should an accident occur.</i></p> <p>8.5 <i>All servicing and refuelling of vehicles must be confined to demarcated and secured areas with an impervious base and which are adequately bunded (at least 110% of the total capacity of all tanks in the area), unless otherwise authorised by the Environmental Control Officer ('ECO') referred to in paragraph 12 below.</i></p> <p>8.6 <i>All spills are to be reported to the Project Manager/Engineer and ECO immediately and appropriate clean-up measures must be implemented as soon as practically possible.</i></p>	<p>CONTROL CONDITION Partial compliance. Some contraventions noted by the ECO (see Annexure A3).</p>

<p>9. The requirements relating to the preservation of heritage resources must be implemented and adhered to during the construction phase...</p>	<p>CONTROL CONDITION</p> <p>Compliance achieved.</p> <p>Valuable artefacts discovered during the excavation of the common. This process was managed well by the ECO and archaeologist with the cooperation of the contractor.</p>
<p>11. The Construction Phase Environmental Management Plan (EMP) compiled by The Environmental Partnership must be implemented.</p> <p>11.1 The EMP must be included in all contract documentation for the construction phase of the development.</p> <p>11.2 The Department must be notified in writing of any proposed changes to the EMP due to additional information gained as a result of construction activities, and the Department must approve any proposed changes prior to implementation.</p> <p>11.3 The ECO must notify the Department immediately of events or incidents that may cause significant environmental damage or breach the requirements of the EMP.</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>Partial Compliance.</p> <p>Although some issues addressed in the EMP were negated due to the fact that they were left out of the contract documents (eg. fines)</p> <p>Changes to method statements and the EMP was done in writing and properly recorded.</p>
<p>12. The applicant must appoint a suitably experienced ECO before commencement...</p>	<p>CONTROL CONDITION</p> <p>Compliance achieved.</p>
<p>15. The Operator must compile and submit to the applicant for approval an acceptable Environmental Management System ('EMS') for the stadium and urban park...</p>	<p>FLEXIBLE MANAGEMENT CONDITION</p> <p>No compliance.</p> <p>Although not related to construction, this EMS requirements is part of the three tiers of proper follow-up, being site related audit of impact, monitoring of impact against baselines and over time to track change and feedback to improve EIA. The EMS could introduce life cycle management related to the crucial feedback in EIA follow-up best practice.</p>
<p>Flexible Control Conditions - 4; Control Conditions - 3</p>	

Annexure B4: Compliance with Conditions of Approval – Simonstown

Conditions of Approval (selected)	(a) Type of Condition and (b) Compliance
<p>1.10 The CEMP must be submitted to the Department two weeks before the project becomes operational.</p>	<p>CONTROL CONDITION Compliance achieved. Submitted and approved before construction.</p>
<p>1.11 The EMP will be seen as a dynamic document. However, any changes to the EMP must be submitted to the authorities before such changes could be affected.</p>	<p>FLEXIBLE MANAGEMENT CONDITION Partial compliance. Method statements for solid waste, site establishment, storm water management, excavation, dust control, transportation of tank sections, washing of cement trucks and containers, hazardous substances and spillages were approved in addition to the EMP. These method statements were, however, submitted and approved two months after construction had commenced.</p>
<p>1.12 The applicant must appoint a responsible person that will act as an Environmental Control Officer (ECO) that will have the responsibility of implementing the approved EMP. The ECO shall be appointed before the start of construction and the authorities must be notified of such an appointment for communication purposes. The ECO shall submit a quarterly environmental compliance report, in writing, to The Director: Environmental Impact Evaluation and copy the Applicant with such report. This report shall include a description of all activities on site, problems identified, transgressions noted and remedial action implemented. The report must reflect the DEAT reference number of the project on the cover page. The ECO shall maintain the following on site: A site diary, Copies of all reports submitted to the Department, A complaints register and the remedies applied to such complaints The ECO shall remain employed until all rehabilitation measures as well as site clean-up are completed and the site is handed over to the Department of Public Works by the contractor for operation.</p>	<p>CONTROL CONDITION Compliance achieved. ECO appointed, conducted audits initially monthly and later two-monthly as required between September 2009 and June 2010. Register maintained on site. Submitted quarterly reports to Department of Environmental Affairs and Tourism.</p>
<p>1.19. Waste collection bins must be supplied, and where such is not available then all solid waste must be disposed at a registered waste dump in accordance with the refuse collection and disposal requirements of the relevant municipality.</p>	<p>CONTROL CONDITION Compliance achieved. Audit reports reflect compliance.</p>

<p>1.20. No contamination of the sea is allowed during the construction phase or the operation phase. Spills must immediately be reported at Marine and Coastal Management.</p>	<p>CONTROL CONDITION Partial compliance. Incidents were reported where construction water was pumped into the sea. Erosion control measures (sand bags) were not maintained properly. No serious pollution incidents occurred.</p>
<p>1.21 Storage of waste on site is not allowed without consent from the land owner or a permit from Department of Water Affairs and Forestry</p>	<p>CONTROL CONDITION Compliance achieved. Was not required.</p>
<p>1.22. No fires are allowed on the construction site to avoid the risk of fire.</p>	<p>CONTROL CONDITION Compliance achieved. No fires noted in ECO audit reports.</p>
<p>1.23. Should any heritage remains be exposed, these must immediately be reported to Heritage Western Cape (In terms of the National Heritage Resources Act, 25 of 1999). Heritage remains uncovered during earthworks must not be disturbed further until the necessary approval has been obtained from Heritage Western Cape.</p>	<p>CONTROL CONDITION Compliance achieved. None noted in ECO audit reports.</p>
<p>1.24. If archaeological remains (including but not limited to fossil bones and fossils, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, marine shell heaps, stone artefacts and bone remain, structures and other built features, rock art and rock engravings) are discovered during the construction they must be reported to Heritage Western Cape and must not be disturbed further until the necessary approval has been obtained from Heritage Western Cape.</p>	<p>CONTROL CONDITION Compliance achieved. None noted in ECO audit reports.</p>
<p>1.25 If any pollution occurs during the construction or operational phase it is the duty of the ECO to immediately report the incident to Marine and Coastal Management</p>	<p>CONTROL CONDITION No compliance. Although reported in the audit reports and in quarterly reports to DEAT, the incident of construction water pumped to sea was not reported to MCM.</p>
<p>1.27 Non-compliance must be reported immediately to the Director: Environmental Impact Evaluation of the National Department of Environmental Affairs and Tourism.</p>	<p>CONTROL CONDITION Compliance achieved. Quarterly reports were submitted to DEAT with the results of all audit reports and incidents on site.</p>
<p>Flexible Management Conditions - 1; Control Conditions - 10</p>	

ANNEXURE C

PROJECT DECISIONS WITH CONDITIONS OF APPROVAL

- ***C1 – BIG BAY (including the Eden on the Bay development precinct)***
- ***C2 – MILNERTON***
- ***C3 – GREEN POINT STADIUM AND –COMMON***
- ***C4 - SIMONSTOWN***

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ANNEXURE D

DOCUMENTATION RELATING TO THE BIG BAY EIA (WHICH INCLUDED THE EDEN ON THE BAY DEVELOPMENT PRECINCT)

- **MEMORANDUM TO CONTRACTOR ON CEMENT CONTAMINATION (25 SEPTEMBER 2008)**
- **SITE CLOSURE COMPLIANCE REVIEW (19 JUNE 2009)**
- **SITE VISIT REPORT (1-15 OCTOBER 2008)**

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ANNEXURE E
PRINCIPLES OF BEST PRACTICE ANALYSIS

Annexure E1: Eden on the Bay

Follow-up Principles and Best Practice	Analysis	Outcome
Enable the outcomes of the EIA	Follow-up did not prevent damage to the environment. Cement water pollution occurred regularly despite being predicted. Seepage onto the beach occurred as unforeseen impact. Compliance with conditions of approval not fully achieved.	✘
Promote transparency	The EIA was an open and participative process. The establishment of the ELC involved various parties sharing information on the project and environmental impact.	✓
Clear EIA follow-up commitments in EIA	The EIA conditions of approval facilitated follow-up, the EMP containing control and flexible management conditions.	✓
Proponent should meet follow-up responsibilities	Proponent did not conduct all studies and audits required. Contractor did not fully comply with EMP and conditions.	✘
Regulators should ensure EIA follow-up	Regulator enforcement and oversight during EIA follow up lacked.	✘
Communities involved in EIA follow-up	ELC established involving community.	✓
All parties should cooperate	Cooperation from approving authority and contractor could not be achieved.	✘
Appropriate follow-up for the project and receiving environment	The follow-up approach and requirements were appropriate, just not achieved by enforcement or incentive.	✓
Follow on from- and address cumulative impacts	Cumulative impact was not assessed. Cumulative impact arose in the form of storm water seepage onto beach.	✘
Timely, adaptive and action-based	Follow-up was well incorporated into the construction process. Regular audits were done. Steps were formulated in response to non-compliance. These steps were not always successful.	✓
Result in learning and knowledge growth	There is no mechanism for feedback and learning from the experiences of this EIA or follow-up process. Unforeseen and predicted impacts occurred, but there is no strategic level plan for the EIA or follow-up findings to feed into.	✘
Roles and tasks should be defined clearly	In the formal construction contract and ELC the institutional arrangements made roles and responsibilities clear. Some responsibilities were not met.	✓

Objective or goal oriented	Conditions of approval, EMP pollution prevention and flexible management conditions allowed for adaptive management towards the objectives of this EIA. The framework was created, but not fully achieved.	✓
Fit for the intended purpose	The follow-up was neither sparse, nor did it over-burden the parties involved.	✓
Measured against performance indicators	There were no performance indicators set to measure the performance of the project against a baseline environmental state or targets.	✗
Life cycle follow-up	Some requirements for annual audits, but not adhered to. ELC still operates. MPOAs took over some roles.	✓
Adequate resources assigned for follow-up	Although the proponent and contractor were not always compliant, follow-up was sufficiently resourced.	✓
Three vertical levels of EIA follow-up as in Morrison-Saunders and Arts (2004) across micro, macro and meta scale	This follow-up was limited to project level on-site control, management and mitigation. Apart from one independent external audit of the EIA, no broad feedback channel from the combined development sites exist. No monitoring is taking place to feed into a larger knowledge base. There is no EIA evaluation to inform regulators.	✗
Three different aspects of EIA feedback as in containing monitoring against baseline data, EIA follow-up after decision stage and audits of the performance as in Noble and Storey (2005)	Project related audits took place. No environmental baselines were established. No monitoring programmes were put in place. No performance evaluation of the EIA was done to assess whether EIA goals and objectives were achieved.	✗
Combined Principle and Best Practice Score	11/19 x 100 (%)	58%

Annexure E2: Milnerton

Follow-up Principles and Best Practice	Analysis	Outcome
Enable the outcomes of the EIA	Outcomes of the EIA were achieved; soil and river pollution minimised, site rehabilitated.	✓
Promote transparency	ECO Audits and site meeting minutes indicate all parties involved. All information about EIA public record and available during follow-up.	✓
Clear EIA follow-up commitments in EIA	Commitments were set out clearly in conditions of approval, EMP, OEMP and as part of the terms of reference for the POA	✓
Proponent should meet follow-up responsibilities	Proponent met expectations with regards to follow-up	✓
Regulators should ensure EIA follow-up	Both Environmental Affairs and Water Affairs were regulating the EIA and both were involved during EIA but not during follow-up to monitor compliance. The local authority took up the role of regulator without a formal mandate.	✗
Communities involved in EIA follow-up	Legislated public participation requirements achieved, but no follow-up involvement by public interest groups	✗
All parties should cooperate	Good cooperation between all parties recorded by ECO in site audit reports and site meetings	✓
Appropriate follow-up for the project and receiving environment	Baseline established, intervention monitored during and after construction, POA established for on-going EIA responsibilities to be met. No undue burden or shortcoming in requirements for follow-up	✓
Follow on from- and address cumulative impacts	The cumulative impact of re-aligning a water course was not assessed in the EIA or after implementation. The cumulative impact of this intervention with other canalisation, hardening or re-routing has not been studied.	✗
Timely, adaptive and action-based	Follow-up was a good combination of control, flexible management and on-going monitoring	✓
Result in learning and knowledge growth	Apart from solving the pollution problem that existed, there was no feedback to wider body of knowledge about monitoring programmes, performance assessments of EIA as a tool or about the effects of realigning a water course	✗
Roles and tasks should be defined clearly	Achieved. Clearly set out in conditions of	✓

	approval, EMP, OEMP documents	
Objective or goal oriented	Follow-up was guided by a clear target to be achieved that was researched before and re-checked afterwards for at least 2 years after implementation.	✓
Fit for the intended purpose	The scale, cost, follow-up and specialist studies were fit for purpose.	✓
Measured against performance indicators	Baseline values established to measure pollution levels before and after the intervention	✓
Life cycle follow-up	No life cycle follow-up beyond site, but a measure of POA commitment to maintain vegetation and watercourse monitoring.	✓
Adequate resources assigned for follow-up	Funding, personnel and time were allocated appropriately. Audits were conducted on time. ECO funding was available. POA funding made available after the legally required follow-up was concluded.	✓
Three vertical levels of EIA follow-up as in Morrison-Saunders and Arts (2004) across micro, macro and meta scale	Only project-based feedback was generated. No knowledge was fed back about the regional or cumulative environmental impact, or the EIA performance as a tool.	✗
Three different aspects of EIA feedback as in containing monitoring against baseline data, EIA follow-up after decision stage and audits of the performance as in Noble and Storey (2005)	Project follow-up (site audits) were done, monitoring against a baseline was done, external audits were done of the EIA	✓
Combined Principle and Best Practice Rating	14/19 x 100 (%)	73%

Annexure E3: Green Point Stadium and Common

Follow-up Principles and Best Practice	Analysis	Outcome
Enable the outcomes of the EIA	Goals of EIA related to construction impacts achieved.	✓
Promote transparency	Regular involvement of community in meetings during construction. ECO responded to various public enquiries and complaints. Audit reports and external audits were public records.	✓
Clear EIA follow-up commitments in EIA	EIA provided for follow-up in conditions of approval	✓
Proponent should meet follow-up responsibilities	Apart from excluding fines and recourse from the construction contract, the City of Cape Town dedicated staff and resources to EIA follow-up process	✓
Regulators should ensure EIA follow-up	Regulator included appropriate follow-up in environmental conditions of approval.	✓
Communities involved in EIA follow-up	Communities were involved in meetings and could channel complaints and enquiries through ECO	✓
All parties should cooperate	Cooperation between proponent, public, consultants, ECO, contractor proper and appropriate for this type of development	✓
Appropriate follow-up for the project and receiving environment	Follow-up requirements were appropriate and not too onerous. Large scale of project did not relate directly to large impacts. In fact, impacts were typical of smaller scale project (dusts, noise, traffic, etc)	✓
Follow on from- and address cumulative impacts	Some evaluation of long term sustainability, but not of cumulative impact	✗
Timely, adaptive and action-based	ECO responded in time, audits were conducted monthly with a full time presence on site. Method statements and ad hoc amendments of EMP indicate action oriented follow-up	✓
Result in learning and knowledge growth	Lessons learnt on sustainability and efficiency, but not about EIA process and follow-up	✗
Roles and tasks should be defined clearly	All parties had clear contractual roles. Roles became conflictive	✓
Objective or goal oriented	Follow-up, external audits and documents were all action and objective driven	✓
Fit for the intended purpose	Scale of project did not draw an over-burdening follow-up process. Follow-up	✓

	requirements were realistic for receiving urban environment	
Measured against performance indicators	No clear indicators were developed for overall EIA performance of follow-up, but audit reports established a rating system and reflected colour coded status for each condition	✓
Life cycle follow-up	Requirement for EMS not yet met	✗
Adequate resources assigned for follow-up	ECO, funding, resources, time were all sufficient	✓
Three vertical levels of EIA follow-up as in Morrison-Saunders and Arts (2004) across micro, macro and meta scale	Only project-based external audit feedback during construction. No wider performance assessment of EIAs or cumulative impact in region or evaluation of EIA as a tool	✗
Three different aspects of EIA feedback as in containing monitoring against baseline data, EIA follow-up after decision stage and audits of the performance as in Noble and Storey (2005)	No environmental baseline established and no pre, during or post project monitoring	✗
Combined Principle and Best Practice Rating	14/19 x 100 (%)	73%

Annexure E4: Simonstown

Follow-up Principles and Best Practice	Analysis	Outcome
Enable the outcomes of the EIA	EIA outcomes for site achieved.	✓
Promote transparency	Both EIA and follow-up transparency lacked. After EIA decision, community was excluded from follow-up.	✗
Clear EIA follow-up commitments in EIA	Conditions of approval contained sufficient requirements with regard to project-based follow-up	✓
Proponent should meet follow-up responsibilities	Proponent rejected EIA and follow-up requirements initially. Proponent failed to include EMP and ECO requirements into contract documentation. ECO had no locus standi on site ito. construction contract. Project-based follow-up requirement for ECO and regular audits were eventually met.	✓
Regulators should ensure EIA follow-up	Conditions of approval contained sufficient requirements with regards to project-based follow-up	✓
Communities involved in EIA follow-up	After EIA decision, community was excluded from follow-up.	✗
All parties should cooperate	Cooperation between community, proponent, ECO, consultants and contractor was not enabled by contractual agreement or regulatory framework. EIA decision required follow-up, otherwise proponent would have cooperated even less.	✗
Appropriate follow-up for the project and receiving environment	Good level of project-based follow-up without being too broad or too sparse.	✓
Follow on from- and address cumulative impacts	EIA and follow-up both ignored cumulative impact.	✗
Timely, adaptive and action-based	There was a clear EMP and thorough method statements, together with regular audits and instructions to the contractor.	✓
Result in learning and knowledge growth	No feedback into EIA performance or wider regional evaluation of the environment took place.	✗
Roles and tasks should be defined clearly	Roles were clearly defined, but the institutional framework did not support effective follow-up. Proponent being national government meant that regulator was regulating another government department.	✓
Objective or goal oriented	Project-based EIA follow-up achieved set	✓

	objectives.	
Fit for the intended purpose	Scale and scope of follow-up fit for intended purpose.	✓
Measured against performance indicators	Project-based follow-up measured against clear EMP and method statement indicators.	✓
Life cycle follow-up	No operational requirement for follow-up.	✗
Adequate resources assigned for follow-up	After initial rejection of EIA, SA Navy allowed sufficient ECO funding and site presence.	✓
Three vertical levels of EIA follow-up as in Morrison-Saunders and Arts (2004) across micro, macro and meta scale	Only project-based EIA follow-up took place. No feedback to EIA performance or wider regional environmental evaluation or database.	✗
Three different aspects of EIA feedback as in containing monitoring against baseline data, EIA follow-up after decision stage and audits of the performance as in Noble and Storey (2005)	Only project-based EIA follow-up took place. No baseline for environment was established to measure impact or monitor impact during operational stage. No external audit of EIA was conducted.	✗
Combined Principle and Best Practice Rating	11/19 x 100(%)	58%

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ANNEXURE F
ANALYSIS OF ADAPTIVE MANAGEMENT

Annexure F1: Eden on the Bay

Indicators of Adaptive Management <i>(Noble, 2000)</i> <i>(Cantor and Atkinson, 2010)</i>	Analysis	Outcome
Management of uncertainty of Predictions in complex system	EIA mainly aimed at preventing pollution and not sufficiently incorporating socio-economic or cumulative impact evaluation	✘
Monitoring of how well mitigation works	No monitoring took place	✘
Accommodating all stakeholder interests	ELC facilitated stakeholder engagement	✓
Flexible management objectives	Half of the conditions of approval in the EIA decision made provision for flexible management during implementation, rather than control.	✓
Management Objectives influenced by follow-up	The EIA follow-up informed the flexible management conditions.	✓
Baseline research, thresholds, status quo studies	No baseline information or thresholds were established to measure impact against.	✘
Follow-up of EIA outcomes	EIA follow-up outcomes were clearly defined in the EMP and conditions of approval and negotiated during the ELC meetings.	✓
Monitoring of EIA outcomes	Environmental impact could not be measured against targets for conservation, thresholds or baselines.	✘
Mechanism to learn from follow-up and EIA	There was no feedback mechanism to a macro or meta level EIA knowledge database.	✘
Collaborative structure for participation	The ELC allowed for collaboration.	✓
Combined Adaptive Management Score	5/10 x100 (%)	50%

Annexure F2: Milnerton

Indicators of Adaptive Management <i>(Noble, 2000)</i> <i>(Cantor and Atkinson, 2010:290-293)</i>	Analysis	Outcome
Management of uncertainty of Predictions in Complex System	EIA well integrated into decisions	✓
Monitoring of how well mitigation works	Monitoring took place	✓
Accommodating all stakeholder interests	No ELC, but frequent stakeholder engagement	✓
Flexible Management Objectives	Equal mix of condition types. Provision made for EIA to influence decisions and formulation of responses to impacts after EIA decision and during implementation.	✓
Management Objectives influenced by follow-up	Monitoring in place to check water nitrate values against targets and adjust interventions on site	✓
Baseline research, thresholds, status quo studies	Baseline study done for water and botany; Water quality targets set and monitoring put in place	✓
Follow-up of EIA outcomes	Clear targets set for reducing pollution on site and in water through site	✓
Monitoring of EIA outcomes	Baseline informed targets to measure against	✓
Mechanism to learn from follow-up and EIA	No feedback to regional environmental evaluation or EIA performance evaluation	✗
Collaborative structure for participation	The wider community did not form part of the site meetings, audits or POA structure	✗
Combined Adaptive Management Score	8/10 x 100 (%)	80%

Annexure F3: Green Point Stadium and Common

Indicators of Adaptive Management <i>(Noble, 2000)</i> <i>(Cantor and Atkinson, 2010:290-293)</i>	Analysis	Outcome
Management of uncertainty of Predictions in Complex System	EIA mainly aimed at preventing pollution. No evaluation of alternatives. EIA included many impact assessment studies that were not integrated into decision making	✘
Monitoring of how well mitigation works	Monitoring limited to run-off water quality	✓
Accommodating all stakeholder interests	ELC facilitated stakeholder engagement	✓
Flexible Management Objectives	Sufficient scope in the conditions of approval for development of custom method statements, design guidelines, precinct planning and design	✓
Management Objectives influenced by follow-up	EIA Follow-up framework allowed little other than construction impacts to feed to design or planning	✘
Baseline research, thresholds, status quo studies	Receiving environment not sensitive in the traditional environmental sense, but visual, cumulative and sustainability impact assessment (triple bottom line) evaluated for stadium	✓
Follow-up of EIA outcomes	Conditions of approval, EMP and method statements were clear	✓
Monitoring of EIA outcomes	No monitoring programme, but water quality monitoring was done for construction site run-off to the ocean against an industry guideline	✓
Mechanism to learn from follow-up and EIA	None	✘
Collaborative structure for participation	Although not true collaboration, the public participation was thorough, as admitted to by the community representatives	✓
Combined Adaptive Management Score	7 /10 x 100 (%)	70%

Annexure F4: Simonstown

Indicators of Adaptive Management <i>(Noble, 2000)</i> <i>(Cantor and Atkinson, 2010:290-293)</i>	Analysis	Outcome
Management of uncertainty of Predictions in Complex System	EIA mainly aimed at preventing pollution. No alternatives or socio-economic considerations	x
Monitoring of how well mitigation works	No monitoring	x
Accommodating all stakeholder interests	No stakeholder engagement	x
Flexible Management Objectives	Only one flexible management condition included in conditions of approval from EIA decision. This in itself is poor. This condition gave rise to the EMP, which was acknowledged to be dynamic in satisfying this condition, and the requirement for method statements. This resulted in follow-up on project that was adaptable after the EIA decision.	✓
Management Objectives influenced by follow-up	Follow-up objective was limited to EMP and could not influence decisions beyond construction pollution prevention.	x
Baseline research, thresholds, status quo studies	None conducted	x
Follow-up of EIA outcomes	Clear outcomes were set for the intended purpose of EIA follow-up in this case, albeit limited to construction pollution prevention.	✓
Monitoring of EIA outcomes	None conducted	x
Mechanism to learn from follow-up and EIA	None	x
Collaborative structure for participation	No public participation during follow-up.	x
Combined Adaptive Management Score	2/10 x 100(%)	20%

ANNEXURE G
INSTITUTIONAL FRAMEWORK ANALYSIS

Annexure G1: EIA Follow-up Role Players

	Eden on the Bay	Milnerton	Green Point	Simonstown
Proponent	Local Authority	Private	Local Authority	Government
Environmental Regulator	Provincial Authority	Provincial Authority	Provincial Authority	National Authority
Contributing Regulators	Local Authority; Provincial Arts and Culture (Heritage)	National Water Affairs	Provincial Arts and Culture (Heritage)	National Department of Environmental Affairs (Marine Coastal Management Division); Local Authority
Appeals Authority	Provincial Minister of Environmental Affairs	No appeal	Provincial Minister of Environmental Affairs	National Minister of Environmental Affairs
Community Forums	Environmental Liaison Committee; Master Property Owners Association	Master Property Owners Association	Environmental Liaison Committee	None
NGOs	Ratepayers' Association, Friends of Blaauwberg Conservation Area	None	Various Ratepayers' Associations; Various Civil Society Interest Groups	Simonstown Historic Society; Simonstown Architectural Advisory Committee
ECO	Consultant	Consultant	Consultant	Consultant
External Auditor	Consultant	None	Consultant	None
Construction Contractor	Private Sector tenderer	Private Sector tenderer	Private Sector tenderer	Private Sector tenderer
Principal Agent	Consultant Architect	Consultant Engineer	Consultant Architect	Consultant Architect
Project Managers	Consultant	Consultant	Consultant	Proponent
Analysis	Local authority was proponent, and acted as regulator within effective and formalised ELC structure; Absence of regulator during follow-up	Typical institutional framework; Excluded community participation during follow-up; No ELC, but regular meetings and MPOA to take operational monitoring and follow-up forward	Local authority was proponent, and acted as contributing regulator; ELC effective as negotiation platform	Government proponent and regulator; Community and local planning authority excluded during follow-up; No ELC or other community structure

Annexure G2: Institutional Framework Facilitating of Follow-up

	Eden on the Bay	Milnerton	Green Point	Simonstown
EIA Maturity (Gibson, 2002)	Pro-active EIA and mitigation measures; No alternatives evaluated or socio economic evaluations; No EIA integrated into planning or strategic decisions	Pro-active EIA and mitigation measures	Although socio-economic impact assessment was undertaken, these studies were largely ignored in decision making; No alternatives evaluated	Pro-active EIA and mitigation measures; No consideration for public opinion, alternatives, socio-economic impact or integration of EIA into decisions
Follow-up drivers (Morrison-Saunders et al., 2003)	Proponent, Community	Regulator, Proponent	Regulator, Community, Proponent	Regulator
Facilitation of follow-up drivers	EMP, ECO audits, External audits, ELC meetings, Inclusions in construction contract	EMP, ECO audits, Inclusions in construction contract, Post project monitoring	EMP, ECO audits, External audits, ELC meetings,	EMP, ECO audits
Comprehensiveness Evaluating social, political and economic factors beyond the assessment of the physical on the development site (Hacking and Guthrie, 2008)	Poor EIA; Reasonable cognisance of wider socio-economic, political or physical impacts limited to development area and project sites	Comprehensive EIA; No real need or attempt to evaluate wider socio-economic impact	Comprehensive EIA evaluating socio-economic, physical and visual impact	Poor EIA aimed only at localised pollution prevention and visual impact
Integratedness Integration of planning, policy, environmental management (Hacking and Guthrie, 2008)	Real attempts at integration of planning and policy, although not achieved; Institutional framework failed to resolve planning and policy conflicts;	Sufficient institutional support for EIA to achieve its outcomes, but only local integration with planning and no feedback of monitoring into regional understanding of river context	The comprehensive evaluation did not influence the decisions or planning; Institutional framework sufficiently structured for participation and cohesive planning and policy, but failed this	No attempts to integrate planning, policy or EIA into project; Institutional framework beyond EIA decision failed to enable follow-up

			integration due to timing pressure	
<p>Strategicness</p> <p>Viewing the EIA and follow-up beyond site specific responses as part of region, cumulative context and within a baseline understanding of the environment (Hacking and Guthrie, 2008)</p>	<p>The EIA and follow-up was not enabled beyond project or development site level; little institutional support for cumulative evaluation, baseline research or feedback on actual impacts by means of monitoring</p>	<p>Reasonable evaluation of local impact; baseline understanding of environment and feedback by means of monitoring, but limited to site and development only and no cumulative or regional feedback or input generation</p>	<p>Follow-up limited to site specific responses; no cumulative, regional feedback or monitoring baselines for change</p>	<p>Site specific responses only; no cumulative, regional feedback or monitoring environmental baselines for change</p>

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ANNEXURE H
CONSOLIDATED CASE STUDY ANALYSIS

Key: ✓ Good
 ~ Partial
 ✗ Poor

Research Question	Eden on the Bay	Milnerton	Green Point	Simonstown
Correlation	Positive correlation; Did not result in effective follow-up. ✓ ✗	Positive correlation; Effective follow-up. ✓ ✓	Partial correlation; Effective follow-up. ~ ✓	Positive correlation; Did not result in effective follow-up. ✓ ✗
Compliance	Balanced mix of condition types; Partial Compliance. ✓ ~	Balanced mix of condition types; Full compliance. ✓ ✓	Balanced mix of condition types; Partial compliance. ✓ ~	Insufficient provision for flexible management conditions; Full compliance. ✗ ✓
Challenges	Poor integration; Poor enforcement. ✗	Overcame baseline; research challenge. ✓	Poor evaluation of alternatives, socio-economic impact and visual impact, which are not possible to address through follow-up ✗	Government regulation of its own project failed; Public participation shortcoming. ✗
Best Practice	58% Partially effective at project level, but not including wider requirements for follow-up. ~	73% Regulator involvement not effective; Insufficient public participation during project. ✓	73% Effective at project level, but wider requirements for follow-up not met. ✓	58% Poor in comparison with best practice; Project follow-up effective, but excluded participation and influence in decisions; No wider follow-up beyond project or learning from EIA. ~

Adaptive Process	50% Provision for adaptive management, but no research or monitoring to ensure effectiveness. ~	80% Could have included more learning from EIA and wider public participation ✓	70% Effective EIA study and objectives did not carry through to the follow-up process. ✓	20% Poor adaptability outcome; No influence on decisions; No collaboration; Lack of integration between project and EIA. ✘
Institutional Framework	Framework did not contribute to effective follow-up. ✘	Framework contributed to effective follow-up. ✓	Framework contributed to effective follow-up. ✓	Framework did not contribute to effective follow-up. ✘
Good	✓✓	✓✓✓✓✓✓✓✓	✓✓✓✓✓✓	✓✓
Partial	~ ~ ~	n/a	~ ~	~
Poor	✘ ✘ ✘	n/a	✘	✘ ✘ ✘ ✘ ✘
Final Outcome	~ <i>Partially Effective EIA Follow-up. Contained some elements of effective follow-up.</i>	✓ <i>Reasonably Effective EIA Follow-up. Contained most of the elements of effective follow-up.</i>	✓ <i>Reasonably Effective EIA Follow-up. Contained most of the elements of effective follow-up.</i>	✘ <i>Least Effective EIA Follow-up. Contained few of the elements of effective follow-up.</i>

ANNEXURE I
INTERVIEW RESPONDENTS

- Mark Sasman and Christine Rabie (*Ecosense Environmental Consultants, Stellenbosch*).
- Jaana Ball and Neal Carter (*Arcus Gibb, Environmental Division, Cape Town*).
- Lize McCourt (*Chief Director, Environmental Impact Management, National Department of Environmental Affairs*).
- ZaahirToefy (*Deputy Director, Integrated Environmental Management, Western Cape Department of Environmental Affairs and Development Planning*).
- Karen Shippey (*Aurecon, Environmental Division, Cape Town*).
- Hendrik van der Hoven (*Hendrik van der Hoven Environmental, Landscaping and Visual Consultants*).
- Pat Titmuss (*Environmental Resource Management, City of Cape Town*).
- Louis Raubenheimer (*Bloubergstrand Ratepayers Association/ Big Bay ELC/ Friends of Blouberg Nature Reserve*).
- Norbert Furnon-Roberts (*Green Point Ratepayers Association*).
- Boet Dommissie, Dave Erickson, Eric Mawhinney and Terry Korsten (*Simonstown Heritage Society and Simonstown Architectural Committee Members*).
- Adrian Sillito (*Sillito Environmental Consulting, Cape Town*).

University of Cape Town

Big Bay Bloubergstrand Development Framework

Record of Decision (dd 29.11.2001) as Amended by the Minister on Appeal (dd 25.03.2002)

Addressed to:

The Executive Officer
City of Cape Town : Blaauwberg Administration

APPLICATION: RE-DEVELOPMENT OF THE EXISTING BIG BAY RESORT AS WELL AS THE ESTABLISHMENT OF URBAN DEVELOPMENT: ERVEN 2, 3, 4, 384, 263, 267, 442, 461, 452, 460, 492, 493, 494, 495, 496 AND 650: IDENTIFIED ACTIVITIES IN TERMS OF SECTION 21 OF THE ENVIRONMENT CONSERVATION ACT, 1989 (ACT NO. 73 OF 1989).

With reference to your application, find below the Record of Decision in respect of this application.

RECORD OF DECISION

A. DESCRIPTION OF ACTIVITY:

The proposed Big Bay development comprises the following:

- The development of the subject properties to provide for high density residential, medium density residential and single residential areas, ecological corridors, dune restoration and conservation areas, dune management areas, commercial areas, a petrol filling station, and a mixed use coastal node accommodating commercial, residential, and public and recreational facilities and a hotel as indicated on the Development Framework.
- The proposed main structuring roads and access points as indicated on the Development Framework.
- The realignment of a portion of Otto du Plessis Drive to the east of its current alignment.
- The provision of an electrical sub-station and a sewage pump station as indicated on the Development Framework.

A “package of plans” approach is proposed to guide the development of the site. This results in a hierarchy of plans with increasing levels of detail, ranging from the contextual framework, the development framework, precinct plans, site development plans and finally building plans. The Scoping Report and Initial Assessment is based on the development framework level of planning. The development framework determines the principles that will guide the subsequent levels of planning in the “package of plans” approach. Some of these principles have been illustrated through the use of conceptual drawings.

The project involves activities identified in Schedule 1 of Government Notice No. R1182 of 5 September 1997, namely:

activity 1(a) viz.:

- Construction or upgrading of facilities for commercial electricity generation and supply.

activity 1(c) viz.:

- Construction or upgrading of transportation routes and structures, and manufacturing, storage, handling or processing facilities for any substance which is dangerous or hazardous and is controlled by national legislation.

activity 2(c) viz.:

- The change of land use from agricultural or undetermined use to any other land use.

activity 2(e) viz.:

- The change of land use from use for nature conservation or zoned open space to any other land use.

herein after referred to as the activities.

B. LOCATION:

The development area (approximately 120ha) constitutes the existing Big Bay Area, situated on the coast immediately north of Blaauwbergstrand, as well as the area immediately inland (east) of Big Bay and Otto du Plessis Drive, herein after both referred to as the "area".

C. APPLICANT:

City of Cape Town: Blaauwberg Administration
PO Box 35
MILNERTON
7435

D. CONSULTANT:

deVilliers Brownlie Associates
21 Menin Avenue
CLAREMONT
7708
Tel/Fax: (021) 674 4263

E. SITE VISIT AND MEETINGS:

The following meetings were held:

- The Directorate: Environmental Management (hereafter referred to as "the Directorate") met with the Environmental Consultant on 8 September 2000.
- This Directorate met the project team and the Blaauwberg Administration on 15 November 2000.

- This Directorate met the project team and the Blaauwberg Administration on 23 January 2001.
- This Directorate met the project team and the Blaauwberg Administration on 15 February 2001.
- Several other *ad hoc* meetings were held.

F. DEFINITIONS

“Applicant” means the party described on page 2 of this record of decision.

“Developer” means the natural or juristic person or persons appointed by the applicant to undertake the activity or part thereof.

G. DECISION:

In terms of Sections 22 and by virtue of powers delegated by the Minister in terms of Sections 28 & 33 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (“the ECA”), the Director: Environmental Affairs of the Department of Environmental and Cultural Affairs and Sport hereby grants authorisation for the execution of the activities described above, subject to the conditions of authorisation contained in this Record of Decision.

H. CONDITIONS OF APPROVAL:

1. Specific Conditions

- 1.1. The authorised activities, including site preparation, may not commence before the statutory 30 day appeal period expires.
- 1.2. One week’s notice, in writing, must be given to this Directorate before commencement of construction activities for each phase. Such notice shall make clear reference to the site location details and reference number given above.
- 1.3. This authorisation is only valid in respect of the activities mentioned in this authorisation, based on the amended development framework (revision date 21 September 2001) attached to the letter from deVilliers Brownlie Associates, dated 25 September 2001, accept in instances when stated differently in this authorisation.
- 1.4. If any activities listed in terms of Schedule 1 of the EIA Regulations, (Government Notice No. 1182 of 5 September 1999, as amended) other than those mentioned in this authorisation, are proposed within the area in future, then application must be made to this Directorate in terms of Section 22(1) of the ECA for each such activity proposed within the area. With regards to industrial development, all specific developments that are likely to have major impacts in the area and are controlled by national legislation e.g. Service/petrol stations, Scheduled Processes in terms of the Atmospheric Pollution Prevention Act, waste management facilities in terms of Section 20 of the Environment Conservation Act, etc, must be submitted as separate applications.
- 1.5. The impact of roads and services (water, electricity and any other services) beyond the boundary of the development site, must be assessed through an Environmental Impact Assessment process. The planning thereof, i.e. the final route selection must be based

- on the findings of such an assessment and must be submitted to this Directorate for authorisation.
- 1.6. The impact of coastal erosion on the beach and its management implications for recreational facilities must be re-assessed before design of the coastal recreational facilities is finalised. A specialist investigation must be commissioned by the applicant. This study must be carried out by a suitably qualified specialist in coastal processes. The study must be completed before the planning of the coastal node is finalised, to the satisfaction of the City of Cape Town. Proof of compliance with this condition must be forwarded to this Directorate one week prior to the submission of precinct plans for the coastal node to the Blaauwberg Administration. A letter from the CSIR, confirming that the findings of its study on coastal processes at Big Bay, which formed the basis of the site sensitivity analysis undertaken by the specialist consultant, remain valid, will suffice to effect compliance with this condition.
 - 1.7. Re-development of the area west of the existing alignment of the Otto du Plessis Drive is subject to the compilation of the concept precinct plan that take cognisance of the recommendations of the Big Bay Development Framework as approved by the City of Cape Town in 2001, maintaining the option to expand extensive recreational facilities northwards. The precinct plan must be approved by the City of Cape Town, and a copy thereof forwarded this Directorate and to the Department of Planning, Local Government and Housing.
 - 1.8. No development may be undertaken within the Conservation and Dune Management Areas except for the crossing of necessary linear infrastructure such as roads, pipelines and power lines through the central dune area at the three designated areas as indicated on the revised figure 21, amended 20 September 2001. All infrastructure must be located within these road reserves. Construction of the roads through the central dune area must be done in such a way as to reduce environmental disturbance of the dune areas to a minimum. Two of the three roads crossing the central dune must be constructed in such a way as to follow the dune profile as far as possible. Detail design of cuttings through the central dune area must be approved by the City of Cape Town and a copy thereof forwarded to this Directorate prior to the construction of the said roads.
 - 1.9. All development in future must ensure a gradual or soft interface with dune management and conservation areas. Development may not be designed in such that it isolates open space areas through the erection of high fences, solid walls or similar structures. Only boundary fences to the satisfaction of the City of Cape Town are permitted along the boundaries of properties abutting open spaces. A contract agreement may be signed between the applicant and the development whereby it is agreed between them that the developer or his successor in title, must enter into contract agreements with the owners of individual erven to ensure that properties abutting open spaces are managed in an acceptable manner. This may *inter alia* include a list of requirements that the property owner of individual erven must adhere to during construction of dwellings, access control to the sensitive open spaces, dumping of refuse, site management etc.
 - 1.10. An ecological corridor must be created along the western side of the Otto du Plessis Drive to reduce noise levels for local residents and enhance the visual integrity of the area as an important scenic route. This must constitute an ecological corridor of on average 25m wide north of the current Big Bay entrance and 20m south of the

entrance. Artificial berms or embankments must be created along the eastern side of the Otto du Plessis Drive. This includes the construction of artificial dunes/berms (to be re-vegetated with locally occurring indigenous vegetation) where applicable. These dunes, berms, embankments and other landscape features must be constructed and landscaped in an irregular fashion to prevent users of the Otto du Plessis Drive experiencing the sensation of driving down a tunnel. Buildings must be set back far enough from the road and landscape features constructed in such a way as to visually screen buildings from the Otto du Plessis. All other additional buffer areas, conservation areas and open spaces as stated in the botanical report (compiled by Coastec and dated March 2001) must be implemented. All these areas must be rehabilitated/restored using locally occurring indigenous species. The Central Dune Area and Conservation Areas must be bordered by a 25m buffer strip. The unvegetated dune north of the existing resort must be conserved, including a 25m buffer area. Two open space corridors of at least 30m must be created, running eastwards from the central dune area to the boundary of the development site. The boundaries of all corridors, dune management areas and conservation areas must be surveyed and demarcated before detailed development planning is completed. The boundaries of these areas must be supported by the specialist botanist.

A precinct plan for all of the open spaces described above must be submitted to the City of Cape Town: Blaauwberg Administration, prior to any application for subdivision of the area. Proof of compliance with this condition must be stated in writing to this Directorate upon submission of the above precinct plan to the City of Cape Town: Blaauwberg Administration.

- 1.11. All open spaces (including Conservation and Dune Management Areas) must be zoned to Public Open Space to support its long term conservation and protection against development pressure.
- 1.12. Conservation worthy indigenous species of plants and animals (as identified by the Environmental Control Officer or specialists) must be removed prior to construction and translocated to conservation areas. Relevant permits must be obtained prior to removal of plants and animals.
- 1.13. A more detailed archaeological survey must be done during every development phase once vegetation has been removed for development purposes and the findings thereof reported to the South African Heritage Resources Agency.
- 1.14. All human remains, burial sites and other archaeological artefacts uncovered during earthworks must be reported to the South African Heritage Resources Agency, and must be subject to inspection by a professional archaeologist.
- 1.15. Given the permeable substrate and unconsolidated deposits that cover much of the general area, adequate provision must be made for the onsite handling of stormwater within future developments. *If not adequately addressed to the satisfaction of the City of Cape Town*, a specialist Hydrogeological Investigation must be commissioned by the local authority, Blaauwberg Administration. This study must be carried out by a suitably qualified hydrogeologist as determined by the City of Cape Town. This study must identify and assess the existing groundwater resource (quantity and quality) in the area and provide recommendations for future management of this resource in light of the proposed developments. The findings of the study must be addressed in future phases of the Big Bay Development, to the satisfaction of the City of Cape Town.

- 1.16. No stormwater outlet to the sea or stormwater detention facilities outside of the development area may be constructed without assessing its environmental implications. If any of these proposals constitute an activity listed in terms of Schedule 1 of the EIA Regulations, (Government Notice No. 1182 of 5 September 1999, as amended), then application for authorisation must be made to this Directorate in terms of Section 22(1) of ECA.
- 1.17. A network of walkways must be designed and constructed through the open spaces, to the satisfaction of the City of Cape Town. These walkways must be constructed as part of every construction phase of the development (where each development phase abuts open spaces). The design of walkways must be submitted as part of the precinct plans for all the open spaces to be approved by the Blaauwberg Administration.
- 1.18. The City of Cape Town must notify this Directorate immediately of any incidence of non-compliance with any condition stated in this authorisation.

2. Conditions relating to Construction Activities and Operational phase

- 2.2. The construction Environmental Management Programmes (“the EMPs”) must be compiled separately for every individual phase of the development. The EMPs will contain generic principles as well as elements pertaining specifically to sensitive natural areas including natural vegetation remnants, the conservation and dune management areas and ecological corridors. The Environmental Liaison Committee must be consulted in regard to and advised of the EMPs. The EMPs must be approved by this Directorate prior to the commencement of any land clearing and construction. The construction EMPs must inter alia contain the following elements:
 - 2.2.1. An adequate description of the different stages of each construction phase of the development with adequate detail on the various environmental aspects, allocation of resources, responsibilities and time. It is emphasised that this phase include the establishment of major services (roads, water sewage and electricity), but exclude construction of dwellings of individual erven.
 - 2.2.2. Appropriate environmental control measures and procedures must be put in place to ensure that adequate environmental protection is exercised during the construction phase (e.g. demarcation and access control into sensitive areas, pollution control measures, plant rescue measures, treatment of topsoil, penalties, etc.).
 - 2.2.3. These procedures (environmental conditions) must be formalised by means of a legal environmental contract (“Environmental Contract”) and be included as environmental specifications as part of the tender call documents to contractors. This will enable contractors to adequately budget (finances, time and other resources) for the project, and provide a better legal standing in handling inappropriate action by contractors.
 - 2.2.4. A landscaping and rehabilitation programme for the Dune Management Areas must be compiled, ensuring that locally occurring indigenous plant species are used for re-vegetation and rehabilitation;
- 2.3. The operational phase Environmental Management Programme for all sensitive natural areas including natural vegetation remnants, the conservation and dune management areas, open spaces, recreation areas and ecological corridors must be prepared. The Environmental Liaison Committee (ELC) must be consulted in regard to and advised of

- the EMPs. The EMPs must be approved by this Directorate, before any of the units may be occupied. The operational EMP must *inter alia* contain the following elements:
- 2.3.1. Management recommendations to identify, manage and address environmental aspects in these areas e.g. alien eradication, rehabilitation, refuse dumping, vagrancy, fires, access control, etc;
 - 2.3.2. outline an organisational structure which clearly identifies and allocates responsible parties for implementing the EMS. This must clearly outline how budgets are going to be provided and allocated;
 - 2.3.3. ensure that locally occurring indigenous plant species are used for re-vegetation/rehabilitation in these areas during ongoing management thereof;
 - 2.3.4. enable a positive interaction between local residents / users and sensitive environmental areas, including maintenance of trails and walkways and the development of additional walkways where applicable;
 - 2.3.5. Make provision for mechanisms to allow for regular feedback to residents associations or similar forums that exist at the time, regarding the management of all sensitive natural areas including natural vegetation remnants, the Conservation Areas and Dune Management Areas, Open Spaces, and recreation areas.
- 2.4. An Environmental Liaison Committee (“ELC”) must be established. Members of the ELC must include, but are not limited to representatives of Blaauwberg Administration, local residents and local environmental NGOs. The ELC must play an advisory role to this Directorate and the Local Authority reviewing future detailed development proposals to ensure that they comply with the conditions of this authorisation. Secondly, the ELC must play an advisory role in environmental management of the area during the entire construction phase of the phases of the phases Big Bay Development. The ELC must be established within two month of the date of issue of this authorisation. The applicant is to cover all reasonable expenses incurred by members of the ELC.
- 2.5. The applicant is to appoint a qualified Environment Control Officer, in consultation with the Environmental Officer: Blaauwberg Administration for the full construction period of the project:
- 2.5.1. The Environment Control Officer must oversee the mitigating/rehabilitation measures and recommendations referred to above, and to ensure compliance with the conditions of authorisation and the Environmental Management Programmes for all construction phases;
 - 2.5.2. The ECO will be responsible to the Environmental Officer: Blaauwberg Administration in consultation with the Environmental Liaison Committee;
 - 2.5.3. The Environmental Officer: Blaauwberg Administration in consultation with the ELC, shall determine the role, powers and function of the ECO at the earliest opportunity, but prior to commencement of any construction.
- 2.6. The developer will be responsible for the rehabilitation and management of all areas for a period of one year after construction has been completed. Thereafter the responsibility of management of these areas shall revert to the City of Cape Town.
- 2.7. The applicant must ensure that each phase must undertake an environmental audit every six months and submit the audit report to be endorsed by the ELC and to be

accepted by the Environmental Officer: Blaauwberg Administration. This must include the plan to undertake corrective action based on the audit findings.

2.8. After construction phases have been completed, the applicant must undertake an environmental audit annually. The audit report must be made available to the public (a copy must specifically submitted to residential and/or community forums). This must include the plan to undertake corrective action based on the audit findings.

2.9. This authorisation does not constitute any right to commence site clearance, construction or to occupy the land/sites forming part of this application. These activities can only commence once the following actions have taken place:

2.9.1. The Environmental Control Officer has been appointed;

2.9.2. The construction phase Environmental Management Programme for the relevant development phase has been approved;

2.9.3. An Environmental Liaison Committee has been appointed;

2.9.4. The Environmental Contracts have been approved and signed.

Proof of compliance with this condition must be stated in writing and forwarded to this Directorate one week prior the site clearance.

GENERAL CONDITIONS:

The following general conditions must be complied with:

1. The applicant must, within five calendar days of receipt of this Record of Decision:

- Inform all interested and affected parties registered during the Scoping and Impact Assessment processes, of the outcome of this application and, if requested, provide copies of this Record of Decision, including all the conditions attached thereto;
- Include in such information the explicit provisions of Regulations 11 of the Environmental Impact Assessment Regulations, (Government Notices No. R 1182 and 1183 of 5 September 1997) which reads as follows:
 - (1) An appeal to the Minister or provincial authority under section 35(3) of the Act must be done in writing within 30 days from the date on which the record of decision was issued to the applicant in terms of regulation 10(1);
 - (2) An appeal must set out all the facts as well as the grounds of appeal, and must be accompanied by all relevant documents or copies of them which are certified as true by a commissioner of oaths.
- Include the date on which the record of decision was issued to the applicant in terms of regulation 10(1) and the date by which appeals must reach the Minister.
- Inform all I & AP's that a signed and certified Appeal Questionnaire, is obtainable from the Minister's office at tel. 483 4350, URL http://westcape.wcape.gov.za/environmental_cultural_affairs/default.asp, or email Sesterhu@pawc.wcape.gov.za must accompany the appeal.

2. This Directorate must be notified, within 30 days thereof, of any change of ownership and/or project developer, as well as any change of address of the owner and/or project developer. Conditions imposed in this record of decision must be made known to the new owner and/or developer and are binding on the new owner and/or developer.

3. The conditions of the authorisation must be brought to the attention of all persons (employees, sub-consultants etc.) associated with the undertaking of this activity and the applicant shall take such measures necessary to bind such persons to these conditions.
4. All outdoor advertising associated with this activity, whether on or off the property concerned, shall comply with the South African Manual for Outdoor Advertising Control (SAMOAC) available from:
The Director: Environmental Impact Management
Department of Environmental Affairs and Tourism
Private Bag X447, Pretoria, 0001.
5. The owner and/or developer must notify this Directorate and any other relevant authority, in writing, within 24 hours thereof if any condition of this authorisation is not adhered to.
6. Records relating to the compliance/non-compliance with the conditions of the authorisation must be kept in good order. Such records must be made available to this Directorate within seven days of receipt of a written request by this Directorate for such records.
7. The applicant shall be responsible for all costs necessary to comply with the above conditions unless otherwise specified.

If any condition imposed in terms of this authorisation is not being complied with, the authorisation may be withdrawn after 30 days written notice to the applicant in terms of Section 22(4). Failure to comply with any of these conditions shall also be regarded as an offence and may be dealt with in terms of Sections 29, 30 and 31 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) as well as any other appropriate legal mechanisms.

Provincial Government, Local Authority or committees appointed in terms of the conditions of the application or any other public authority or organisation shall not be held responsible for any damages or losses suffered by the developer or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the developer with the conditions of approval as set out in this document or any other subsequent document emanating from these conditions of approval.

I. KEY FACTORS AFFECTING THE DECISION:

Some of the key factors that have been considered in the decision include:

1. Regional context of the site

- 1.1. A number of spatial planning policy documents address the development of the site, including the Metropolitan Spatial Development Framework, Draft Bloubergvlei Sub-Regional Plan (1996), Draft Blaauwberg Spatial Development (2000), Draft Local Structure Plan for the Coastal Strip between Blaauwbergstrand and Melkbosstrand (1995) and Development Framework for Big Bay and Environs (1997). The following elements are highlighted:
 - That the Big Bay Development is situated within the urban edge;
 - part of the site is identified for urban development, especially east of the present Otto du Plessis Drive;
 - the general environmental sensitivity of the site is recognised;
 - Otto du Plessis Drive is highlighted as a scenic drive of metropolitan significance;

- the importance of Big Bay resort as a regional recreational node is recognised. It is intensively used by a large number of people (and is increasing continually), as well as a number of different types of recreational users;
 - the re-alignment of the Otto du Plessis Drive is proposed.
- 1.2. The Development Framework for Big Bay and Environs (1997) can be singled out as the spatial planning policy that can be applied most appropriately to the development site, and has been approved by the City of Cape Town: Blaauwberg Administration. The proposed development is not totally in line with this policy. The most noteworthy difference is that the policy allocates the area west of the current Otto du Plessis to extensive recreational facilities. A limited amount of buildings are proposed, focussing on recreational/tourism uses. The Big Bay Development proposal in this application earmarked this part of the development area for mixed use development with a 100m setback from the highwater mark. No motivation, scientific information or assessment of the 100m setback has been provided in the Scoping Report or the Big Bay Development Framework.

This constitutes a significant deviation from the spatial planning policy. The policy provided opportunity for expansion of the extensive recreational facilities northwards, whereas the development proposal only caters for limited expansions if any. This places an added pressure on Eerste and Tweede Steen to provide for the future increase in the need for recreational facilities. In the application it is therefore assumed that the Eerste and Tweede Steen facilities will accommodate the regional needs for such facilities. The Environmental Impact Studies for Eerste and Tweede Steen have however, not been done and no application for authorisation has been received by this Directorate to date.

2. Defining the Environment

- 2.1. A crucial aspect of decision making is clarity on the definition of “environment” and the significant detrimental impact that authorisation of the Big Bay Development may have on the environment. Elements that have been considered in arriving at a decision in this matter include, the principles of Integrated Environmental Management (IEM) set out in the IEM Guideline series, Department of Environmental Affairs, 1992, the concept of sustainable development, principles set out in The White Paper on Environmental Management Policy for South Africa (Notice 749 of 1998), the White Paper for Sustainable Coastal Development in South Africa (April 2000), the White Paper on Sustainable Tourism Development and Promotion in the Western Cape (2001) and the principles set out in the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) among others.

It is important to note that the principles in the Environmental Management Policy and White Paper for Sustainable Coastal Development in South Africa referred to in this Record of Decision (“ROD”), are complimented by parallel principles, similarly worded, in the National Environmental Management Act, 1998 (Act 107 of 1998) that have statutory effect. These have also been borne in mind even when not specifically quoted in the ROD.

- 2.2. The fact that the Big Bay Development is situated within the urban edge and that the site is earmarked for urban development within the relevant forward planning documents, could raise the question of why there is a need for the consideration of environmental issues. Apart from the legal requirement in terms of sections 21, 22 and

26 of the Environment Conservation Act, 1989 (Act 73 of 1989) and sections 24 of the National Environmental Management Act, 1998 (Act 107 of 1998) ("NEMA"), the following is relevant:

2.2.1. A key consideration in this regard is the definition of the environment given in the Environmental Management Policy, 1998. It states:

"Because the environment means different things to different people it is necessary to start by defining what it means. In this policy the word environment refers to the biosphere in which people and other organisms live. It consists of:

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

It is quite clear from this definition, as well as the NEMA definition, which is derived from the definition in the policy above, that consideration of sustainable urban planning practices is not outside the scope of environmental management.

2.2.2. It is also important to note that the Big Bay resort and adjacent coastal areas are considered as resources of national importance according to the principles as stated in the White Paper for Sustainable Coastal Development in South Africa (April 2000). The national vision for the coast as stated in the White Paper *"...strives for sustainable coastal development – involving a balance between prosperity, social development, cultural values, spiritual fulfilment and ecological integrity, in the interest of all South Africans....."*

3. Identification and description of issues and concerns and related impacts

- 3.1. Issues and concerns have been broadly described in the Scoping Report, dated June 2001, compiled by deVilliers Brownlie Associates. The individual issues and concerns (including those identified by interested and affected parties) and their related impacts have not been adequately described in the Scoping Report. This specifically excludes botanical issues, which have been dealt with in detail.
- 3.2. The environmental impacts have been discussed on a strategic level but individual impacts have not been assessed in terms of their significance.
- 3.3. The issue of alternatives has been addressed by incorporating environmental aspects and mitigating actions into the planning process in an iterative process. The level to which the preferred option and mitigating proposals addressed environmental impacts has not been assessed.
- 3.4. The impact of the roads and services (water, electricity and any other services) beyond the boundary of the development site constitutes impacts that are directly related to this development, but have not been assessed as an integrated part of the development. This is not, however, an impediment to this decision and has been addressed by Condition 1.3.

- 3.5. Appendix A to the Scoping Report indicate that stormwater detention facilities are to be constructed outside the development area. The impact of these facilities has not been assessed in the Scoping Report. This has been addressed by Condition 1.17
- 3.6. The scoping report did not assess the impact of the proposed development on the aesthetic value of the site in detail, apart from promoting guiding principles to be included into the development layout.

4. Biophysical Environment

- 4.1. With the exclusion of the Big Bay resort and the Otto du Plessis Drive, the site is characterised by an undulating topography with the central dune system rising up to 40m above sea level. The impact of the proposed development on the existing topography is not clear from the information provided. From the figures provided it is derived that significant earthworks are envisaged. The implication on the current views from the Otto du Plessis is not addressed
- 4.2. The vegetation on the site has been well described in a specialist report and include the following relevant and noteworthy elements:
 - Tall Dune Thickets inland on deeper sand
 - Inland dwarf Dune Thicket on shallower sand
 - Dwarf Dune Thicket on coastal dunes.
 - A clump of Milkwoods (*Sideroxylon inerme*) occurs in the southern part of the central dune valley. This clump will be conserved as part of the Dune Conservation Area. Several other Milkwoods occur elsewhere on the site, but will not all be conserved.
 - A number of other Red Data plant species occur on the site. Some of the locations fall within the proposed open spaces, but several sites will not be conserved. These plants will have to be transplanted in a search and rescue exercise. This is addressed by Condition 1.13.
 - Different areas of the site have been invaded by Rooikrans (*Acacia Cyclops*) in varying degrees.
- 4.3. The following open space system is included in the development:
 - The central dune area east of the Otto du Plessis, including the clump of Milkwoods occurs in the southern part of the central dune valley will be conserved, including a 25m buffer strip (50m for the Milkwood clumps).
 - The unvegetated dune north of the existing resort is integrally linked to the sediment movement along the coast and will be conserved, including a 25m buffer area.
 - The high dune area behind Moolman Street west of the Otto du Plessis Drive.
 - The open space strip along the western side of the Otto du Plessis Drive constituting an ecological corridor no less than 25m wide north of the current Big Bay entrance and 20m south of the entrance.
 - Two open space corridors eastwards from the central dune area to the boundary of the development site.
 - A low point to the south of the site, which is mainly retained for stormwater management purposes.

Conservation worthy elements of the site have therefore been incorporated into open spaces, dune management and conservation areas and therefore create opportunities to develop ecological corridors to the proposed Blaauwberg Conservation Area. The conservation measures pertaining to dune areas and vegetation proposed as part of the development are considered appropriate within its urban context.

- 4.4. The existing and potential impact of dynamic coastal processes on the management of the dune area in front of the existing Big Bay resort has not been addressed. One of the goals of the White Paper for Sustainable Coastal Development in South Africa (April 2000) specifically directs coastal developments “....to be planned and managed to minimise disruption of dynamic coastal processes and to avoid exposure to significant risk from natural hazards”. The impact of coastal erosion on the beach and its management implications for recreational facilities should be re-assessed before final design of the coastal recreational facilities are finalised. This has been addressed by Condition 1.4

5. Social and Cultural-historical issues

- 5.1. An archaeological survey was done of the site. The findings were considered of low significance but the report concluded that the “....probability of locating further archaeological site, once vegetation is cleared for development, is high....”. Recommendations regarding further studies were made and SARHA concurred with this recommendation. Their comments focussed on archaeology and no Heritage Impact Assessment was requested;
- 5.2. The study area is considered to be visually sensitive. The following identified elements are relevant:
 - 5.2.1. Big Bay is visually exposed and creates a specific “sense of place” both to the traveller on the Otto du Plessis and to the recreational users of the resort. This “sense of place” is also linked to the proposed Blaauwberg Conservation Area and the coastal area between Blaauwbergstrand and Melkbosstrand.
 - 5.2.2. The Otto du Plessis Drive is regarded as a scenic route of metropolitan significance. The part of Otto du Plessis travelling through the site provides uninterrupted views of the high dune central dune at first and then of the coastline. Most of the open views to the coast will probably be lost to the traveller along the Otto du Plessis, but seaviews for residents west of the central dune will be optimised. Most of the central dune system as visual amenity will be lost to the traveller on the Otto du Plessis. Certain of the residential nodes in the proposed development will however, have views over the central dune.
 - 5.2.3. The primary unvegetated dune immediately north of the resort. The dune is a dominating feature of the current landscape. The dune will be included as a conservation area.

The scoping report did not assess the impact of the proposed development on the aesthetic value of the site.

- 5.3. The participation of interested and affected parties was undertaken by means of consultation, distribution of a Background Information Document (BID), a public meeting, the formulation of a Community Committee and the release of the report in draft form for comment. Media notices were used to inform IAPs of the proposed

activities and to invite IAPs to the Public Meeting. The report details the steps followed to inform and consult the public regarding the proposed development. Several workshops were held with the Community Committee and meetings were held with key stakeholders. The issues and concerns identified by IAPs have been listed without detailed descriptions.

Tourism value of the site

- 5.4. One of the key elements arising from the principles mentioned in the White Paper on Sustainable Coastal Development in South Africa (April 2000) as well as all NEMA principles, are the fact that environmental decisions must be people centred. When considering the unique attributes of the site it is important to focus on optimising the benefits to society at large, and not the advantages for the limited number of people that will benefit directly from the development. The social cost of losing the regional recreational attributes of the site is a burden that should be carried by the developer and not by society at large.

The relevant IEM principle reads, "That there be an attempt to ensure that the 'social costs' of development proposals (those borne by society, rather than the developers) be outweighed by the 'social benefits' (benefits to society as a result of the actions of the developers). Nowhere in the environmental assessment is there an assessment of the comparative social benefits of replacing the proposal for recreational expansion as reflected in the Development Framework for Big Bay and Environs (1997) with that proposed in the Big Bay Development Framework now proposed. The existing Big Bay resort is considered as a recreational area of metropolitan significance. With the increased focus of promoting the Western Cape as a tourism destiny, it is imperative that the natural assets that underpin this industry, be protected. The Environmental Scoping Report and Initial Assessment does not afford adequate attention to this aspect.

An important objective in the White Paper for Sustainable Coastal Development in South Africa (April 2000) states that "*The State shall retain ownership of and ensure effective management of public land along the sea shore.*" This objective is specifically relevant in light of the responsibility of all relevant authorities involved to ensure that the future recreational need of the bigger Blaauwberg/Table View area and Metropolitan Area are addressed in a responsible manner. One of the fundamental principles of the White Paper on Sustainable Tourism Development and Promotion in the Western Cape (2001) states that "*Tourism should benefit the population at large*".

In this regard it is important to note that the Development Framework for Big Bay and Environs (1997) optimises the regional recreational opportunities the site provides, while still allowing mixed use development of the site beyond the existing alignment of the Otto du Plessis Drive. The Big Bay Development Framework as part of this application promotes mixed use development on most of the site, including the coastal site of the Otto du Plessis Drive. This limits the expansion of the Big Bay resort to cater for any future expansion of the resort as a regional recreational site. The recommendations of the Development Framework for Big Bay and Environs (1997) are supported as a balanced approach that optimises public interest.

6. Co-operative Governance

- 6.1. There is the principle of co-ordination set out in the Environmental Management Policy that is closely linked to the above-mentioned principle and environmental issue. It states, "*Environmental concerns affect all aspects of life and must be integrated into*

the work of all government institutions. This requires intergovernmental harmonisation of policies, legislation, monitoring, regulation and other environmental functions in accordance with the requirements of environmental policy.” A similar principle is stated in the White Paper for Sustainable Coastal Development in South Africa (April 2000). It is the responsibility of all relevant authorities involved to ensure that the development of the site is addressed in a responsible manner that considers all environmental implications.

In addition NEMA, section 24(7)(g) requires that procedures for the investigation, assessment and communication of the potential impact of activities must, as a minimum, ensure co-ordination and co-operation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state.

- 6.2. In this regard it is also imperative that all relevant authorities take cognisance of the regional context of the site and the national importance of the coast as a national asset.

J. DURATION AND DATE OF EXPIRY:

This authorisation shall lapse if the activity does not commence within 5 (five) years of the date of issue of this authorisation.

K. APPEAL:

In terms of Section 35 of the Environment Conservation Act, 1989 (Act No. 73 of 1989), formal, motivated appeals can be directed within 30 days of the date of the issuing of this Record of Decision, to:

The Minister of Environmental and Cultural Affairs
Western Cape Province
PO Box 15653, Vlaeberg, 8018
Fax: (021) 483-3885

Appeals must comply with the provisions of regulation 11 of the Environmental Impact Assessment Regulations, (Government Notices No. R. 1182 and 1183 of 5 September 1997) which reads as follows:

- (1) An appeal to the Minister or provincial authority under section 35(3) of the Act must be done in writing within 30 days from the date on which the record of decision was issued to the applicant in terms of regulation 10(1);
- (2) An appeal must set out all the facts as well as the grounds of appeal, and must be accompanied by all relevant documents or copies of them which are certified as true by a commissioner of oaths.

A signed and certified Appeal Questionnaire, obtainable from the Minister's office at tel. 483 4350, URL http://westcape.wcape.gov.za/environmental_cultural_affairs/default.asp or email Sesterhu@pawc.wcape.gov.za must accompany the appeal.

Verwysing
Reference
Isalathiso

E12/2/1-220-Prtn of Erf 10778 & Erf
6220, Milnerton



Navrae
Enquiries
Imibuzo

FABIO VENTURI

Date of Issue

*Departement van Omgewingsake en Ontwikkelingsbeplanning
Department of Environmental Affairs and Development Planning
ISebe leMicimbi yeNdalo esiNgqongileyo noCwangciso loPhuhliso*

The Director
AECI Limited
Private Bag X101
SOMERSET WEST
7129

Attention: Mr Martin Burr

Tel: (021) 852 1111
Fax: (021) 852 1178
and (021) 550 2238

Dear Sir,

**THE PROPOSED REALIGNMENT OF THE DUIKERSVLEI STREAM AS PART OF THE
GROUNDWATER CONTAMINATION REMEDIATION STRATEGY FOR THE OLD
KYNOCHE FACTORY SITE, MILNERTON.**

With reference to your application, find below the **Record of Decision** in respect of this application.

RECORD OF DECISION

A. DESCRIPTION OF ACTIVITY:

The proposed activity entails the realignment of the Duikersvlei stream along the southern and western boundary of the site to form part of a large scale AECI terrestrial and groundwater rehabilitation programme for the property. This will also include the installation of sub surface fin-drain systems which will collect flushed and polluted groundwater for safe disposal and handling, the construction of structural stream design features aligned with specialist study recommendations, introduction of suitable riparian indigenous vegetation and alien vegetation eradication.

This is an activity identified in Schedule 1 of Government Notice No. R1182 of 5 September 1997, as amended, being:

Item 1 (i) viz. The construction, erection or upgrading of canals and channels, including diversions of the normal flow of water in a river bed and water transfer schemes between water catchments and impoundments.

hereinafter referred to as the "activity".

*Department of Environmental Affairs & Development Planning
Directorate: Integrated Environmental Management (Region B)*

B. LOCATION:

The proposed activity will be located on the old Kynoch Factory Site, Erf 10778 & Erf 6220, Milnerton, Cape Town.

Co-ordinates:

33° 51' 00" South

18° 31' 12" East

hereinafter referred to as "the property/site".

C. APPLICANT:

The Director
C/o Mr. Martin Burr
AECI Limited
Private Bag X101
SOMERSET WEST
7129

Tel: (021) 852 1111

Fax: (021) 852 1178 and (021) 550 2238

D. CONSULTANT:

DJ Environmental Consultants
C/o Mr. D Janeke
PO Box 24
Sir Lowry's Pass
7133

Tel: (021) 858 1078

Fax: (021) 858 1098

E. SITE VISIT(S):

A site visit was held on the 26 of October 2004 and attended by Mr R. Diamond (Department of Environmental Affairs and Development Planning), Mr T. van Vuuren Department of Environmental Affairs and Development Planning), Mr H. Mazema (City of Cape Town), Mr D van Driel (City of Cape Town), Mr. R Arnold (City of Cape Town), Mrs P Titmus (City of Cape Town), Mr M Pinder (City of Cape Town). An additional site visit was conducted by the Department of Environmental Affairs and Development Planning (Fabio Venturi) on the 15th of November 2005 as part of the AECI Annual Authorities meeting held on the site.

F. DECISION:

In terms of Sections 22 and by virtue of powers delegated by the Minister in terms of Sections 28 & 33 of the Environment Conservation Act, 1989 (Act No. 73 of 1989), the relevant authority (as defined in GN No R1183 of 5 September 1997, as amended) hereby grants authorisation **with the conditions** contained in this Record of Decision, for the execution of the activity described above.

This Authorisation has been granted in terms of section 22 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) solely for the purposes of undertaking the activity referred to above, and does not exempt the holder thereof from compliance with any other relevant legislation.

G. CONDITIONS OF AUTHORISATION:

1. One week's notice, in writing, must be given to the Directorate: Integrated Environmental Management (Region B), (hereinafter referred to as "this Directorate"), before commencement of construction activities.
 - 1.1 Such notice shall make clear reference to the site location details and reference number given above.
 - 1.2. The said notice must also include proof of compliance with the following conditions described herein:

Conditions: 2, 6, 8, 10 and 11.

2. The requirements of the Department of Water Affairs and Forestry (DWAF) as stipulated in their letter dated 24 June 2005 (Ref: 16/2/7/G202/B18, attached) must be implemented. These include:
 - 2.1. Applying for authorisation from DWAF for the diversion of the Duikersvlei stream in terms of the National Water Act, 1998 (Act 36 of 1998).
 - 2.2. Submitting a proposed programme to DWAF for decommissioning, clean-up and remediation of the site as a whole.
 - 2.3. Submitting a Stormwater Management Plan to DWAF for the site that takes into account concerns raised by the City of Cape Town.

Copies of the above must also be submitted to this Department for our records and for our comment and approval in the case of the Stormwater Management Plan.

3. The realigned portion of the Duikersvlei Stream as per the Kantey and Templer site layout diagram dated 09 February 2006 (ref: 10705T-07 revision A) must be contained within a compound, cascading channel and allowed to meander.
 - 3.1. Flow velocities along the straight reaches of the canal may not exceed 1.0m/s and the appropriate engineering solutions including but not limited to gabion step-down weirs or similar stepped energy dissipaters must be implemented to address this.
 - 3.2. The outer portion of the canal bend is to have its entire slope lined with a reno mattress and the inner bend stabilised with groynes.
 - 3.3. Buried groynes must be installed along the full length of the canal as per the recommendations of Sigma Beta Consulting Civil Engineers dated 07 February 2006 (attached).
 - 3.4. The floors of the proposed road culverts as indicated (ref: 10705T-07 revision A) must be sunk to below the sandy floor of the realigned stream to allow for continuity of the streambed.
4. Should any heritage remains be exposed during any excavations or related activities, these must immediately be reported to Heritage Western Cape. Heritage remains uncovered during earthworks must not be disturbed until inspected and verified by a professional archaeologist.
5. A Property Owner's Association (POA) with a Constitution must be established for the property with the intention being that any and all owners of the property (or future subdivisions or amalgamations thereof) are legally obliged and responsible for the ongoing implementation and auditing of the EMP through the POA. Within this context, the Constitution must cater for but not be limited to the following:

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- 5.1. The POA will include all owners of the property (or future subdivisions or amalgamations thereof),
- 5.2. Provision must be made for any and all future subdivisions or amalgamations of the property,
- 5.3. Provision must be made for any and all future ownership, leases or transfers of the Property,

The POA will be legally responsible for the implementation and the auditing of the EMP. The POA will include the AECI for a minimum of two years after initiation of the POA.

6. The applicant must compile and submit an acceptable construction phase Environmental Management Plan ("CEMP"), as well as a code of conduct for building contractors to this Directorate for approval prior to any site preparations and construction commencing. This EMP must be submitted to this Directorate at least **six weeks** prior to any construction activities or construction related activities commencing. The EMP must be included in all contract documentation for the construction phase of the development.
7. The applicant must appoint a suitably experienced Environment Control Officer (or Site Agent where appropriate) before commencement of any land clearing or construction activities to ensure that the mitigation/rehabilitation measures and recommendations referred to in this Record of Decision are implemented and to ensure compliance with the provisions of the construction phase Environmental Management Plan.
8. The applicant must compile and submit an acceptable Operational Phase Environmental Management Plan ("OEMP"). This must be approved by this Directorate before completion of the realigned stream. This Operational EMP must incorporate the conditions of authorisation as stipulated in this Record of Decision. The Property Owners' Association together with the applicant must implement and ensure compliance with the Operational Phase EMP. The operational EMP must address and make provision for but not be limited to the following:
 - 8.1. Describing the level and type of competency required of the Environmental Control Officer ("ECO"),
 - 8.2. Define and allocate the roles and responsibilities of the ECO referred to above, and the Environmental Site Agent where applicable,
 - 8.3. Determine the frequency of site visits,
 - 8.4. The rehabilitation and maintenance of natural and introduced riparian and surrounding indigenous vegetation,
 - 8.5. Responsible maintenance of the 'stream' and water quality exiting the stream facilitated through strict and audited monitoring programmes,
 - 8.6. The maintenance of stream superstructure facilitated through strict and audited monitoring programmes,
 - 8.7. Ongoing mitigation measures for erosion facilitated through strict and audited monitoring programmes,
 - 8.8. The removal of alien invasive plants,
 - 8.9. On going implementation of conditions of approval of the ROD.

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9. An integrated waste management approach must be used that is based on waste minimization and should incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste including but not limited to contaminated sediment shall be disposed of at a landfill licensed in terms of section 20 of the Environment Conservation Act, 1989 (Act No. 73 of 1989).
10. The applicant must, **within five calendar days** of the date of issue of this Record of Decision:
 - Inform the relevant local authority as well as all interested and affected parties, ("I & AP's") registered during the Scoping and Impact Assessment processes in writing of the outcome of this application and, if requested, provide copies of this Record of Decision within a reasonable time before expiry of the thirty day appeal period;
 - Include in such information the provisions of Regulation 11 of Government Notice No. R 1183 of 5 September 1997, as amended, which reads as follows:
 - a) An appeal to the Minister or provincial authority under section 35(3) of the Act must be done in writing within 30 days from the date on which the record of decision was issued to the applicant in terms of regulation 10(1);
 - b) An appeal must set out all the facts as well as the grounds of appeal, and must be accompanied by all relevant documents or copies of them that are certified as true by a commissioner of oaths.
 - Include the date on which the record of decision was issued to the applicant in terms of regulation 10(1) and the date by which appeals must reach the Minister.
 - Inform all I & AP's that a signed and certified Appeal Questionnaire, obtainable from the Minister's office at tel. (021) 483 3915, email jedevill@pgwc.gov.za or URL <http://www.capegateway.gov.za/other/2005/4/appealquestionnaire05.pdf> must accompany the appeal.
 - If the applicant should appeal against this Record of Decision, he must inform all interested and affected persons that such an appeal is being lodged with the Minister and if requested, the applicant/appellant must provide those persons with reasonable access to a full copy of the appeal within a reasonable time before expiry of the thirty day appeal period.
11. The applicant shall be responsible for ensuring compliance with the conditions contained in the Record of Decision by any person acting on his behalf, including but not limited to, an agent, servant, employee or any person rendering a service to the applicant in respect of the activity, including but not limited to contractors and consultants.
12. The owner and/or developer must notify this Directorate and any other relevant authority, in writing, within 24 hours thereof if any condition of this authorisation is not adhered to.
13. Departmental officials shall be given access to the property referred to in B above for the purpose of assessing and/or monitoring compliance with the conditions contained in this Record of Decision, at all reasonable times.

H. RECOMMENDATIONS:

The remediation of the contamination of the site is a major concern for this Department. It must be emphasised that the Proponent has General duty of care obligations for the property, in particular Section 28(1) of NEMA and the remediation of environmental damage, specifically states that –

“Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.”

Within this context this Department strongly recommends the following:

A remediation or management plan should be compiled containing detailed measures of how the contamination of the polluted areas of the site will be addressed. Further, such a plan must be clearly costed and explicit arrangement of the funding of the implementation of such a plan must be provided. For example provision must be made through property levies, investment or other suitable financial vehicle for an environmental fund to be established to create a self sustaining financial system to cater for the ongoing maintenance of the site through the above mentioned management plan. It is recommended that this requirement be included in the licensing conditions of DWAF.

I. KEY FACTORS AFFECTING THE DECISION:

General

The proposed activity will be located on a relatively uncontaminated portion of the the Old Kynoch fertiliser factory grounds and will serve to remediate the current groundwater pollution ingress to the Duikersvlei stream and subsequent downstream contamination effects on the Milnerton Lagoon and wetland surrounds caused by eutrophication through high nutrient load. The AECl is undertaking a property wide rehabilitation programme to rectify the pollution problem and the proposed Duikersvlei realignment is an important component of this rehabilitation programme. The stream experiences high levels of pollution ingress due to its close proximity to the sources of the groundwater pollution on the property. This has been mitigated to a degree through an experimental cut-off drain system. The drain system collects and disposes of a large amount of polluted groundwater after the groundwater has been diluted with treated effluent that is forcefully flushed through the groundwater system in an attempt to eradicate the remaining pockets of groundwater pollution. However, this does not totally prevent pollution ingress. The realigned stream along the boundary of the property will be self-contained and is not susceptible to further pollution ingress from the groundwater on the property. In addition, a new fin-drain system will be installed to collect the flushed and polluted groundwater for safe disposal and handling, thus reducing the overall groundwater pollution of the property. The realignment of the stream will also optimally facilitate the systematic removal of contaminated sediment deposits on site. The ultimate goal of the realignment is to facilitate minimising the pollutant levels leaving the site through the Duikersvlei stream to acceptable levels and subsequently minimising pollution inflow to Milnerton lagoon and surrounding wetlands further downstream. The realignment is also coupled with providing for an opportunity to establish a more acceptable and visually attractive stream, through the introduction of suitable riparian vegetation.

Biophysical

The water quality and subsequent ecological functioning of the stream on site is severely degraded due to historically irresponsible industrial activities which resulted in extensive soil and groundwater pollution. Alien plant infestation has resulted from the high nutrient load and subsequent eutrophication. The proposed activity will facilitate improving the overall site conditions and is integral to the remediation programme that AECI has proposed to address the currently severe groundwater pollution problems on site. Further, the proposed activity as supported by specialist studies will create an improved aquatic system and positively contribute to reducing pollution inflow to the extensive wetland system further downstream as well as creating a suitable habitat to encourage a more appropriate stream habitat.

Alternatives

Four (4) strategic alternatives were provided for through the process. Factors taken into consideration included soil/groundwater impacts, sedimentation contamination impacts, and riparian vegetation rehabilitation linked to the creation of habitat for suitable biota, hydrological effects, hydraulic effects and ecological impacts. Broadly, the specialist studies indicated that low flow velocities, "soft" engineering solutions and an option that best simulates a natural river system would be preferred.

The "do nothing" alternative was provided for as benchmark to measure alternatives. This option would not serve to improve the current status of the stream or facilitate the overall site remediation programme.

The "non-realignment" alternative entails the rehabilitation of the current Duikersvlei stream course. Although this option presents a more natural approach it would require suitable engineering to minimise horizontal groundwater pollution ingress but this is not entirely effective. It would also require large scale removal of polluted substrate thereby effectively creating a 'new' stream system similar to the realignment options. The stream would still experience groundwater pollution ingress and the overall site remediation strategy would be inefficient through this option. This option would also involve significant costs as well as obstructing the overall site remediation strategy for the property and possibly mobilise additional sediment pollution into the stream. This option is not preferred.

The "realignment option 1" alternative entails redirecting stream flow across the perimeter of the property and away from the contaminated 'hot spots' on the property. This would allow for the establishment of a new fully contained stream section that could effectively be managed and protected against further pollution ingress while facilitating the larger site rehabilitation programme. This is further coupled with a system of cut-off trenches (fin-drain systems) to collect the flushed groundwater and transport it away to be diluted with treated effluent water from the Potsdam Waste Water Treatment Works and pumped out to sea as a temporary and DWAF approved solution. This option also includes several energy dissipating systems in the form of step down gabions, weirs and meanders as recommended by appropriate specialist studies, thus eliminating the need for a "hard" engineering solution whilst best simulating a natural stream system that also includes large scale indigenous vegetation introduction. This will ultimately attract suitable biota into the

stream system to help regenerate the aquatic system. This is the preferred alternative.

The "realignment option 2" alternative entails the canalisation of the Duikersvlei stream through a "hard" engineering solution. Although this creates a fully contained system it also creates conditions that nullify natural stream bed system conditions and encourage high flow velocities. This option is also not supported by DWAF. It will still however achieve the ultimate goal of the exercise by minimising groundwater pollution ingress which would decrease downstream wetland pollution and compliment the rehabilitation programme for the property. This option is not preferred.

The "realignment option 3" alternative involves redirecting the stream across highly contaminated areas on the site which would then require hard engineering solutions to avoid groundwater pollution ingress. Again, this would effectively nullify natural stream bed system conditions. This option however would still achieve the ultimate goal of the exercise by minimising groundwater pollution ingress which would decrease downstream wetland pollution and compliment the rehabilitation programme for the property. This option is not preferred.

Further, stream channel design alternatives were also investigated to facilitate flow velocities, erosion control and the simulation of a natural stream bed habitat. These options addressed three broad categories in the form of stream channel cross sections, longitudinal sections and sinuosity and are detailed below.

Stream channel cross sections included two alternatives.

Simple channel:

This involves straight walls and a flat bottom and is most suited to canalisation and high velocities. This option is not preferred.

Compound channel:

This involves a purpose built canal to cater for low velocity and meandering flows. It is also designed to contain flood events. In this case it was purpose built to contain the 1:100 year flood event and is also environmentally preferred due to its ability to cater for a variety of diverse habitat conditions thus encouraging biotic diversity. This is the preferred option.

Stream channel longitudinal sections included two alternatives, which include:

Gradually sloping stream channel:

This would allow for a high velocity flow which will contribute to erosion and associated damage. The flow channel would thus have to be hardened to mitigate the associated erosion. This option would also not allow for a low flow velocity as identified and recommended through the specialist studies. This option is not preferred.

Cascading stream channel:

This would allow for step down gabions or similar energy dissipating mechanisms to reduce the flow velocity to approximately 0.7m/s and thus eliminate the need to harden the flow channel. This would facilitate natural stream bed conditions and meet the required flow velocities as identified through the specialist studies. This is the preferred option.

Stream sinuosity included two alternatives, which include:

No Meander:

This involves a straight, open ended channel which would serve to encourage less diverse conditions in addition to higher stream velocities. This option does not meet the requirements as identified through the specialist studies. This option is not preferred.

Meandering:

This ensures that the flow channel meanders to an extent that is appropriate for a natural stream, thus supporting diverse conditions and a lower stream channel velocity. This alternative thus meets the required flow velocities and simulated stream conditions as identified through the specialist studies. This is the preferred option.

The results of the specialist study clearly indicated that realignment Option 1 is preferred with a meandering, compound and cascading flow channel. Thus, this combination is the preferred alternative.

Public Participation

A pre-application meeting and site visit was conducted on the 26 of October 2004 and attended by Mr R. Diamond (Department of Environmental Affairs and Development Planning), Mr T. van Vuuren Department of Environmental Affairs and Development Planning), Mr H. Mazema (City of Cape Town), Mr D van Driel (City of Cape Town), Mr. R Arnold (City of Cape Town), Mrs P Titmus (City of Cape Town), Mr M Pinder (City of Cape Town).

Advertisements were also placed in the Table Talk, Die Burger and the Cape Times on the 14th of February 2005. A 21 day commenting period was allowed for. All concerns have been addressed in the form of the Final Scoping Report and the Addendum to the Final Scoping report.

A Background Information Document (BID) was prepared and submitted to Interested and Affected Parties (IAPs) and immediate landowners. A public meeting at the old Kynoch factory site was held on the 24th of February 2005 to provide for an opportunity to discuss concerns and submit comments via a comment sheet.

Further one on one meetings were held with Mr Rod Arnold (City of Cape Town – Stormwater Management Division), Mrs Wilna Kloppers (DWAF) and Mr Hohan Massyn (City of Cape Town – Blaauberg Administration).

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J. DURATION AND DATE OF EXPIRY:

This authorisation shall lapse if the activity does not commence within two (2) years of the date of issue of this authorisation.

K. APPEAL:

In terms of Section 35 of the Environment Conservation Act, 1989 (Act No. 73 of 1989), formal, motivated appeals **must be directed within thirty (30) days** of the date of the issuing of this Record of Decision, to:

Provincial Minister for Environment
Planning and Economic Development
Private Bag X9086
CAPE TOWN
8000
Fax: (021) 483-6081

Appeals must comply with the provisions of regulation 11 of Government Notice No. R. 1183 of 5 September 1997, as amended.

If the appellant is not the applicant, the latter must be informed of the appeal within the appeal period referred to above and must provide the applicant with reasonable access to a full copy of the appeal, if requested.

A signed and certified Appeal Questionnaire, obtainable from the Minister's office at office at tel. (021)483 3915, email: jedevill@pgwc.gov.za or URL <http://www.capegateway.gov.za/other/2005/4/appealquestionnaire05.pdf> must accompany the appeal.

If any condition imposed in terms of this authorisation is not being complied with, the authorisation may be withdrawn after 30 days written notice to the applicant in terms of Section 22(4). Failure to comply with any of these conditions is also an offence and may be dealt with in terms of Sections 29, 30 and 31 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) as well as any other appropriate legal mechanisms.

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Provincial Government, Local Authority or committees appointed in terms of the conditions of the application or any other public authority or organisation shall not be held responsible for any damages or losses suffered by the developer or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the developer with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

Your interest in the future of our environment is greatly appreciated.

Yours faithfully

ANTHONY BARNES
DIRECTOR: INTEGRATED ENVIRONMENTAL MANAGEMENT (REGION B)

DATE OF DECISION: _____

CC: *John Hopkins - City of Cape Town, Planning and Environment*
Bertrand Van Zyl – Berg WMA Catchment Manager, DWAF
Pat Tittmus – Blaauwberg Administration
C Rudman - Blaauwberg Administration
D Janeke - DJ Consultant
Wilna Kloppers - DWAF
R Diamond - DEA&DP – Pollution and Waste

Fax (021) 988 2742
Fax (021) 946 3666
Fax (021) 550 7517
Fax (021) 550 7517
Fax (021) 858 1098
Fax (021) 946 3666



Ministry for Environment, Planning and Economic Development
Ministerie van die Omgewing, Beplanning en Ekonomiese Ontwikkeling
ISebe ezeNdalo, isiCwangciso noPhuhliso IwezoQoqosho

The Municipal Manager
City of Cape Town
P.O. Box 16548
VLAEBERG
8018

Attention: Mr Keith Wiseman

Tel: (021) 487 2283
Fax: (021) 487 2255

Dear Sir

APPEALS: THE PROPOSED NEW GREEN POINT STADIUM, GREEN POINT COMMON, CAPE TOWN

Having considered the information at my disposal and the national environmental management principles in section 2 of the National Environmental Management Act 107 of 1998 ('NEMA'), I, the Minister for Environment, Planning and Economic Development of the Western Cape Province hereby record my decision in terms of section 35(4) of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (hereinafter referred to as 'ECA') on the appeals against the decision of the Director: Integrated Environmental Management (Region B) ('the Director') in the Department of Environmental Affairs and Development Planning in the Western Cape Province ('the Department') taken in terms of section 22 of the ECA, granting to the applicant authorisation for the execution of the activities described below subject to the conditions contained in a Record of Decision dated 31 October 2006 ('the Director's ROD').

RECORD OF MY DECISION

A. DESCRIPTION AND LOCATION OF ACTIVITIES:

The application is for the proposed change of land use from zoned open space to any other land use for the development of a new stadium at the Green Point Common; the construction and upgrading of transport infrastructure (including the construction of the Granger Bay Boulevard) to facilitate access to and egress from the stadium and the remainder of the Green Point Common; the construction and upgrading of the electrical supply network between Montague Gardens and the Green Point Common to meet the electricity needs of the stadium; and the establishment of an urban park on the remainder of the Green Point Common. The design of the stadium will comply with the requirements set by the Federation International Football Association ('FIFA') for a semi-final match in the 2010 FIFA World Cup tournament. The stadium, together with the urban park, will be operated as a multi-purpose facility for recreation and sporting events of various sporting codes and informal trading.

Stadium:

The stadium will consist of:

- seating for not more than 68 000 spectators during the 2010 FIFA World Cup tournament and not more than 55 000 spectators post 2010,
- a stadium building not higher than 50m above natural ground level (the reference to natural ground level being 13m above mean sea level),
- a surrounding podium not higher than 9m above natural ground level,
- grand staircases and ramps to access the stadium,
- a forecourt area at ground level from where ticket sales will occur,
- associated stadium infrastructure (e.g. utilities, cables and communication infrastructure),
- training, medical and rehabilitation facilities, administration offices and hospitality facilities provided within the stadium, and
- at least 2 000 permanent parking bays provided within the stadium precinct.

The stadium will be designed to have three tiers of seating during the 2010 FIFA World Cup tournament. After the tournament the uppermost tier will be removed and replaced with a multi-purpose use area. The seating capacity of the stadium after the tournament will not be more than 55 000.

The stadium together with the surrounding podium will cover an area approximately 10ha in extent. The stadium precinct, which includes the stadium, podium, ramps, forecourt and other ancillary elements, will cover an area approximately 18ha in extent.

The stadium precinct will be located in the north eastern part of the Green Point Common between Beach Road, the proposed new Granger Bay Boulevard and Fritz Sonnenberg Road (discussed below).

Urban park:

The existing Green Point Stadium structure will be partially demolished and the area of the Green Point Common outside the new stadium precinct will be transformed into a quality open space and sports complex – the urban park – that will accommodate a range of sports codes, limited informal trading and a range of other recreational pursuits. The new stadium will form an integral part of the urban park.

Construction and upgrading of transport infrastructure:**Granger Bay Boulevard**

A new four-lane dual carriageway road, to be named Granger Bay Boulevard, will be constructed to connect Western Boulevard (at the vicinity of the Green Point traffic circle) to Beach Road (at the location of the existing Granger Street). Granger Bay Boulevard will run in a north eastern direction curving along the northern boundary of the Green Point Track to Beach Road. There will be an access point for the stadium precinct on Granger Bay Boulevard.

Access point off Western Boulevard and upgrading of Fritz Sonnenberg Road

There will be an additional access point for the stadium precinct and for the urban park on the Western Boulevard. Fritz Sonnenberg Road will be upgraded.

Bus Embayments / pick-up and drop-off facilities

Permanent bus embayments and public transport pick-up and drop-off facilities will be constructed along Granger Bay Boulevard. Temporary embayments and facilities will be provided along Somerset Road and Western Boulevard for specific events in accordance with the relevant transport management plan

Parking

At least 2 000 permanent parking bays will be provided within the stadium precinct. In accordance with the Transport Management Plan temporary parking for a further 3 000 vehicles on the Green Point Common and remote parking areas elsewhere will be provided for specific events.

Bus/shuttle Service

In accordance with the relevant transport management plan a bus/shuttle service will be operated to bus/shuttle people to the Green Point Common for specific events.

Non-Motorised Transport

Pedestrian and bicycle facilities will be provided along Somerset Road and on the Green Point Common. Grade-separated pedestrian crossings (bridges or subways) will be provided along Buitengracht Street, Western Boulevard and Granger Bay Boulevard.

Upgrading of electrical infrastructure:

The proposed stadium will require an additional 10 mega volt amps (MVA) of electrical power and the following electrical infrastructure upgrades will therefore occur:

Montague Gardens Electrical Substation

Existing 132 kilovolt (kV) circuit breakers will be replaced within the existing building.

Underground Cable from Montague Gardens to the Foreshore

Existing underground cables will be replaced with two 132 kV cables installed in a trench 1.3m wide and 1.2m deep. The cableway will run along the N1 highway from Montague Gardens towards Cape Town, through the Ysterplaat Air Force Base, through the Brooklyn residential suburb, through the Paarden Eiland Industrial area (along the existing railway reserve), into the Culemborg area, along Table Bay Boulevard and across Oswald Pirow Street into the Foreshore substation.

The remaining parts of the Green Point Common will be redeveloped as the urban park.

Granger Bay Boulevard will run in a north eastern direction from the existing Green Point traffic circle, connecting Western Boulevard to Beach Road.

The location of the proposed reinforcement of the 132kV electrical supply network from the existing Montague Gardens substation to the new Green Point Stadium substation is depicted on plan numbers JPE 2006.1.4000 Sch 1, Sch 2 and Sch 3 comprising Figure 7 to the Environmental Impact Report dated September 2006.

Application form and listed activities

An Application Form and Checklist dated March 2006 was lodged in terms of Government Notice Number R1183 of 5 September 1997 ('the EIA Regulations'), as amended, for authorisation in terms of section 22 of the ECA to perform the following activities listed in Government Notice Number R1182 of 5 September 1997, as amended:

Item 1(a), namely The construction, erection or upgrading of facilities for commercial electricity generation with an output of at least 10 megawatts and infrastructure for bulk supply;

Item 1(c), namely The construction, erection or upgrading of, with regard to any such substance, which is dangerous or hazardous and is controlled by national legislation- ... (ii) Manufacturing, storage, handling, treatment or processing facilities for any such substance;

Item 1(d), namely The construction, erection or upgrading of roads, railways, airfields and associated structures;

Item 1(g), namely The construction, erection or upgrading of structures associated with communication networks, including masts, towers and reflector dishes, marine telecommunication lines and cables and access roads leading to those structures, but not including above ground and underground telecommunication lines and cables and those reflector dishes used exclusively for domestic purposes;

Item 1(m), namely The construction, erection or upgrading of public and private resorts and associated infrastructure; and

Item 2(e), namely The change of land use from use for nature conservation or zoned open space to any other land use.

In what follows, for ease of reference, the activities described above for which authorisation is sought, are referred to either as 'the activities described in Part A' or collectively as 'the activity'.

B. APPLICANT:

City of Cape Town

% Mr Keith Wiseman

PO Box 16548

VLAEBERG

8018

Tel: (021) 487 2283

Fax: (021) 487 2255

C. CONSULTANT:
The Environmental Partnership
% Ms Carmen du Toit
PO Box 945
CAPE TOWN
8000

Tel: (021) 4220999
Fax: (021) 4220998

D. SITE VISIT:

I conducted a site visit on 19 December 2006. Besides me, the persons present were the following officials in the Department: Rudi Ellis, Zaahir Toefy and Susara van der Merwe.

E. MY DECISION:

Having considered all the information at my disposal and the national environmental management principles in section 2 of the NEMA, in terms of sections 22 and 35(4) of the ECA I hereby:

- vary the decision contained in the Director's ROD; and
- **grant authorisation for the activities described in Part A of this Record of Decision subject to the conditions contained in Part F thereof.**

The authorisation in this Record of Decision is solely for the purposes of undertaking the activities described in Part A, and does not exempt the holder thereof from compliance with any other relevant laws or requirements.

F. CONDITIONS OF AUTHORISATION:

1. One week's notice, in writing, must be given to the Department before commencement of construction activities.
 - 1.1 Such notice shall make clear reference to the site location details and reference number given above.
 - 1.2 The said notice must also include proof of compliance with the following conditions described herein: Conditions: 11 and 12.
2. The height of the stadium must not exceed 50 m above natural ground level.
3. The height of the podium must not exceed 9 m above natural ground level.
4. At least 2 000 permanent parking bays must be provided within the stadium precinct.
5. The new Green Point Stadium electrical substation must be positioned within the stadium precinct and must be colour-coded and screened to limit visual impact.
6. Architectural and Landscaping Guidelines and Site Development Plans for the stadium precinct and the urban park to cater for the 2010 FIFA World Cup tournament ('the tournament') as well as for the period after the tournament ('post 2010'), must be compiled.

- 6.1 The Architectural and Landscaping Guidelines for the stadium precinct and the urban park must be compiled after consulting with Heritage Western Cape.
- 6.2 The Architectural and Landscaping Guidelines for the stadium precinct and the Site Development Plan for the stadium precinct must be completed by the applicant and given effect to in the building plans for the stadium precinct to be approved by the applicant in terms of the National Building Regulations and Building Standards Act 103 of 1977.
- 6.3 The Architectural and Landscaping Guidelines for the urban park and the Site Development Plan for the urban park must be submitted to the Provincial Minister for approval within six (6) months of the date of issue of this Record of Decision.
- 6.4 The submission of the Site Development Plan referred to in paragraph 6.3 must be:
 - 6.4.1 preceded by the submission to the Provincial Minister for approval within one (1) month of the date of issue of this Record of Decision of a plan for a comprehensive process of public participation to inform the Site Development Plan for the urban park, which includes the provision of information to and consultation with the broader Cape Town community and the communities in the vicinity of the urban park; and
 - 6.4.2 accompanied by proof of compliance with the approved public participation process.
- 6.5 The implementation of the Architectural and Landscaping Guidelines and the Site Development Plans for the stadium precinct and the urban park for the tournament must be completed prior to the commencement of the operation of the stadium.
- 6.6 The implementation of the Architectural and Landscaping Guidelines and the Site Development Plans for the stadium precinct and the urban park for post 2010 must commence within two (2) months after the completion of the tournament and must be completed within twelve (12) months of such commencement.
- 6.7 The Architectural Guidelines for the stadium precinct must address the visual impact of all built forms, including the following:
 - 6.7.1 colour-coding to reduce visual impact;
 - 6.7.2 reduction of bright or reflective surfaces to reduce glare; and
 - 6.7.3 where practically possible, the use of terracing to reduce the visual impact of the podium.
- 6.8 The Architectural Guidelines for the stadium precinct and the urban park must comply with the following requirements concerning the artificial lighting of the stadium and the urban park:
 - 6.8.1 naked light sources must not be visible outside the area of Green Point Common;
 - 6.8.2 light sources must be shielded to reduce light spillage and light pollution;
 - 6.8.3 uplighting onto the outer sides of the buildings must be used sparingly;
 - 6.8.4 shielded downlights must be used on the podium and in all open public areas; and

- 6.8.5 neon or unshielded bright security lights may be used inside the stadium only.
- 6.9 The Architectural Guidelines for the stadium precinct and the urban park must comply with the following requirements concerning signage within the stadium precinct and the urban park:
 - 6.9.1 a standardised signage style must be designed and applied to all signage;
 - 6.9.2 brightly illuminated signage must be used only when necessary; and
 - 6.9.3 where practically possible brightly illuminated signage must not be visible from the surrounding residential areas.
- 6.10 The Architectural Guidelines for the stadium precinct must ensure that the following noise mitigation measures are incorporated into the design of the stadium to ensure that the noise levels experienced outside the stadium are at least 6dB lower than they would be without such measures and that the said noise levels will not exceed those currently experienced outside the existing Green Point Stadium:
 - 6.10.1 there must be a carefully designed double membrane roof;
 - 6.10.2 the roof opening must not be at the highest point of the stadium roof;
 - 6.10.3 the size of the roof opening must not exceed the size of the pitch;
 - 6.10.4 the façade of the stadium must consist of a continuous outer skin constructed with a membrane-fabric which will prevent noise transmission from within;
 - 6.10.5 measures or features to reduce noise emissions from all:
 - 6.10.5.1 openings between the roof and the stadium structure
 - 6.10.5.2 ventilation ducts;
 - 6.10.5.3 outside entrances; and
 - 6.10.6 the design of the sound system must minimise the amount of direct and reverberant sound at all audio frequencies radiating out of the stadium.
- 6.11 The Architectural Guidelines for the stadium precinct and the urban park must ensure that a standard style for fencing and other security features which lends itself to the surrounding aesthetics, is used. Razor wire must not be used.
- 6.12 The Site Development Plan for the urban park must ensure that the urban park is a multi-purpose space for sporting activities, informal trading and recreational activities and not simply a reorganisation of the existing sports fields and golf course or an outflow area for the stadium.
- 6.13 The following further matters, amongst others, must be addressed in the Site Development Plans or the Landscaping Guidelines for the stadium precinct and the urban park:
 - 6.13.1 the interfaces between the stadium precinct, the urban park, the surrounding historically significant landmarks (such as the Green Point Track, Fort Wynyard and the Somerset Hospital precinct), the surrounding coastline and the V&A Waterfront;

- 6.13.2 the access point to the stadium and the urban park off Western Boulevard may not be used by private vehicles as a thoroughfare to Beach Road. The access point and road may be used only during events and for emergency purposes. The design and layout of the access point and road must fit in with the character of the urban park and must predominantly focus on pedestrian and cycle use;
 - 6.13.3 although certain areas of the urban park will be used for temporary parking during events at the stadium, the primary function of these areas must be to accommodate sporting codes, informal trading and/or other recreational activities for the benefit of the broader community. The areas that may be used for temporary parking must therefore be grassed not hard surfaced. They must be clearly indicated;
 - 6.13.4 the access and egress routes to and from all such temporary parking areas must be clearly indicated;
 - 6.13.5 pedestrian and cycle paths throughout the urban park;
 - 6.13.6 the location and nature of all hard and soft landscaping, lighting, fixtures, street furniture, signage, etcetera;
 - 6.13.7 landscaping must screen any obtrusive features as far as practically possible;
 - 6.13.8 the final designs and landscaping of Granger Bay Boulevard and Fritz Sonnenberg Road, which must:
 - 6.13.8.1 include where practically possible, tree plantings on both sides of these roads;
 - 6.13.8.2 include appropriate street furniture, lighting, fencing, signage, sidewalks and cycle paths, with finishes which match those of the stadium precinct and urban park, to facilitate the movement and comfort of pedestrians and cyclists along these roads; and
 - 6.13.8.3 generally fit in with the character of the urban park and facilitate pedestrian and cycle use.
7. The design and operation of the stadium and urban park must provide for energy and water-efficiency, must adopt an integrated waste management approach and must avoid the pollution of surface or ground water.
- 7.1 Where practically possible, the following water-efficiency measures must be taken or implemented:
 - 7.1.1 water-efficient fittings on showers, taps and toilets (multi-flush rather than dual-flush);
 - 7.1.2 water-wise landscaping; and
 - 7.1.3 rainwater harvesting and storage for irrigation and toilet flushing.
 - 7.2 Where practically possible, the following energy-efficiency measures must be taken or implemented:
 - 7.2.1 energy-efficient lighting and automatic switches and sensors,
 - 7.2.2 energy efficient heating, ventilation and cooling systems (including minimal pipe runs and heat exchange),
 - 7.2.3 insulation of hot water pipes, and

- 7.2.4 maximum use of daylighting.
- 7.3 The integrated waste management approach must be based on waste minimization and should incorporate recycling and re-use. Any solid waste must be disposed of at a landfill licensed in terms of section 20 of the ECA.
- 7.4 No surface or ground water may be polluted. The relevant requirements of the National Water Act, 1998 (Act No. 36 of 1998) must be complied with at all times.
8. The following requirements relating to the storage of fuel, oil and other chemicals on the site must be implemented and adhered to:
- 8.1. All storage must be confined to demarcated and secured areas with an impervious base which are adequately bunded (at least 110% of the total capacity of all tanks in the area).
 - 8.2. Any temporary storage tanks must be designed and installed in accordance with the relevant oil industry and South African National Standards.
 - 8.3. Any temporary storage tanks and associated infrastructure must be removed at the expense of the applicant after the relevant construction activities have been completed.
 - 8.4. All tanker drivers and adequately qualified staff must be present at all times during offloading. An emergency cut-off switch must be installed to immediately stop delivery should an incident occur.
 - 8.5. All servicing and refuelling of vehicles must be confined to demarcated and secured areas with an impervious base and which are adequately bunded (at least 110% of the total capacity of all tanks in the area), unless otherwise authorised by the Environmental Control Officer ('ECO') referred to in paragraph 12 below.
 - 8.6. All spills are to be reported to the Project Manager/Engineer and ECO immediately and appropriate clean-up measures must be implemented as soon as practically possible.
9. The following requirements relating to the preservation of heritage resources must be implemented and adhered to during the construction phase:
- 9.1. If any archaeological remains (including but not limited to fossilized bones, fossilized shells, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, marine shell heaps, stone artefacts and bone remains, structures and other built features, rock art and rock engravings) other than graves or unmarked human burials are discovered during construction, the discovery must immediately be reported to Heritage Western Cape and they must not be disturbed further until the approval of Heritage Western Cape has been obtained.
 - 9.2. If any graves or unmarked human burials are discovered during construction, they must be treated with respect and the discovery must immediately be reported to the South African Heritage Resources Agency ('SAHRA') and they must not be disturbed further until the approval of SAHRA has been obtained. If any human remains are to be moved or removed, that must be done under the supervision of an archaeologist contracted to do so at the expense of the applicant.
10. The following further requirements relating to transport to and from the stadium and the urban park must be implemented and adhered to:
- 10.1 Pedestrian and bicycle paths must be provided along Somerset Road.

- 10.2 Grade separated pedestrian and cycle crossings must be provided along Buitengracht Street, Western Boulevard and Granger Bay Boulevard.
- 10.3 A bus/shuttle service must be introduced for specific events in accordance with the Transport Management Plan referred to in paragraph 13.1.1 below to bus/shuttle people to the stadium from remote parking and public transport drop-off areas.
11. The Construction Phase Environmental Management Plan ('EMP') compiled by The Environmental Partnership must be implemented.
 - 11.1 The EMP must be included in all contract documentation for the construction phase of the development.
 - 11.2 The Department must be notified in writing of any proposed changes to the EMP due to additional information gained as a result of construction activities, and the Department must approve any proposed changes prior to implementation.
 - 11.3 The ECO must notify the Department immediately of events or incidents that may cause significant environmental damage or breach the requirements of the EMP.
12. The applicant must appoint a suitably experienced ECO before commencement of any land clearing or construction activities to ensure that the mitigation/rehabilitation measures and recommendations referred to in this Record of Decision are implemented and to ensure compliance with the provisions of the construction phase EMP.
13. A Stadium and Urban Park Operating Agreement must be entered into between the applicant and the operator of the stadium and urban park ('the Operator') prior to the commencement of the operation of the stadium. This agreement must include:
 - 13.1 A Stadium Operational Management Plan, that in turn must include, amongst other things, a Generic Event Management Plan which caters for various event scenarios and must be mindful of the surrounding community. The Generic Event Management Plan must include, amongst other things:
 - 13.1.1 a Transport Management Plan which must address, amongst other things public and private transport to and from the stadium, parking, pedestrians, cyclists, access control and a public notification and awareness strategy;
 - 13.1.2 emergency planning;
 - 13.1.3 security; and
 - 13.1.4 signage.
 - 13.2 An Urban Park Operational Management Plan must be mindful of the surrounding community and be based on the premise that the urban park is for use by all the citizens of Cape Town. This Plan must include, amongst other things:
 - 13.2.1 a permitting system to accommodate the various sporting codes and other uses (such as informal trading) which must facilitate participation by the broader Cape Town community through, amongst other things, reasonable fee structures;
 - 13.2.2 a maintenance and operational plan for the general use areas of the urban park, including the landscaped areas and pedestrian and cycle tracks;

- 13.2.3 a maintenance plan for the playing fields and associated facilities; and
- 13.2.4 security and access control measures.
- 13.3 An Integrated Waste and Litter Management Plan, which includes efficient litter collection.
- 13.4 A Water and Energy Demand and Efficiency Management Plan.
- 14. The following further matters, amongst others, must be addressed in the Stadium and Urban Park Operating Agreement:
 - 14.1 The stadium and urban park must be managed as an integrated whole.
 - 14.2 The costs of implementing the Stadium Operational Management Plan and the Urban Park Operational Management Plan must be borne by the Operator.
- 15. The Operator must compile and submit to the applicant for approval an acceptable Environmental Management System ('EMS') for the stadium and urban park. The EMS must, amongst other things:
 - 15.1 incorporate the conditions of authorisation contained in this Record of Decision which apply to the operational phase of the project, and
 - 15.2 be based on the best practice approach for such systems and must include all the components that are typical of an EMS, including an environmental policy, auditing, environmental training and monitoring.
- 16. The applicant itself may be the Operator, in which event the applicant must comply with conditions 13, 14 and 15 above and it must submit all the plans and the EMS described therein to the Provincial Minister for approval prior to the operation of the stadium.
- 17. The applicant shall be responsible for ensuring compliance with the conditions contained in this Record of Decision by any person acting on his behalf, including but not limited to, the Operator, an agent, employee or any person rendering a service to the applicant in respect of the activity, including but not limited to contractors and consultants.
- 18. The applicant must notify the Department and any other relevant authority, in writing, within 24 hours of it becoming aware that any condition of this authorisation has not been complied with or is not being complied with.
- 19. The applicant shall allow officials of the Department access to all of the properties referred to in Par A of this Record of Decision at all reasonable times for the purpose of assessing and/or monitoring compliance with the conditions contained in this Record of Decision.

G. RECOMMENDATIONS:

I make the following recommendations, which the applicant must seriously consider:

- adherence to FIFA's Green Goal Principles;
- the recovery and re-use of as much material as possible during the demolition of the existing stadium structure (particularly bricks, rubble, wood, metal and re-usable products such as the seating which could be retained for other stadia);
- the use of recycled materials in construction (e.g. in the foundations and in plastic products);
- an investigation, in consultation with provincial and national Governments, of the possibility of using renewable energy sources in the stadium precinct and the urban park;

- the establishment of a consultative forum, which includes representatives of the Green Point, Granger Bay and Mouille Point communities and the broader Cape Town community, for the operation of the stadium and the urban park;
- the accommodation of all existing sporting codes on the Green Point Common, if practically possible;
- the rehabilitation of Fort Wynyard and the Green Point Track through appropriate conservation interventions;
- the formulation by a suitable heritage specialist of Conservation Management and Interpretation Plans for the heritage resources in the immediate vicinity of the stadium, including guidelines for alterations, additions, repairs and maintenance;
- the undertaking of a wind study once the final design information for the stadium is available;
- preference should be given to locals when meeting direct labour requirements, sub-contracting and buying goods and services;
- the applicant should proactively consider ways in which FIFA's requirements can be met while maximising opportunities for local businesses. The experience of other host cities should be instructive in this regard; and
- ISO14001 should be used as a guide for the EMS.

H. KEY FACTORS AFFECTING MY DECISION:

Planning Context

The proposed stadium and urban park development is generally in line with the applicable structure plan and similar planning policy documents, including the Green Point Development Framework (1998) ('GPDF'). The GPDF includes as a priority the reinforcement of the Green Point Common as a public amenity of metropolitan importance. To realise this vision the policy emphasises the importance of maintaining public/social space offering relief to inner city inhabitants and supports the need for the Green Point Common to accommodate sporting facilities of an international status as well as local facilities meeting metropolitan and local sport and recreational needs. The GPDF suggests that a range of high order facilities can be strategically located as gateway elements within the Green Point Common area. The applicant's Municipal Council approved a deviation from the GPDF on 7 December 2006 'in order to establish the Multi-purpose Stadium and ancillary/incidental uses, together with electrical services infrastructure'. This does not alter the vision for the Green Point Common described in Chapter 7 of the GPDF. The extent of the deviation is that a portion of the golf course currently demarcated as private sport use, and a portion of the area currently demarcated for the stadium market, will now be used for the new stadium and ancillary uses.

A focus of the GPDF is the integration of the Green Point Common area within the inner city and the reinforcement of linkages between the Common and the inner city, Atlantic Seaboard and Waterfront through an improved pedestrian and cycling network. To achieve this, the policy document suggests that a range of high order facilities can be strategically located as gateway elements within the Green Point Common area. The proposed development has been evaluated within this broader metropolitan context, cognisant of the vision for the area.

The opportunity this proposal presents is the realisation of the Green Point Common as a public amenity, which has metropolitan significance. The benefits of this amenity to the broader public outweigh any potential negative environmental impacts that could be experienced by the immediate community of Green Point.

Economic Impacts

An Economic Impact Assessment was conducted for the proposed stadium and associated infrastructure. The study notes that from a national perspective, a new 68 000 seat stadium in Cape Town is not a necessity for the country to host the 2010 Soccer World Cup and would raise the already high opportunity costs of 2010. The Economic Impact Assessment concludes that if adequate funding is forthcoming from the National Government and there is no consequential reduction in future funding from the National Government, the positive economic impacts of the development for Cape Town will be highly significant. The improved local amenity associated with the project should exceed any potential increases in local negative impacts (such as noise, visual and traffic impacts) beyond those associated with the existing Green Point Stadium and facilities. In the long term the construction of the stadium and urban park will in fact have a positive impact on local property values with low to medium significance.

The applicant has requested that the National Treasury fund R2 billion of the currently estimated cost of about R2,49 billion (plus VAT). Given the enormous sums of money involved and the requirements of legislation like the Local Government: Municipal Finance Management Act 56 of 2003, there is no doubt that the applicant will not conclude the construction contract for the stadium (let alone commence construction pursuant thereto) until it is satisfied that the requisite outside funding (particularly that from the National Treasury) will be forthcoming and the contractor can be paid for the work done under the contract.

The opportunity the proposed development presents in terms of attracting added tourism expenditure in Cape Town post 2010 and increasing civic pride cannot be ignored. Stadium construction at Green Point will result in a highly significant stimulus to a variety of sub-sectors, the benefits of which would be felt in the whole of Cape Town and to a lesser degree throughout the province.

Heritage Impacts

From an archaeological point of view, the site of the new stadium is not considered to be sensitive as no evidence of burials or skeletal remains were found during trial excavations. The geological conditions on the site are also not favourable for use as burial grounds and therefore it is unlikely that burial areas extend to the Green Point Common. Some Stone Age shell middens are likely to occur along Beach Road near Fort Wynyard. The general lack of archaeological material probably relates to the fact that the Green Point Common has largely remained an undeveloped, open public space over time.

A Heritage Impact Assessment ('HIA') was conducted and it was found that the development of the stadium on the golf course site would result in a moderate positive heritage impact. The heritage specialist concluded that the historical recreational role of the Green Point Common will be reinforced by the proposed stadium development. There will be a progression from the Green Point Common being one of the first sporting areas in Cape Town to a site containing a facility of broader national and international significance, thus contributing positively to the historic layering of the Green Point Common.

The development of the stadium on the golf course site presents opportunities for the preservation and celebration of historic and cultural activities through linkages to surrounding heritage resources such as Fort Wynyard, Somerset Hospital and the Green Point Track. The position of the stadium on the golf course further provides a better opportunity for the possible accommodation of the existing sporting codes, as well as for the rationalization of land and resources and the retention of distinctive boundaries between green and built forms.

The Granger Bay Boulevard will pass through a historically significant area, which includes the Green Point Track, a historically important site which has served as a social facility for previously marginalised communities with links to Bo-Kaap and the former District Six. The Track itself will not be affected because of the curved alignment of the road, although it will sever the B and C fields from the track.

From a heritage and cultural perspective the proposed siting of the stadium on the golf course site and the urban park are seen to have a medium-high positive impact. They will create opportunities for more effective use of the Green Point Common. The built component will be concentrated on the eastern edge of the Green Point Common. Fewer sporting codes will be directly impacted by the new stadium. More space will be available for the reorganisation of the existing sporting codes and additional open space for other recreational activities.

The original proposed electricity supply cable route from the Foreshore via the city centre was identified as having a high anticipated heritage impact and is not a favoured route alternative in terms of associated archaeological impacts. An alternative cable route that will follow the foreshore freeways, and then run via the Waterfront area before crossing over to the Green Point Common via Western Boulevard, has therefore been selected.

The implementation of mitigation measures included as conditions in this Record of Decision will ensure that the impact of the proposed development on the cultural landscape is acceptable.

Noise Impacts

A noise specialist study was undertaken for the proposed stadium development. This study was reviewed by an acoustic design specialist with international stadium experience. According to the noise specialists, the impact of noise due to the events that will occur at both stadium alternatives will be a high negative impact. However, with appropriate mitigation measures, now stipulated in this Record of Decision, the noise impact could be reduced to medium negative.

Anticipated noise impacts associated with concerts are of particular concern. The stadium and urban park operator will however implement an Event Management Plan that will, amongst other things, address the management of noise levels. Overall, through the use of technologically advanced sound systems, the incorporation of a partially closed roof and acoustically sensitive stadium design, and the management of noise levels during events, it is anticipated that the surrounding community will not be worse off than at present.

Visual Impacts

A Visual Impact Assessment ('VIA') was conducted for the proposal. The VIA concluded that both site alternatives will have a negative visual impact of high significance. However, it was found that the visual impact of the stadium on the golf course site will be lower and affect fewer people directly than if placed on the existing stadium site. The position of the stadium on the golf course site reduces the severance of the Green Point Common and creates the potential to unify the whole area. By locating the proposed stadium on the golf course site, the proposed development will be experienced as an extension of the existing development to the east of the Green Point Common and not as an intrusion into the Green Point Common. Given the existing and future planned bulk of development within the Somerset Hospital precincts and along the Granger Bay Boulevard, the stadium on the golf course site will be less perceived as introducing a new development into the area.

The height of the stadium will not exceed 50 m above natural ground level, while the height of the podium will not exceed 9 m above natural ground level. The treatment of the façade, through the incorporation of a continuous outer skin, will enhance the aesthetics of the stadium.

The redevelopment of the Green Point Common into an urban park will have a positive visual impact on the surrounding area.

The overall significance of the visual impact of Granger Bay Boulevard is expected to be medium during the construction phase and low thereafter.

It is anticipated that the completed electrical upgrade will not result in any significant visual impacts.

Transport

A Transport Impact Assessment was conducted for the proposed stadium development and various transport scenarios considered for the tournament and the post 2010 situation.

The construction of a new stadium will result in substantial improvement of pedestrian and cycle facilities in the vicinity of Green Point which is considered positive.

Through the provision of permanent parking bays in the stadium precinct for at least 2 000 vehicles, the parking situation at Green Point will improve from the current situation. For specific events temporary parking for a further 3 000 vehicles will be provided on the Green Point Common.

The construction of the stadium will be an impetus for the upgrading of public transport in the vicinity such as the re-instatement of the planned Inner City Bus Distribution System. Private vehicle accessibility into the precinct will improve as well as internal circulation within the precinct.

As regards the management of transport during events, this Record of Decision requires a Generic Event Management Plan catering for the various event scenarios. This plan must be mindful of the surrounding community. One of its elements must be a Transport Management Plan which must address, amongst other things, public and private transport, parking, access control and a public awareness and notification strategy. These plans will therefore facilitate the management during events of traffic into and around Green Point and will also provide for satellite parking locations with dedicated routes used to transport spectators to and from these parking areas. In this way the negative impact on the surrounding residents and businesses of the increased activity at the new stadium, will be managed and mitigated.

Although the stadium will bring more traffic to the area during events, no significant impacts on traffic safety are anticipated due to the fact that the proposed improvements to the road and pedestrian/cycle infrastructure will counter these impacts.

The development of Granger Bay Boulevard is not only necessary for the stadium, but will also planned future developments at the V&A Waterfront and in the Somerset Hospital precinct.

Services

Apart from the implementation of the electrical infrastructure upgrades authorised in this Record of Decision, the necessary linkages to the municipal services infrastructure are available and the applicant has confirmed that there is sufficient capacity to service the development.

Social impacts

A Social Impact Assessment was conducted for the proposed stadium development. A large number of concerns were raised by mainly local residents of Green Point and immediate surrounds. Key concerns raised related to the impact the stadium and stadium precinct would have on the loss of public recreational open space, the displacement of existing sporting codes and loss of facilities, the reduction in space available for sporting codes on the Green Point Common and the precedent for future commercial development on the Green Point Common. The Social Impact Assessment says that the preferred option for a new stadium on the Green Point Common is on the existing stadium site.

However, more sporting fields will be affected by the placement of the stadium on the existing stadium site and the opportunity to have more space available to include other activities other than formal sports will be lost. Local impacts such as visual and heritage impacts will also be less if the stadium is placed on the golf course site. Where possible, existing sporting codes and other uses will be accommodated during the redevelopment of the Green Point Common, with the Metropolitan Golf Course, athletics track and informal trading uses possibly being accommodated on the Green Point Common.

The implementation of the Stadium and Urban Park Operating Agreement and Urban Park Operational Management Plan required by this Record of Decision will result in a better management dispensation for the Green Point Common (including the sporting codes) than that at present. The increased regional amenity value of the stadium and urban park will outweigh any negative impacts for any particular sporting codes. The quality of the recreational space will be enhanced.

The development will not set a precedent for future commercial development of the Green Point Common.

The creation of a stadium that is a multi-purpose venue for functions and matches will also be enhanced by the development of a safe and accessible urban park on the Green Point Common.

Concerns around construction related impacts that were raised in the assessment can and will be managed through the implementation of a construction phase Environmental Management Plan required by this Record of Decision.

Alternatives

Based on FIFA's requirements for a stadium for an opening match, a semi-final match and a final match – namely that the stadium must have a minimum spectator capacity of 60 000, excluding seating for the media and VIP's, and a total capacity, including VIP's and media, 65 000 – the City of Cape Town considered two sites for the placement of the proposed Green Point Stadium: the existing Green Point Stadium site and a site on the southern portion of the Metropolitan Golf Course. The 'No Go' option was also considered and served as a baseline against which the other alternatives were evaluated. The 'No Go' option is the situation where no stadium is built at Green Point or anywhere else in Cape Town. The implication of this alternative is that no semi-final venue will be available for the 2010 FIFA World Cup tournament in Cape Town.

The 'No Go' option was not invoked because none of the adverse impacts of the proposed development was so significant that no stadium of this sort should be constructed on the Green Point Common. In addition, the benefits of the new stadium and urban park for the broader community of Cape Town outweigh the negative environmental impacts on the local community in the surrounding areas.

Although many of the stakeholders who commented on the proposal are in favour of the new stadium being positioned on the existing stadium site, the golf course site alternative is the preferred alternative because it will result in, amongst other things:

- an overall lower visual impact;
- a higher positive response to heritage indicators;
- a lower severance impact on the landscape with the built component being concentrated on the eastern edge of the Green Point Common;
- less sporting codes being directly impacted by the new stadium; and
- more space being available for the reorganisation of the existing sporting codes and will provide additional open space for recreational activities other than formal sports.

Public Participation

The development received wide media coverage and the public participation process followed included:

Media Notices

The public were notified of the proposal, invited to an Open House Day and invited to register as Interested and Affected Parties ("I&APs") through notices in the following papers: *Sunday Times* on 2 April 2006, *Die Burger* on 29 March 2006, *Cape Argus* on 29 March 2006, *Cape Times* on 29 March 2006, and *Atlantic Sun* on 30 March 2006.

The public were informed of a second public meeting and the availability of the draft Environmental Impact Report through notices in the following papers: *Die Burger* on 21 July 2006, *Cape Argus* on 21 July 2006, and *Cape Times* on 21 July 2006.

Background Information Document and Information Sheets

Background Information Documents ('BIDs') which included an invitation to the Open House Day were distributed on 30 March 2006 to residential and commercial buildings in Green Point directly abutting the Green Point Common as well as other identified I&APs and those who responded to the advertisements. This was done through mail drops, email and facsimile as well as displaying posters in the foyers of apartment blocks and commercial stores surrounding the Green Point Common.

Registered I&APs were also given information sheets and afforded the opportunity to comment on the documents at the draft Scoping Report stage on 25 April 2006 and the draft EIR stage on 21 July 2006.

A letter as well as an email was distributed on 22 September 2006 informing registered I&APs that the final EIR was available for comment.

All information sheets and documents were also made available on The Environmental Partnership's website.

Public libraries

The draft Scoping Report was made available at the Cape Town, Sea Point, Camps Bay, Athlone and Claremont public libraries.

The draft EIR and final EIR were made available at the Cape Town, Sea Point, Camps Bay, Claremont, Athlone, Strand (in the case of the draft EIR), Bellville, Atlantis, Mitchell's Plain and Somerset West (in the case of the Final EIR) public libraries.

Public Meetings and Focus Group Meetings

Two public meetings were held. The first public meeting was held on 11 April 2006 at the Hamilton's Rugby Club. The findings of the draft EIR were presented at a second public meeting held on 7 August 2006 at the Sea Point Civic Centre.

Two Focus Group meetings were held. The first meeting was held on 15 May 2006 with the Mouille Point Residents and Ratepayers Association and the Green Point Common Coalition. The second meeting was held on 23 May 2006 with the Oasis United Cricket Club and Schotse Kloof Cricket Club.

Comments received

A large number of comments were received from I&APs throughout the process. The majority of comments were concerns related to the stadium being built at Green Point. Comments centred around, amongst other things, the following issues:

- Financial implications
- Traffic, transport and access
- Parking
- Noise Impact
- Visual Impact
- Urban Park
- Existing sports facilities
- Impact on the bio-physical environment
- Crime
- Comments on the two Common alternative sites
- Construction-phase impacts
- Alternative sites
- Impact on property values
- EIA process
- Stadium site selection process
- Legal and policy issues
- Socio-economic comments
- Sustainability of the proposed stadium
- Vagrants
- Safety and security
- Tourism comments
- Pollution increase
- Comments on existing services
- Rezoning and title deeds

- Granger Bay Boulevard
- Leases
- Specialist studies
- Urban Park

All the above issues were addressed during the process and as a result specific mitigatory measures and conditions of approval have been included in this Record of Decision.

I. DURATION AND DATE OF EXPIRY:

This authorisation shall lapse if the activity does not commence within **three (3)** years of the date of issue of this authorisation.

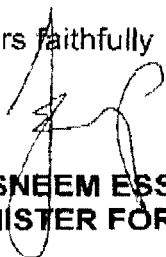
J. GENERAL:

If any condition imposed in terms of this authorisation is not being complied with, the authorisation may be withdrawn after 30 days written notice to the applicant in terms of section 22(4) of the ECA. Failure to comply with any of these conditions is also an offence and may be dealt with in terms of sections 29, 30 and 31 of the ECA as well as any other appropriate legal mechanisms.

The Western Cape Provincial Government or any of its organs appointed in terms of the conditions of the authorisation in this Record of Decision or any other public authority or organisation referred to therein shall not be held responsible for any damage or losses suffered by the applicant, developer or their successors in title for anything done in good faith pursuant to this authorisation or such conditions, including where construction or any operations subsequent to construction are temporarily or permanently stopped for reasons of non-compliance by the applicant, developer or their successors in title in title with the conditions of the authorisation in this Record of Decision or any other subsequent document emanating from this Record of Decision.

Your interest in the future of our environment is greatly appreciated.

Yours faithfully



**TASNEEM ESSOP
MINISTER FOR ENVIRONMENT, PLANNING AND ECONOMIC DEVELOPMENT**

DATE OF DECISION: 5.01.07

Copies to: (1) Ms C. du Toit (The Environmental Partnership)
(2) Mr D. Hugo (City of Cape Town)

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Mr Marius Taljaard
The Department of Public Works
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PER FACSIMILE / MAIL

Dear Sir,

ENVIRONMENTAL AUTHORISATION: PROPOSED CONSTRUCTION OF THE SOUTH AFRICAN NAVY'S SUBMARINE ESCAPE TRAINING SIMULATOR, SIMONSTOWN: WESTERN CAPE PROVINCE

With reference to the abovementioned application, please be advised that the Department has decided to grant authorisation. The environmental authorisation and reasons for the decision are attached herewith.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2006, you are instructed to notify all registered interested and affected parties, in writing and within 10 (Ten) calendar days of the date of this letter, of the Department's decision in respect of your application as well as the provisions regarding the making of appeals that are provided for in the regulations.

Your attention is drawn to Chapter 7 of the Regulations which regulate the appeals procedure. Attached please find a simplified table of the appeals procedure to be followed. Kindly include a copy of this procedure with the letter of notification to interested and affected parties.

A copy of the official appeal form can be obtained from:

Mr PKM Retief, Appeals Administrator, Tel: 012 310 3705, pretief@deat.gov.za ; or

Mr H Grové, Appeals Administrator, Tel: 012 310 3070, hgrove@deat.gov.za, at the Department.

Any party wishing to appeal any aspect of the decision must, *inter alia*, lodge a notice of intention to appeal with the Minister, within 10 days of receiving notice of the decision, by means of one of the following methods:

By facsimile: (012) 310-7561;
By post: Private Bag X447, Pretoria, 0001; or
By hand: 2nd Floor, Fedsure Form Building, North Tower, cor. Van der Walt and Pretorius Streets, Pretoria.

Should the applicant decide to appeal, the applicant must serve a copy of its notice of intention to appeal on all registered I&AP's as well as a notice indicating where, and for what period, the appeal submission will be available for inspection.

Please include the Department, attention of the Director: Environmental Impact Evaluation, in the list of I&AP's, notified through your notification letter of the decision, for record purposes.

The authorised activity/activities may not commence within thirty (30) days of the date of signature of the authorisation. Please further note that the Minister may, on receipt of appeals against the authorisations or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours faithfully



Ms Nosipho Ngcaba

Director – General

Department of Environmental Affairs and Tourism

Letter signed by: Ms Lize McCourt

Designation: Chief Director: Environmental Impact Management

Date: 10/11/2008

Cc:

**Mr M Pillay
Mr P Retief**

**Ninham Shands
DEAT**

Fax: (021) 433-1334



environment & tourism

Department:
Environmental Affairs and Tourism
REPUBLIC OF SOUTH AFRICA

Environmental Authorisation

Authorisation register number:	12/12/20/1222
Last amended:	
Holder of authorisation:	<i>Department of Public Works</i>
Location of activity:	<i>South African Naval Base, Simonstown, City of Cape Town Metropolitan Municipality, Cape Town: Western Cape</i>

[Signature]
10/11/2008

Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this environmental authorisation, that the applicant should be authorised to undertake the activity specified below.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2006 the Department hereby authorises –

The Department of Public Works:

with the following contact details –

Mr Marius Taljaard
Private bag X9027
CAPE TOWN
8000

Tel: (021) 402-2292

Fax: (021) 425-4714

to undertake the following activity/ activities (hereafter referred to as "the activity")

GN. No. 386

Activity Number 2

Construction or earth moving activities in the sea or within 100 metres inland of the highwater mark of the sea, in respect of –

- (a) facilities for the storage of material and the maintenance of vessels;*
- (b) fixed or floating jetties and slipways;*



10/11/2005

- (c) tidal pools;
- (d) embankments;
- (e) stabilising walls;
- (f) buildings; or
- (g) infrastructure.

- 6 *The excavation, moving, removal, depositing or compacting of soil, sand, rock or rubble covering an area exceeding 10 square metres in the sea or within a distance of 100 metres inland of the high-water mark of the sea*

for the construction of a submarine escape training simulator. The proposed simulator will consist of a three storey building, a tower protruding from the centre, an elevator, offices, briefing rooms, locker and change rooms and ablution facilities.

The physical size of the activity is approximately 332m², while the servitude needed for the activity is approximately 500m². The total height of the structure is approximately 26m (this is about 6m higher than the existing training tank on site at the dive school). Approximately 640m³ of potable water will be required to fill the training tank to conduct the training exercise. The water is in a closed cycle of being treated and disinfected and then re-used in the tank. Due to anticipated losses and required "topping up" experienced during training it is expected that the facility will need approximately one full tank of water (640m³) about every three years of operation. No additional water will be required, as described in the Basic Assessment Report (BAR) submitted to this Department in August 2008,

which fall within the jurisdiction of the *City of Cape Town Metropolitan Municipality*, hereafter referred to as "the property".

The granting of this environmental authorisation is subject to the conditions set out below.



10/11/2008

Conditions

Scope of authorisation

- 1.1 Authorisation of the activity is subject to the conditions contained in this authorisation, which conditions form part of the environmental authorisation and are binding on the holder of the authorisation.
- 1.2 The holder of the authorisation shall be responsible for ensuring compliance with the conditions by any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the holder of the authorisation.
- 1.3 The activity authorised may only be carried out at the property indicated above.
- 1.4 Authorisation is granted for Alternative 1, as describe in the BAR, dated August 2008.
- 1.5 Any changes to, or deviations from, the project description set in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.
- 1.6 This activity must commence within a period of four (4) years from the date of issue. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

Appeal of authorisation

- 1.7 The holder of the authorisation must notify every registered interested and affected party (IAP), in writing within 10 (Ten) calendar days, of receiving notice of the Department's decision to authorise the activity.
- 1.8 The notification referred to in 1.7 must –
 - 1.8.1 specify the date on which the authorisation was issued;



Handwritten signature and date: 10/11/2008

- 1.8.2 inform the interested and affected party of the appeal procedure provided for in Chapter 7 of the regulations; and
- 1.8.3 advise the interested and affected party that a copy of the authorisation will be furnished on request, and
- 1.8.4 give the reasons for the decision.

Management of the activity

- 1.9 The Construction Environmental Management Plan ("CEMP") Appendix J in the BAR, dated August 2008 is approved by the Department.
- 1.10 The CEMP must be submitted to this Department two weeks before the project becomes operational.
- 1.11 The EMP will be seen as a dynamic document. However, any changes to the EMP must be submitted to the authorities for approval before such changes could be effected.

Monitoring

- 1.12 The applicant must appoint a responsible person that will act as an Environmental Control Officer (ECO) that will have the responsibility of implementing the approved EMP.
 - The ECO shall be appointed before the start of construction and the authorities must be notified of such an appointment for communication purposes.
 - The ECO shall submit a quarterly environmental compliance report, in writing, to The Director: Environmental Impact Evaluation and copy the Applicant with such report. This report shall include a description of all activities on site, problems identified, transgressions noted and remedial action implemented. The report must reflect the DEAT reference number of the project on the cover page.
 - The ECO shall maintain the following on site:
 - A site diary


10/11/2008

- Copies of all reports submitted to the Department
- A complaints register of all public complaints and the remedies applied to such complaints
- The ECO shall remain employed until all rehabilitation measures as well as site clean-up are completed and the site is handed over to the Department of Public Works by the contractor for operation.

Recording and reporting to the Department

1.13 The holder of the authorisation must submit an environmental compliance audit report to the Department upon completion of the construction and rehabilitation activities. The environmental audit report must include –

1.12.1 The date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the Environmental Authorisation conditions as well as the requirements of the EMP.

1.12.2 Records relating to compliance monitoring must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

1.12.3 Detail of the rehabilitation measures of the site that must be compiled by an Independent Environmental Auditor.

1.12.4 Detail of all incidents and mitigation measures implemented to address such incidents.

1.12.5 Any measure that require follow-up.

Commencement of the activity

1.13 The authorised activity / activities may not commence within thirty (30) days of the date of signature of the authorisation.

1.14 Should you be notified by the minister of a suspension of the authorisation pending appeal procedures, you may not commence with the activity / activities unless authorised by the minister in writing.



10/11/2005

Notification to authorities

- 1.15 Fourteen (14) days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence. This notification period may coincide with the period contemplated in 1.13.
- 1.16 Fourteen (14) days written notice must be given to the Department that the operational phase of the activity will commence.

Operation of the activity

- 1.17 Fourteen (14) days written notice must be given to the Department that the activity's operational phase will commence.

Site closure and decommissioning

- 1.18 Should the use of the facilities installed as part of this authorisation ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

Specific conditions

- 1.19 Waste collection bins must be supplied, and where such is not available then all solid waste collected must be disposed at a registered waste dump in accordance with the refuse collection and disposal requirements of the relevant municipality.
- 1.20 No contamination of the sea is allowed during the construction phase or the operation phase. Spills must immediately be reported at Marine and Coastal Management.
- 1.21 Storage of waste on site is not allowed without the consent from the land owner or permit from Department of Water Affairs and Forestry (DWAF).
- 1.22 No fires are allowed on the construction site to avoid the risk of fire.



- 1.23 Should any heritage remains be exposed, these must immediately be reported to Heritage Western Cape (In terms of the National Heritage Resource Act, 1999 (Act No. 25 of 1999). Heritage remains uncovered or disturbed during earthworks must not be disturbed further until the necessary approval has been obtained from Heritage Western Cape.
- 1.24 If any archaeological remains (including but not limited to fossil bones and fossils, coins, indigenous and / or colonial ceramics, any articles of value or antiquity, marine shells heaps, stone artefacts and bone remain, structures and other built features, rock art and rock engravings) are discovered during the construction they must immediately be reported to Heritage Western Cape and must not be disturbed further until the necessary approval has been obtained from Heritage Western Cape.
- 1.25 If any pollution occurs during the construction and operational phase, it is the duty of the ECO to immediately report the incident to Marine and Coastal management.
- 1.26 This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.
- 1.26.1 Relevant legislation that must be complied with by the holder of this authorisation include but is not limited to:
- Compliance with the requirements of Section 38 (1) and (7) of the National Heritage Resources Act, Act 25 of 1999, including the comments and recommendations of the relevant heritage resources authority responsible for the area in which the development is proposed.
 - Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).
 - Compliance with the requirements of the National Water Act (Act 36 of 1998).
 - Relevant local authority bylaws and regulations.
- 1.27 Non compliance must be reported immediately to the Director: Environmental Impact Evaluation of the National Department of Environmental Affairs and Tourism.



10/11/2006

General

- 1.28 A copy of this authorisation must be kept at the site office where the activity will be undertaken. The authorisation must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.
- 1.29 Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/ or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.
- 1.30 The holder of the authorisation must notify the Department, in writing and within 48 (forty eight) hours, if any condition of this authorisation cannot be or is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance. Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the regulations.
- 1.31 National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the applicant with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

Date of environmental authorisation: 10 November 2008



Ms Nosipho Ngcaba

Director – General

Department of Environmental Affairs and Tourism

Letter signed by: Ms. Lize McCourt

Designation: Chief Director: Environmental Impact Management

Annexure 1: Reasons for Decision

1. Background

The applicant, the Department of Public Works, applied for authorisation to carry out the following activities –

GN. No. 386

Activity Number 2 Construction or earth moving activities in the sea or within 100 metres inland of the highwater mark of the sea, in respect of –

- (a) facilities for the storage of material and the maintenance of vessels;*
- (b) fixed or floating jetties and slipways;*
- (c) tidal pools;*
- (d) embankments;*
- (e) stabilising walls;*
- (f) buildings; or*
- (g) infrastructure.*

- 6 *The excavation, moving, removal, depositing or compacting of soil, sand, rock or rubble covering an area exceeding 10 square metres in the sea or within a distance of 100 metres inland of the high-water mark of the sea*

for the construction of a submarine escape training simulator. The proposed simulator will consist of the following:

- A three storey building;
- A tower protruding from the centre;
- Elevator;
- Offices;
- Briefing rooms;



Handwritten signature and date: 16/11/2008

- Locker and change rooms and;
- Ablution facilities.

The physical size of the activity is approximately 332m², while the servitude needed for the activity is approximately 500m². The total height of the structure is approximately 26m (this is about 6m higher than the existing training tank on site at the dive school). Approximately 640m³ of potable water will be required to fill the training tank to conduct the training exercise. The water is in a closed cycle of being treated and disinfected and then re-used in the tank. Due to anticipated losses and required "topping up" experienced during training it is expected that the facility will need approximately one full tank of water (640m³) about every three years of operation. No additional water will be required, as described in the Basic Assessment Report (BAR) submitted to this Department in August 2008,

The applicant appointed Ninham Shand Environmental Services to undertake an EIA process and to compile a BAR as required by regulation R. 385.

2. Information considered in making the decision

In reaching its decision, the Department took, *inter alia*, the following into consideration -

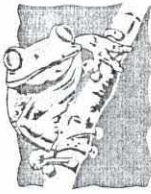
- a) The information contained in the BAR submitted to the Department in August 2008;
- b) Recommendations and mitigation measures as it is describe in the specialists reports;
- c) Comments from Simon's Town Historical Society, dated 26 May 2008.
- d) Comments received for DEA:DP
- e) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

3. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below:



10/11/2008



Ecosense

Consulting Environmentalists/Ecologists
Konsulerende Omgewingskundiges/Ekoloë
Abaqakamshelwayo ngezendalo

Memorandum

To: Ebrahim Mohammed

From: Anna Bussell

Date: 25 September 2008

Re: Cement Contamination

Pages: 2

CC: Hannelie du Plessis (MPOA)
Pat Titmuss (CoCT: EO)
Michael Bester (ACG)

Dear Ebrahim

As a result of not adhering to repeated requests from the ESM to establish a wash-out area / impermeable sump on the construction site; cement mixers and other cement related machinery are washing equipment on unprotected surfaces within the construction site resulting in pollution of the surrounding environment.

It was specifically requested on 03-09-8 and again 16-09-08 and 23-09-08 that a suitable wash-out area / impermeable sump be established on the construction site (space is available along the western boundary).

As per page 32 of the Construction Phase Environmental Management Plan (CEMP) for the site:

Where the Contractor inflicts non-repairable damage upon the environment *or fails to comply with any of the environmental specifications*, he shall be liable to pay a penalty fine over and above any other contractual consequence.

The contractor is deemed NOT to have complied with this requirement and relevant specifications in that cement and cement run-off are not confined to an impermeable sump, resulting in pollution of the surrounding environment.

It is on these grounds that a penalty recommendation to the amount of **R1 000** be imposed (spot fines of between R20 and R2 000, shall be imposed by the Engineer on the Contractor for contraventions of the environmental specifications by individuals or operators employed by the Contractor and/or his subcontractors), which will be invoiced by the Big Bay Master Property Owners Association, to be used around Big Bay for future management.

- (a) The proposed activity will address the need for the training of personnel for emergency escape procedure if the submarine is submerged.
- (b) The project will not severely or significantly impact negatively on the environment.
- (c) Sufficient public participation process was conducted and the consultant has met the minimum requirements as prescribed in the EIA regulations, GN. No. 385 of 21 April 2006 for public involvement.

4. Findings

After consideration of the information and factors listed above, the Department made the following findings –

- The environmental issues were adequately addressed.
- The information contained in the BAR was relevant and credible in order to make a decision.
- The applicant has satisfied the minimum requirements as prescribed in the EIA regulations of 21 April 2006.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be mitigated to acceptable levels. The application is accordingly granted.



10/11/2008

Please ensure that all cement spills and cement run-off on and around the construction site are removed / cleaned up and placed in rubble skips. A wash-out area / impermeable sump to be established along the western boundary, and to be emptied / cleaned on a regular basis. Asrin need to submit an updated method statement for cement handling as requested in the environmental report for the month of September a.s.a.p.

Kind regards

Anna Bussell
Ecosense cc



Mobile cement mixers being washed on exposed ground, no sump / washout area established. Dry cement run-off to be removed and a proper washout area lined with plastic to be established. Sump will need to be cleaned on a weekly basis.



Ecosense

Consulting Environmentalist / Ecologists
Konsultierende Omgewingskundiges / Ekoloë
Abaqokomhchwayo ngezendalo

DRAFT CLOSURE CHECKLIST AND COMPLIANCE REVIEW

BIG BAY PRECINCT 2.1 (EDEN ON THE BAY) ERF 801	ESM: Date:	M. Sasman, on-site work: A. Viljoen 19/06/2009
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Issue	Item	Compliance			Comments
		Y	N	Partial	
All temporary site facilities removed	Temporary toilets		x		Temporarily stored on precinct 2.2, without permission
	Site area temporary fencing	x			Temporary fence have been removed off site.
	Site containers/offices	x			All caravans have been removed - the surrounding area still need to be cleaned
	Equipment and plant		x		All excess materials and equipment to be removed from precinct 2.2 into a unit within Eden on the Bay.
Waste Removed	Excess materials		x		
	All wastes removed from site, final litter collection and cleanup undertaken		x		Waste skip to be removed from Precinct 2.2 and also of POS. Litter to be collected and removed from site
Rehabilitation undertaken	All oil/fuel spills remediated		x		Concrete and oil spillages on public roads to be cleaned and treated
	Any chemical spillages/pollution mopped up		N/A		
	Any damage to features outside of the site repaired POS/adjacent landscaping areas rehabilitated		x	x	Damages to western boundary grass area and irrigation need to be reinstated In progress
Material storage and handling	Storage of cement/other materials and general waste e.g. packaging/cement bags secure and controlled against wind dispersal		x		General waste and empty cement bags were noted outside the refuse area on occasions due to the waste skip not always covered with shade cloth and waste cage occasionally overflowing.
	Material stockpile sites within site and approved by ESM		x		Materials were stockpiled outside site boundaries in POS without any permission or permits
Hazardous substances	No paints disposed on site	x			
	Effluent containing diesel, petrol, oil, paint or any other noxious substance collected in conservancy tanks and removed off site			x	Several paint spillages occurred over project period due to site staff not following approved paint disposal method statement and washing equipment at water taps
	Any chemical spillages observed or reported		N/A		
Fuel Storage and Handling	Fuels/flammable as per method statement. Store adheres to fire safety requirements e.g. signage	x			
	Adequate supply of oil absorbent material on site at all times to be used in case of fuel spillage	x			
	All reported/observed fuel spills treated			x	Paving spills still to be treated
Workers facilities	Refuelling in designated areas only		x		Diesel bowzers were stored outside site boundaries
	Suitable sanitary facilities provided for all staff on site within reasonable walking distance. Chemical toilets not positioned in areas of running/standing water and secure from wind			x	
Solid waste management	Toilets kept in hygienic condition and emptied on a regular basis. Spillage prevented. Toilet paper provided.			x	ECO had to request on numerous occasion for toilets to be cleaned and emptied on a regular basis.
	Adequate scavenger/weatherproof bins provided			x	Bins were provided at the start of the project, but no bins as time progressed
	Camp cleaned/Bins emptied weekly			x	limited amount of bins on site, waste skip constantly overflowing
	Designated eating area used; bins provided.		x		Labourers were having lunch outside the site boundaries
Camp site	No burying of rubble/debris & no dumping on adjacent sites			x	Dumping on Precinct 2.2 and Waters Edge. Rubble on Precinct 2.2 still to be removed
	Drip trays under machinery when not in use			x	
	Mechanical repairs have drip tray for accidental spills			x	
	Drip trays used in refuelling/servicing activities; emptied regularly		x		
Noise control	No leaking equipment on site			x	
	Noise levels kept to acceptable levels			x	
Dust control	Dust generation minimized on site			x	
Site Demarcation	All contractors staff stay out of areas designated as "no-go" areas			x	Warnings of penalties/ Spot fines issued by ESM
	Buffer areas/prohibited area boundaries fenced at all times		x		Construction site boundaries lacked fencing occasionally near the end of the project
	All construction materials within site boundaries		x		Materials were stockpiled outside site boundaries in POS without any permission or permits. Several penalties were issued
Construction traffic management	Construction vehicles prevent loss of loads due to wind/rain onto public roads			x	Haul trucks occasionally did not cover loads
	Any spills on public roads cleaned immediately by contractor			x	No all fuel spills were treated
	Traffic warning signs maintained; flagman where necessary			x	Flagman was on site but not sufficient
Fire control	No open fires lit anywhere on construction site			x	Penalty were issued
	ESM approved fires only. Supervised at all times; fire extinguisher at hand			x	Fires were noted on site without fire extinguisher approval
Safety and security	Fire extinguisher serviceable and at hand at site office and for 'hot work'	x			Fire extinguisher were located at site office at all times
	Manholes/excavations demarcated with danger tape			x	Not always covered posed a safety hazard
	Safety officer appointed for the site. Report safety matters to s. officer	x			Communication lines between safety officer and ESM sometimes restricted
Community relations	Signage for public e.g. 'construction site - no entry' in place			x	In beginning signage were noted, was removed at a later stage
	Sign board in place	x			
Community relations	No disruption to neighbours			x	disruption were caused by blockage of roads
	Complaints book updated and complaints dealt with timeously			x	

Issue	Item	Compliance			Comments
		Y	N	Partial	
Archaeology	Any archaeological / paleontological artefacts reported	x			No artefacts found or reported to ESM
Flora & Fauna	Animals encountered on site not killed or injured				No animals observed or reported
	Search and rescue undertaken				No research and rescue were required
Storage and maintenance of equipment	No mechanical equipment and work vehicles serviced on site unless approved			x	Vehicles were on occasion serviced in the parking area
Erosion	Appropriate stabilization measures employed to prevent large scale erosion			x	
Stormwater	Litter traps maintained at outfalls		x		All stormwater drains still to be cleaned
Bitumen	Correct storage/use of bitumen				N/A
Concrete batching	Cement effluent from mixer washings and run off from batching areas contained and prevented from contaminating surrounding areas		x		No several penalties were issued
	No concrete mixing on open ground		x		Batching boards were seldom used for concrete mixing. Batching boards/plastic sheet absent in basement
	Empty cement bags stored in a dry bin		x		
Earth shaping	Major earthworks restricted to erf boundaries and closely supervised		x		
Landscaping	Landscaping work complete			x	Landscaping has been reinstated along the western boundary (Irrigation still to be fixed)

Completion Requirements

Carried over. All damages to Precinct 2.2 to be rectified. Damaged landscaping, paving and irrigation to be repaired. Damaged kerbs to be replaced. Stormwater drains to be cleared of sand and rubble. Concrete and oil spillages on roads to be treated. All outstanding penalties to be paid.

General Comments

The pictorial evidence below is carried over - no issues have been dealt with. ECO suggests that site meetings do commence so that issues can be raised and minuted

Environmental Closure Granted:

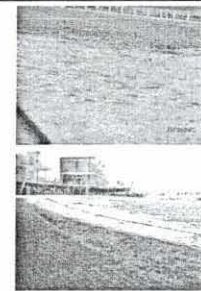
General comments:

Distribution:

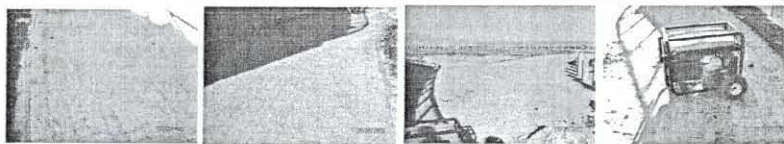
Pictorial Evidence



All damages to fencing, shade netting, footing and sandbags to be replaced. All construction related materials to be removed. Also all litter and food packaging to be collected and removed from Precinct 2.2



Damaged irrigation along the western boundary to be reinstated and sand to be manually removed



Concrete spillages in different areas around Eden on the Bay still to be cleared



Ecosense

Consulting Environmentalist / Ecologists
 Konsultante Omgewingskundiges / Ekoloë
 Abaqanshi/wayo ngazondalo

**ENVIRONMENTAL
 SITE VISIT REPORT**

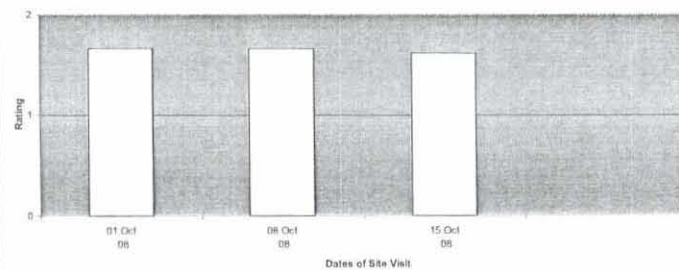
ECO REFERENCE

The frog is an indicator of a healthy environment - Die padda is 'n aanduiding van 'n gesonde omgewing

SITE	LOCATION	PRINCIPAL CONTRACTOR	CONTACT	ECO TEAM
Eden on the Bay	Big Bay	Asrin	Ebrahim Mohammed	1: Anna Bussell
			Geoff Bonzaaier	2: Ane-Mi Viljoen
SITE VISITS	01 October 2008	15 October 2008		
	08 October 2008			

RATING	ISSUES COUNTS	AUDIT RESULT			
		VISITS / AREAS / ZONES	01 Oct 08	08 Oct 08	15 Oct 08
1: Immediate Attention	34	SITE CAMP	2	2	2
2: Intervention Required	17	WASTE MANAGEMENT	1	1	1
3: Adequate	12	WATER	2	2	1
		MATERIAL HANDLING	1	2	1
		ENVIRONMENTAL CONTROL	2	1	2
		ADMINISTRATION	2	2	2
		SITE AVERAGE	2	2	2

Compliancy Rating



Ref	Issues	Comments	Rating per visit		
			01 Oct 08	08 Oct 08	15 Oct 08
1	Fuel/Flammable Substance storage areas	Collapsed rebar fence panels along the southern boundary to the re-erected. Close-off ventilation opening along the northern boundary wall and pedestrian access leading into vacant fenced behind 2.2. MULTIPLE REPEAT.	3	3	3
			1	1	1
			1	1	1
2	Restriction of working areas	Site staff having lunch at vehicles, along retaining walls and at the boardwalk area, leaving lunch litter behind. Lunch breaks to be confined to site boundaries all litter to be collected and disposed of into the general waste skip. MULTIPLE REPEAT.	3	3	3
			2	2	1
			2	2	1
3	Availability of drinking water for employees	Toilets to be serviced regularly (x 2 per week).	2	2	2
			2	2	2
			2	2	2
4	Condition and availability of eating areas for employees	Construction litter and lunch litter need to be collected and placed in bins/bags, waste in basement underneath crane, and the northern boundary and on ground 2.2 to be collected and disposed of in the general waste skip. MULTIPLE REPEAT.	1	1	1
			1	1	1
			1	1	1
5	Sufficient and availability of clean toilets for employees	Brick ties & plastic shrink wrapping to be placed in waste cage along the eastern boundary.	1	1	2
			1	1	2
			1	1	2
6	Reduce Control	Rubble to be removed off site frequently, rubble cannot be stored on verge area need to 02.2. construction activities to be confined to site boundaries. MULTIPLE REPEAT.	1	1	1
			1	1	1
			1	1	1
7	Empty cement bags, brick pallet shrink wrap and strapping	Cement tray-off on ungrouted surfaces (western boundary) and on road along the eastern boundary to be cleaned, slurry / cleaning pit to be established on site. MULTIPLE REPEAT.	1	1	1
			1	1	1
			1	1	1
8	Hazardous waste	Slurry replace behind ditch, pump to be placed inside drums, cover sump with shade netting. REPEAT.	2	2	1
			2	2	1
			2	2	1
9	Bulldozers rubble	Water supply points to be monitored, running water may not be left unattended.	1	1	1
			1	1	1
			1	1	1
10	Prevention of water pollution	Material storage to be confined to site boundaries, all materials need to placed within the site boundaries. MULTIPLE REPEAT.	1	1	1
			1	1	1
			1	1	1
11	Waste water control	Paint effluent noted at water supply point along the eastern boundary and at ramp entrance along the northern boundary, spillages to be cleaned and disposed as hazardous waste. Paint buckets may not be washed on site and need to be cleaned / disposed of off site at painters supply yard.	1	3	1
			1	3	1
			1	3	1
12	Water wastage	Current silos were removed, need to establish sump / washed area and submit final method statement. Potentially recommendations will continue to be issued for cement condensation until a sump / cleaning pit is established on site. MULTIPLE REPEAT.	1	1	1
			1	1	1
			1	1	1
13	Material storage	Erosion control	3	2	3
			3	2	3
			3	2	3
14	Handling of Hazardous substance	Stormwater control	2	1	1
			2	1	1
			2	1	1
15	Handling of Paint Effluent	All stormwater drains need to be covered with lidless catch or slush netting. MULTIPLE REPEAT.	1	1	1
			1	1	1
			1	1	1
16	Handling of cement effluent and cement waste	All roads to be cleaned of sand, debris & construction materials. ONGOING.	2	2	2
			2	2	2
			2	2	2
17	Erosion control	Wind blown sand along Koro boundaries. Koro to be removed, sand to be placed back on the construction site. MULTIPLE REPEAT.	1	1	1
			1	1	1
			1	1	1
18	Stormwater control	Remove construction materials stored in landscaping. ONGOING.	1	1	1
			1	1	1
			1	1	1
19	Cleaning of Public roads	Traffic management plan still outstanding. Final concrete & cement handling method statement to be submitted, draft received. MULTIPLE REPEAT.	1	1	1
			1	1	1
			1	1	1
20	Dust and wind blown sand control	Franki Pile inductions scheduled for 16-10-08.	1	1	1
			1	1	1
			1	1	1
21	Fauna and Flora protection	Employees been inducted	1	1	1
			1	1	1
			1	1	1
22	Method Statements submitted and approved		1	1	1
			1	1	1
			1	1	1
23	Employees been inducted		1	1	1
			1	1	1
			1	1	1