

**PRE- CONSTRUCTION AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT
PROGRAMME (EMP)**

FOR

**THE PROPOSED EXTENSION OF THE 0.7 ≈1 KM INGONYAMA LINK ROAD AND THE
ASSOCIATED 60M BRIDGE CROSSING IN DIEPSLOOT WITHIN THE CITY OF
JOHANNESBURG METROPOLITAN MUNICIPALITY (COJ), GAUTENG**

For submission to:

GAUTENG DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT (GDARD)



Prepared for:
Johannesburg Development Agency
PO Box 61877
Marshalltown
2107
Tel: 011 688 7851
Fax: 011 688 7899

Prepared by:
Strategic Environmental Focus (Pty) Ltd
P.O. Box 74785
Lynnwood Ridge
0040
Tel. No.: (012) 349-1307
Fax. No.: (012) 349-1229



Date: November 2013

SEF Ref No. 505220

GDARD Ref No: GAUT 002/13-14/E0116

COPYRIGHT WARNING

Copyright in all text and other matter, including the manner of presentation, is the exclusive property of the author. It is a criminal offence to reproduce and/or use, without written consent, any matter, technical procedure and/or technique contained in this document. Criminal and civil proceedings will be taken as a matter of strict routine against any person and/or institution infringing the copyright of the author and/or proprietors.

ABBREVIATIONS

A	Authorities
BA	Basic Assessment
BAR	Basic Assessment Report
C	Contractors
CE	Consulting Engineers
CLO	Community Liaison Officer
CoJ	City of Johannesburg Metropolitan Municipality
D	Developer/Proponent
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ELO	Environmental Liaison
EMP	Environmental Management Programme
EMS	Environmental Management System
EO	Environmental Officer
ER	Engineers Representative
ESO	Environmental Site Officer
GDARD	Gauteng Department of Agriculture and Rural Development
I&AP	Interested and Affected Party
IEM	Integrated Environmental Management
JDA	Johannesburg Development Agency
MSDS	Materials Safety Data Sheet
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
OA	Other Authority
PM	Project Manager
SEF	Strategic Environmental Focus (Pty) Ltd
SDP	Site Development Plan

DEFINITIONS

Alien species	Plants and animals which do not arrive naturally in an area - they are brought in by humans. Alien plants often force indigenous species out of the area.
Alternative	A possible course of action, in place of another, that would meet the same purpose and need defined by the development proposal. Alternatives considered in the EIA process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives or input alternatives.
Aspect	Element of an organisation's activities, products or services that can interact with the environment.
Auditing	A systematic, documented, periodic and objective evaluation of how well the environmental management plan is being implemented and is performing with the aim of helping to safeguard the environment by: facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.
Biodiversity	The rich variety of plants and animals that live in their own environment. Fynbos is a good example of rich biodiversity in the Cape.
Built environment	Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.
Bi-monthly	Bi-monthly means every second month. Similarly "two- monthly" is assumed to have the equivalent meaning to "bi-monthly"
Conservation	Protecting, using and saving resources wisely, especially the biodiversity found in an area.
Contractor	The main contractor as engaged by the JDA for the construction of the subject infrastructure, including all Subcontractors and service providers appointed by the main contractor of his own volition for the execution of parts of the Works. "Contractor" also includes any other contractor engaged by the JDA directly in connection with any part of the construction operations, which is not a nominated sub-contractor to the main contractor
Contamination	Polluting or making something impure.
Corrective (or remedial) action	Response required addressing an environmental problem that is in conflict with the requirements of the EMP. The need for corrective action may be determined through monitoring, audits or management review.
Degradation	The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.
Ecology	The scientific study of the relationship between living things (animals, plants and humans) and their environment.
Ecosystem	The relationship and interaction between plants, animals and the non-living environment.
Emergency	An undesired event that does result in significant environmental impacts and requires the notification of relevant statutory body such as a local or provincial authority.

Environment	Our surroundings, including living and non-living elements, e.g. land, soil, plants, animals, air, water and humans. The environment also refers to our social and economic surroundings, and our effect on our surroundings.
Environmental Control Officer	A person who is responsible for the monitoring of the implementation of the requirements of an EMP
Environmental Officer	A person who is responsible for the implementation of the requirements of an EMP.
Environmental Impact	An environmental change caused by some human act
Environmental Impact Assessment (EIA)	An EIA refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of a proposed development. The EIA includes an evaluation of alternatives; recommendations for appropriate management actions for minimising or avoiding negative impacts and for enhancing positive impacts; as well as proposed monitoring measures.
Environmental Management System (EMS)	EMS provides guidance on how to manage the environmental impacts of activities, products and services. They detail the organisational structure, responsibilities, practices, procedures, processes and resources for environmental management. The ISO14001 EMS standard has been developed by the International Standards Organisation.
Environmental policy	Statement of intent and principles in relation to overall environmental performance, providing a framework for the setting of objectives and targets.
Habitat	The physical environment that is home to plants and animals in an area, and where they live, feed and reproduce.
Incident	An undesired event which may result in significant environmental impacts but can be managed through internal response.
Impact	A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.
Indigenous species	Plants and animals that are naturally found in an area.
Infrastructure.	The network of facilities and services that are needed for economic activities, e.g. roads, electricity, water, sewerage.
Integrated	Mixing or combining all useful information and factors into a joint or unified whole. See Integrated Environmental Management below.
Integrated Environmental Management (IEM)	A way of managing the environment by including environmental factors in all stages of development. This includes thinking about physical, social, cultural and economic factors and consulting with all the people affected by the proposed developments. Also called "IEM".
Land use	The use of land for human activities, e.g. residential, commercial, industrial use.
Method Statement	Setting out in detail how the management actions contained in an EMP will be implemented, in order to ensure that the environmental objectives are achieved
Mitigation	Measures designed to avoid, reduce or remedy adverse impacts.
Natural environment	Our physical surroundings, including plants and animals, when they are unspoiled by human activities.

Policy	A set of aims, guidelines and procedures to help you make decisions and manage an organisation or structure. Policies are based on people's values and goals. See Integrated Metropolitan Environmental Policy.
Process	Development usually happens through a process - a number of planned steps or stages.
Proponent.	Developer. Entity which applies for environmental approval and is ultimately accountable for compliance to conditions stipulated in the Environmental authorisation (EA) and requirements of the EMP.
Public Participation Process	A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.
Recycling	Collecting, cleaning and re-using materials.
Rehabilitation	Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement re-vegetation of a disturbed area and the insurance of a stable land surface. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.
Resources	Parts of our natural environment that we use and protect, e.g. land, forests, water, wildlife, and minerals.
Scoping	A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail
Scoping Report	A report describing the issues identified
Stakeholders	A subgroup of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term includes the proponent, authorities and all interested and affected parties.
Stormwater management	Strategies implemented to control the surface flow of stormwater such that erosion, sedimentation and pollution of surface and ground water resources in the immediate and surrounding environments are mitigated. This is specifically important during the construction and decommissioning phases of a project.
Sustainable development	Development that is planned to meet the needs of present and future generations, e.g. the need for basic environmental, social and economic services. Sustainable development includes using and maintaining resources responsibly.
Sustainability	Being able to meet the needs of present and future resources.
Waste Disposal Facility	Waste disposal facility means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises.
Waste Management	Classifying, recycling, treatment and disposal of waste generated during construction and decommissioning activities.
Wetlands	An area of land with water mostly at or near the surface, resulting in a waterlogged habitat containing characteristic vegetation species and soil types e.g. vleis, swamps.

Zoning	The control of land use by only allowing specific type development in fixed areas or zones.
--------	---

REFERENCES

DEAT (1992) Integrated Environmental Management Guideline Series, Volumes 1-6, Department of Environmental Affairs, Pretoria.

DEAT (2004a) Environmental Management Plans, Integrated Environmental Management, Information Series 12, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

Lochner, P. 2005. Guideline for Environmental Management Plans. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Republic of South Africa. 1998. National Environmental Management Act 107 of 1998 (NEMA).

TABLE OF CONTENTS

1	INTRODUCTION.....	7
1.1	Background Information	7
1.2	Purpose of the Environmental Management Programme.....	8
1.3	Structure of this Document.....	8
2	SETTING THE CONTEXT.....	10
2.1	Overview of the proposed project	10
2.1.1	Background.....	10
2.1.2	Integration of environmental considerations into the project design.....	11
2.1.3	Objectives of the Environmental Management Programme....	11
2.1.4	Scope of the Environmental Management Programme.....	12
2.1.5	Environmental Management Programme	12
2.1.6	Environmental Authorisation.....	12
3	ENVIRONMENTAL SPECIFICATIONS.....	13
3.1	Integration of the Environmental Management Programme into the contract.....	13
3.2	Specification Structure and Application.....	13
3.2.1	Method statements	13
3.2.2	Provisions for addressing non-conformance	14
3.2.3	Environmental considerations in adjudication of tender	15
3.3	Environmental Management Measures for all phases of the project.....	16
3.3.1	Preamble.....	16
3.3.2	Structure and contents of tables	17
3.3.3	Planning Phase.....	17
4	ON-SITE IMPLEMENTATION.....	1
4.1	Organisational Structure.....	1
4.2	Environmental Roles and Responsibilities Matrix	1
4.3	Enforcement, monitoring and auditing	4
4.4	Non-Compliance.....	5
4.5	General guidelines	5
4.6	Awareness training.....	6
4.7	Environmental Contact Persons.....	6
4.8	Emergency Numbers.....	6

List of Tables

Table 1: Functions and Responsibilities of the Project Team	1
---	---

List of Figures

Figure 1: Recommended lines of communication, reporting and monitoring.....	4
---	---

List of Appendices

Appendix A: Site Layout Plans (including the Stormwater Management Plan)

Appendix B: Environmental Authorisation

1 INTRODUCTION

1.1 Background Information

Johannesburg Development Agency (JDA) appointed Strategic Environmental Focus (Pty) Ltd (SEF) as an independent Environmental Assessment Practitioner (EAP) to facilitate the Basic Assessment (BA) process, including the public participation process for the proposed development of a Basic Assessment (BA) Process for the proposed Ingonyama Link Road and the associated 60m bridge crossing in Diepsloot, Gauteng. The proposed project is for the construction of the Ingonyama Link Road Extension and the associated 60 m long river crossing bridge in Diepsloot Township. The proposed route is 0.7 km \approx 1 km in length. The overall width is estimated at 12.5m, and therefore, the size/ area of the road is 8 750m².

The proposed development will include, *inter alia*:

- Contractor's establishment on site including camp site and fuel storage facilities;
- The construction of the carriageway (with a surfaced width of 6.0m, 2.0m sidewalks, a cycle lane of between 2.0 m and 3.0 m and a single 1.5 m trading/green lane);
- Appropriate shelter for the street vendors and for the public transport users;
- The construction of a bridge over the river to accommodate the proposed single carriageway; and
- Importation of construction material.

The proposed road falls within the Diepsloot farm area, City of Johannesburg Metropolitan Municipality (CoJ), Gauteng. The area has the following SG Code: T0JR0000000038800000. The Johannesburg Roads Agency (JRA) is the Landowner.

SEF has compiled and is submitting an Environmental Management Programme (EMP) as part of the Final Basic Assessment Report (BAR), to the decision making authority, the Gauteng Department of Agriculture and Rural Development (GDARD).

This EMP is compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development [Department of Environmental Affairs and Tourism (DEAT¹), 1992]. IEM is a key instrument of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). NEMA promotes the management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental management tools that are appropriate for the various levels of decision-making. One such tool is an EMP.

¹ The DEAT is now referred to as the Department of Environmental Affairs (DEA)

In terms of regulation 22 (2) (l) of Government Notice Regulation (GNR) No. 543 of the NEMA, promulgated in terms of chapter 5 of the Act, the BAR must contain all the information that is necessary for the competent authority (GDARD) to consider the application and to reach a decision contemplated in regulation 25 of the Act, and must include an EMP containing the aspects contemplated in regulation 33 of the Act.

1.2 Purpose of the Environmental Management Programme

The purpose of this EMP is to:

- Sketch the background for the development;
- Introduce the structure of the EMP, particularly in terms of the contractual application of the environmental specifications;
- Highlight the salient features of the EMP.
- Detail the roles of the various parties with respect to the implementation and monitoring of the EMP;
- Clarify and streamline the implementation of the EMP;
- Outline procedures for proactive environmental management and environmental control, in the event of pollution or similar incidents; and
- Provide stakeholders the opportunity to comment on the proposed mitigation measures for the identified environmental impacts.

It should be noted that this EMP is part of the BA process being undertaken for the proposed project, and should be read in conjunction with the Final BAR and all associated appendices.

1.3 Structure of this Document

This document has been divided into four parts, each addressing a different aspect of the EMP.

- | | |
|------------|---|
| Section 1: | Provides a brief introduction and overview of the purpose and structure of this guideline document; |
| Section 2: | Sets the context for the EMP by providing an overview of the project, summarising the objectives of the EMP, highlighting the scope of the EMP and briefly emphasising the JDA's environmental commitments; |
| Section 3: | Provides an introduction to the specification, an overview of the structure and application of the specification and highlights the environmental considerations that should inform the tender adjudication process; and |
| Section 4: | Provides guidance in terms of the on-site implementation of the EMP, highlighting the organisation structure and various roles and responsibilities, emphasising the importance of awareness training, summarising the requisite approach to monitoring |

and auditing and addressing the requirement for review and amendment of the environmental specifications.

2 SETTING THE CONTEXT

2.1 Overview of the proposed project

2.1.1 Background

The proposed route is 0.7 km \approx 1 km in length. The overall width is estimated at 12.5m, and therefore, the size/area of the road is 8 750m². The proposed development will include, *inter alia*:

- Contractor's establishment on site including camp site and fuel storage facilities;
- The construction of the carriageway (with a surfaced width of 6.0m, 2.0m sidewalks, a cycle lane of between 2.0 m and 3.0 m and a single 1.5 m trading / green lane);
- Appropriate shelter for the street vendors and for the public transport users;
- The construction of a bridge over the river to accommodate the proposed single carriageway; and
- Importation of construction material.

A Floodline Study has been undertaken and it served to provide more detail on the optimal sizing of the bridge to cause the smallest backwater effect. Taking into account the flood level analysis, it was decided to go for a 3 span bridge spanning 60m in total. Two end spans of 17m and one main span of 26m were adopted based on structural considerations. The approximate depth of the bridge deck from top of asphalt to the beam soffits is 1.61m.

The street lighting forms an integral part in the design to meet JDA's objectives. The previously upgraded sections of the Ingonyama Road are used as a baseline and the street lighting theme is being carried out through the rest of the upgrade. Detailed information with regards to the design criteria, selection of poles and light fittings and associated design calculations for the roadway upgrade have been provided for in the street light design submission report prepared by DJP Power Services (Please refer to Appendix G of the Final BAR).

The lighting design is based on recommended levels for Group A3 Roads: Important urban traffic routes, for speed limits not exceeding 60km/h, without median and for traffic volumes during darkness of 600 vehicles per hour. The lights will be fed from existing pole-mounted transformer which is feeding existing street lights on the gravel roadway where Ingonyama Road is to be constructed. The design of the street lighting circuits originates from those control boxes. The old lighting circuits and fittings will be decommissioned and removed as they are not meeting the requirements of the new road layout and classification. The decommissioned streetlights will be returned to City Power Maintenance department during construction.

The type of street lighting that has been proposed is as follows:

- Beka Strada with 250W HPS at 10 mounting height (street light);
- Beka Lane with 57W CFL at 4m mounting height (pedestrian light); and

- Pole type galvanised steel A6 as per City Power CP_TSSPEC_032: 2006.

The above streetlights are the same as what is currently at the upgraded sections of the Ingonyama Road. The spacing of the lights on the proposed design is 35m.

2.1.2 Integration of environmental considerations into the project design

Associated Infrastructure Layout

The associated infrastructures have been outlined in the Final BAR and also the Layout Plans as attached in Appendix A. The exact layout of the proposed infrastructure will be finalised post environmental authorisation within the approved site layout and design. The layout will be determined by taking environmental and social sensitivities and technical feasibility into consideration.

2.1.3 Objectives of the Environmental Management Programme

Environmental management does not end with obtaining the required EAs. Rather there is a need to ensure that the remedial requirements identified during the environmental process are effectively realised during project implementation, and this is where EMPs have a key role to play.

An EMP is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the project phases are prevented and that the positive benefits of the projects are enhanced”. Impacts range from those incurred during start up (site clearing, erection of the construction camp) and through to those incurred during the construction activities themselves (erosion, pollution of watercourses, noise, and dust).

Specifically, the objectives of this EMP can be articulated as follows:

- To give effect to the construction related requirements;
- To give effect to the environmental commitments to the various role players;
- To ensure that these requirements/commitments are expressed in a manner that is accessible to all parties and is binding upon those responsible for project implementation;
- To ensure that sufficient resources are allocated to the project budget in order to give effect to the environmental requirements/commitments, and to ensure that the scale of EMP-related interventions is consistent with the significance of identified impacts;
- To provide a coherent and pragmatic framework for the implementation of the requirements, ranging from the roles and responsibilities of the key project participants to the auditing and reporting of compliance;
- To facilitate appropriate and proactive response to unforeseen events or changes in project implementation that were not considered in the BA process; and

- To ensure that the construction phase of the project does not result in undue or reasonably unavoidable adverse environmental impacts, and that any potential environmental benefits are enhanced.

2.1.4 Scope of the Environmental Management Programme

The scope of the EMP must ensure that the objectives outlined in Section 2.1.3 will be addressed, and is principally determined by the key documentation related to the BA process, notably the Final BAR and the Environmental Authorisation (EA) once received. A brief overview of the key issues raised in each of these documents is provided below.

Basic Assessment Report

In terms of the Final BAR, various constructions related environmental impacts have been identified as per the tables below.

2.1.5 Environmental Management Programme

Adherence to the environmental management measures for all phases of the project requirements of this EMP.

2.1.6 Environmental Authorisation

Once EA has been received from the GDARD, any additional conditions stipulated in the authorisation will be included into this dynamic EMP (refer to Appendix B).

3 ENVIRONMENTAL SPECIFICATIONS

3.1 Integration of the Environmental Management Programme into the contract

This EMP has been written in a form and language that is consistent with the tender / contract documentation used for engineering contracts i.e. the EMP takes the form of a set of environmental specifications that can integrate in the civil, mechanical and electrical tender / contract documentation. There are various advantages to this approach:

- The Contractor is made aware of the EMP at the tender stage;
- The Contractor is able to cost for compliance with the EMP;
- The EMP is presented to the Contractor in the language and terminology with which he is familiar, and unnecessary duplication and contradiction is eliminated;
- Inclusion of the EMP within the contract ensures that the EMP becomes a legally binding document within a well-developed legal framework; and
- The standardised form and structure of the environmental specifications ensures that with time and each new contract, the Contractor becomes increasingly familiar with, and thus more accepting of, the EMP and implements it with the same diligence as any other set of specifications contained within the contract.

Ultimately, by measuring compliance against an explicit set of environmental controls that are well located within a robust legal framework, the approach has been proven to enhance success in the implementation and enforcement of the EMP significantly.

3.2 Specification Structure and Application

These specifications are not exclusive and could, within reason, be expanded on or amended at any time during the contract by the Environmental Control Officer (ECO).

3.2.1 Method statements

EAPs are not specialists with regard to construction techniques. Therefore, so as not to hinder construction activities by stipulating elaborate, costly and/ or ineffective mitigation measures, the environmental specification is underpinned by a series of Method Statements, within which the Contractor is required to outline how they propose to mitigate any identified environmental risks. For example, if the specification states that “cement contaminated water shall not be allowed to contaminate the soil or adjacent watercourse”, the Method Statement compiled by the Contractor would be required to outline how he or she intends to achieve this requirement.

In terms of the environmental specifications for the proposed project, the Contractors must submit various written Method Statements to the Engineer and ECO as requested in the Specification. For the purposes of the environmental specifications, a Method Statement is defined as “a written submission by the Contractor to the Engineer in response to the Specification or a request by the Engineer, setting

out the materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting the Method Statement, in such detail that the Engineer is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

- Construction procedures;
- Materials and equipment to be used;
- Getting the equipment to and from site;
- How the equipment/ material will be moved while on site;
- How and where material will be stored;
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- Timing and location of activities;
- Compliance/ non-compliance with the Specifications; and
- Any other information deemed necessary by the Engineer.

The environmental specifications set very stringent requirements in terms of the provision of Method Statements and the commencement of the activities they cover:

- Any Method Statement required by the Engineer or the specification must be produced within the timeframes specified by the Engineer or the specification (typically two weeks);
- The Contractor may not commence the activity covered by the Method Statement until it has been approved, except in the case of emergency activities and then only with the consent of the Engineer;
- The Engineer may require changes to a Method Statement if the proposal does not comply with the specification or if the proposed methodology carries an unreasonable risk of excessive damage to the environment;
- Approved Method Statements must be readily available on the site and must be communicated to all relevant personnel;
- The Contractor is required to carry out the activities covered by the Method Statement in accordance with the proposed approach; and
- Approval of the Method Statement does not absolve the Contractor from their obligations or responsibilities in terms of the Contract.

3.2.2 Provisions for addressing non-conformance

Ultimately, the key to effective environmental management during the construction phase is ensuring that the requirements of the EMP are adequately and appropriately implemented on site. Accordingly,

monitoring performance and addressing non-compliance are key attributes of any environmental interventions. Section 4 addresses the actual process for identifying and addressing non-compliance, whilst this section provides an overview of the provision made for this in the environmental specification.

Broadly, the mechanisms for addressing non-compliance that are provided for in the environmental specifications and associated contract documentation can be divided into the following categories:

- Controlling performance via the certification of payments;
- Requiring the Contractor to “make good”, at their own cost, any unjustifiable environmental degradation;
- Implementing a system of penalties to dissuade environmentally risky behaviours; and
- Removing environmentally non-compliant staff/ equipment from site, or suspending part or all of the activities on site.

3.2.3 Environmental considerations in adjudication of tender

In terms of this EMP, the JDA has an obligation to ensure compliance by various parties with a suite of environmental requirements related to the construction phase. The compilation of the EMP and its integration into the Tender document, as a suite of environmental specifications, form part of meeting the obligation, however, to ensure that these obligations continue to be fulfilling during the actual construction processes, it behoves the JDA to ensure that the appointed Contractors possess the requisite environmental management experience and expertise. Accordingly, it would be prudent for the JDA to ensure that environmental considerations form part of the tender adjudication process. Key considerations in this regard would be as follows:

- To request as part of the tender process that the Contractor provide his environmental policy and indicate how this will influence the way the construction process is approached and managed on site. At the tender stage the Contractor would merely be asked to provide the overarching environmental policy for the company or joint venture;
- To request as part of the tender process a list of the Contractor’s previous experience in terms of the onsite implementation and management of environmental requirements;
- To request as part of the tender process an indication of the proposed organisational structure for the contract, and specifically for the Contractor to indicate which staff would be acting in the capacity of Environmental Officer (EO) and which senior staff member would have overall responsibility for ensuring compliance by the Contractor with the specified environmental requirements; and
- To confirm, upon receipt of the Tender, that the Contractor has made sufficient allowance in his Tender Price for meeting the various environmental requirements.

During the tender adjudication process for each Contract, each Contractor should be scored in terms of the aforementioned considerations and allocated an environmental competency score. This score should form a key consideration in the final decision-making regarding the award of the various contracts.

3.3 Environmental Management Measures for all phases of the project

The management measures documented in each of the sub-sections below have been compiled using the following information:

- Impact Assessment and mitigation measures documented in the Final BAR for the proposed project.

In addition to the abovementioned information source, the EMP will be updated to include the conditions documented in the EA to be received upon approval of the Final BAR.

3.3.1 Preamble

The point of departure for this EMP is to ensure a pro-active rather than re-active approach to environmental performance by addressing potential problems before they occur. This will limit corrective measures needed during the construction phase of the project. Therefore, the purpose of an EMP is to provide management measures that must be implemented by developers, Engineers and Contractors alike to ensure that the potential impacts of the proposed development are minimised. It must also be ensured that the EMP is maintained and upheld as a dynamic document in order for the project team to add or improve on issues that might be considered left out or not relevant to the project. In such instances, the approving authority may authorise the ECO to make such changes.

The tables below form the core mitigation measures appropriate to the pre-construction and construction phase. The tables present the objectives to be achieved and the management actions that need to be implemented in order to mitigate the negative impacts and enhance the benefits of the project. Associated responsibilities, criteria/targets and timeframes are clearly specified.

The 'pre-construction' section of this EMP, refers to the period of time leading up to and prior to commencement of construction activities, and is included to ensure pro-active environmental management measures with the goal of identifying avoidable environmental damage at the outset and sustain optimal environmental performance throughout the construction phase. Most impacts will occur during the construction phase and must be mitigated through the contingency plans identified in the pre-construction phase.

The bulk of environmental impacts will have immediate effect during the 'construction' phase (e.g. noise and dust). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the measures outlined in this section, together with a commitment to sound environmental management from the project team.

The "construction" section refers to all construction related activities that will occur within the approved area, until the project is completed. This "construction" section is divided into three functional areas, namely "materials"; "construction camp"; and "construction". Each of these functional areas within the EMP contains specific mitigation requirements and requested contractor method statements stipulated where required.

3.3.2 Structure and contents of tables

The table consists of seven parts as follows:

- **“Phase of development”** - This row will identify either pre-construction (planning) or actual construction phase.
- **“Impact /issue”** - This row will identify the issue being addressed, e.g. Materials, site demarcation, heritage, etc.
- **Mitigation Measure** - This column will include all the necessary mitigation measures for each impact/issue’.
- **Management objectives** - This column will indicate what the management objectives to be achieved for each mitigation measure are.
- **Measurable targets** - This column will indicate what evidence is to be used as an indication to whether or not the ‘Management objectives’ have been implemented and hence achieved.
- **Frequency of action** - These columns provide time guidelines for the ‘Responsible party’ by which he/she is to action or manage the required mitigation.

3.3.3 Planning Phase

To mitigate the negative environmental impacts, a number of measures would have to be addressed in the design of the proposed building during the planning phase. An inspection must be carried out on the design before commencement of construction to ensure that the mitigation measures have been incorporated in the design.

Phase of development	PRE-CONSTRUCTION				
Impact / issue	GENERAL PLANNING (A)				
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
A1: Project contract and programme					
<p>The EMP must be included as part of the tender documentation thereby making it part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract.</p> <p>The construction footprint must be discussed and strategised with the ECO and Engineer prior to commencement or clearing of any area. The construction footprint must be kept to an absolute minimum and clearly demarcated (e.g. warning tape) prior to the commencement of construction activities thus reducing the infringement of the development on surrounding habitats. A copy of this EMP must be available on site. The Contractor must ensure that all the personnel on site, sub-contractors and their team, suppliers, etc. are familiar with and understand the specifications contained in the EMP.</p>		<p>Contingencies for minimising negative impacts anticipated to occur during the construction phase</p> <p>Ensure environmental awareness and formalise environmental responsibilities and implementation</p>	<p>Contract records Signed declaration pro forma's</p>	-	-
A2: Appointments and duties of project team					
<p>The contact details for the ECO, Engineers Representative (ER), Environmental Officer (EO), Contractor and Environmental Site Officer (ESO) must be completed on the attached pro-forma and a copy kept on site. This document must be made available to the approving authority on request.</p> <p>Before construction activities commence, role players must have a clear indication of their role in the implementation of this EMP.</p> <p>Subcontractor(s) contracts with the principle contractor must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP.</p>		<p>Contingencies for minimising negative impacts anticipated to occur during the construction phase</p>	<p>Contract records Signed declaration pro forma's</p>	-	
A3 Method statements					
<p>Certain method statements must be provided by the contractor. All activities which require method statements may only commence once the method statements have been approved by the engineer and/or ECO as applicable.</p>		<p>Contingencies for minimising negative impacts anticipated to occur during the construction phase</p>	<p>Approved method statements and relevant pro forma documents</p>	As and when required	

Phase of development	PRE-CONSTRUCTION				
Impact / issue	GENERAL PLANNING (A)				
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
Where applicable, the contractor will provide job-specific training on an ad hoc basis when workers are engaged in activities, which require method statements.			Training records		
<p>A4 Site demarcation and development</p> <p>The surveys for the overall project area and construction footprint as approved must be discussed and strategised with the ECO and Engineer prior to commencement or clearing of any area.</p> <p>“No-go” areas such as sensitive areas identified during the BA process, e.g. wetland areas which must be clearly demarcated (e.g. warning tape) prior to the commencement of construction activities.</p> <p>All relevant ‘general’ and ‘specific’ conditions contained in the EA must be included in the space provided below and included as part of this EMP when the “declaration of understanding” is signed by the Developer, Engineer and Contractor. The proponent is to sign the space provided. Plants/trees to be retained must be clearly marked in conjunction with the ECO and Vegetation Specialist.</p>		Contingencies for minimising negative impacts anticipated to occur during the construction phase	Demarcated area's Filled in section of this document	As and when required	
<p>A5 Emergencies, non-compliance and communication</p> <p>The contractor must provide method statements on the protocols to be followed, and contingencies to be put in place for the following potential incidents before construction may begin: Contamination of soils from spills; and fire.</p> <p>Communication in emergencies must follow the suggested lines of communication.</p> <p>The contractor understands that failure to adhere to the requirements of the EMP will result in fines over and above the costs incurred for any remediation required as result of the specific non-compliance.</p>		Contingencies for minimising negative impacts anticipated to occur during the construction phase	Method statements	As and when required	

Once planning has been completed, the proposed project is to be constructed according to the standard specification sections, which are included in SANS 1200 (standardised specification for civil engineering construction). These standards should be referred to and included in the tender document for the construction contractor.

To mitigate the adverse impacts during the construction phase of the project, mitigation measures must be implemented. Mitigation of the anticipated impacts during construction can be achieved by the inclusion of suitable specification clauses and by ensuring that contractors comply with the specifications.

The Responsible Party from JDA, as well as the ECO, will monitor the activities of the construction team on site to ensure all mitigatory measures are implemented and to prevent any additional impacts from occurring. A tender for construction of the proposed development will be compiled, and subsequent to that, an evaluation of the tenders will be undertaken and the preferred tenderer will be appointed.

Phase of development	GENERAL PLANNING	EA reference number			
Impact / issue	EA Conditions (B)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<i>All relevant 'general' and 'specific' conditions contained in the Environmental Authorisation (EA) must be included in the space provided.</i>					

Phase of development	CONSTRUCTION				
Impact / issue	MATERIALS (C)				
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
C1 Stockpiles					
<p>All stockpiled material must be easily accessible without any environmental damage.</p> <p>All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised.</p> <p>The stockpiles may only be placed within the demarcated areas the location of which must be approved by the ER, EO or ECO.</p> <p>Stormwater run-off from the stockpile sites and other related areas must be directed into the stormwater system with the necessary pollution prevention measures such as silt traps and may not run freely into the immediate and surrounding environments.</p> <p>Stockpiles are to be stabilised if signs of erosion are visible.</p> <p>Soils from different horizons must be stockpiled such that topsoil stockpiles do not get contaminated by sub-soil material.</p>		<p>Minimise scaring of the soil surface and land features</p> <p>Minimise disturbance and loss of soil</p> <p>Minimise construction footprint</p> <p>Minimise sedimentation of nearby drainage lines</p> <p>Maintain the integrity of topsoil's for landscaping and rehabilitation</p> <p>Containment of invasive plant growth</p> <p>Minimise contamination of stormwater run-off</p>	<p>No visible erosion scars once construction is completed</p> <p>The footprint has not exceeded the agreed site in terms of EA, etc.</p> <p>Minimal invasive weed growth</p> <p>No signs of sedimentation and erosion</p>	Daily	

Phase of development	CONSTRUCTION			
Impact / issue	MATERIALS (C)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Topsoil stockpiles must be monitored for invasive exotic vegetation growth. Contractors must remediate as and when required in consultation with the EO, ER and ECO.</p> <p>No plant, workforce or any construction related activities may be allowed onto the topsoil stockpiles.</p> <p>Topsoil stockpiles must be clearly demarcated as no-go areas.</p> <p>Stockpiles must not be higher than 2m to avoid compaction thereby maintaining the soil integrity and chemical composition.</p>				
<p>C2 Oil and chemicals</p> <p>The contractor must provide method statements for the “handling & storage of oils and chemicals”, “fire”, and “emergency spills procedures”.</p> <p>These substances must be confined to specific and secured areas within the contractor’s camp, and in a way that does not pose a danger of pollution even during times of high rainfall. These areas must be imperviously bunded with adequate containment (at least 1.5 times the volume of the fuel) for potential spills or leaks.</p> <p>Drip trays (minimum of 10cm deep) must be placed under all vehicles that stand for more than 24 hours.</p> <p>Vehicles suspected of leaking must not be left unattended, drip trays must be utilised.</p> <p>The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing.</p> <p>The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle. The drip tray must be able to contain the volume of oil in the vehicle.</p>	<p>Prevention of pollution of the environment</p> <p>Minimise chances of transgression of the acts controlling pollution</p>	<p>No pollution of the environment</p> <p>No litigation due to transgression of pollution control acts</p> <p>No complaints from I&APs</p> <p>Method statements</p>	<p>Daily</p>	

Phase of development	CONSTRUCTION			
Impact / issue	MATERIALS (C)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice (SUNSORB is a recommended product that is environmentally friendly).</p> <p>All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site, (this includes contaminated soils, and drenched spill kit material).</p>				
<p>C3 Cement</p> <p>The contractors must provide and maintain a method statement for “cement and concrete batching”. The method statement must provide information on proposed storage, washing & disposal of cement, packaging, tools and plant.</p> <p>The mixing of concrete must only be done at specifically selected sites on mortar boards or similar structures to contain run-off into soils rocky outcrops, streams and natural vegetation.</p> <p>Cleaning of cement mixing and handling equipment must be done using proper cleaning trays.</p> <p>All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a licensed facility.</p> <p>Any spillage that may occur must be investigated and immediate remedial action must be taken.</p> <p>The visible remains of concrete, either solid, or from washings, must be physically removed immediately and disposed of as waste to a registered landfill site.</p> <p>Cement batching areas must be located in consultation with the ER, EO or ECO to ensure residues are contained and that the proposed location does not fall within sensitive areas such as drainage lines, stormwater channels, etc.</p>	<p>Minimise the possibility of cement residue entering into the surrounding environment</p> <p>Minimise pollution of soil, surface and ground water resources</p>	<p>No evidence of contaminated soil on the construction site</p> <p>No evidence of contaminated water resources Method statement</p>	<p>Monitored daily</p>	
C4 Dangerous and Toxic Materials				

Phase of development	CONSTRUCTION			
Impact / issue	MATERIALS (C)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in bermed areas or under lock and key, as appropriate, in well-ventilated areas.</p> <p>Sufficient care must be taken when handling these materials to prevent pollution. Training on the handling of dangerous and toxic materials must be conducted for all staff prior to the commencement of construction.</p> <p>In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs (DWA) must be informed immediately.</p> <p>Storage areas must display the required safety signs depicting “no smoking”, No Naked lights” and “Danger” containers must be clearly marked to indicate contents as well as safety requirements.</p> <p>The contractor must supply a method statement for the storage of hazardous materials at tender stage.</p> <p>Material Safety Data Sheets (MSDS) must be prepared for all hazardous substances on site and supplied by the supplier where relevant. MSDS’s must be updated as required.</p>	<p>Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments</p> <p>Minimise chances of transgression of the acts controlling pollution</p>	<p>No visible signs of pollution</p> <p>No litigation due to transgression of pollution control acts</p>	Monitor daily	
<p>C5 Use of dangerous and toxic materials</p> <p>The contractor must keep the necessary materials and equipment on site to deal with spills/ fire of the materials present should they occur.</p> <p>The contractor must set up a procedure for dealing with spills/ fire, which will include notifying the ECO and the relevant authorities prior to commencing with construction. These procedures must be developed with consultation and approval by the appointed EO.</p> <p>A record must be kept of all spills and the corrective action taken.</p>	<p>Prevention of pollution of soil and ground water resources in the immediate environments</p> <p>Minimise chances of transgression of the acts controlling pollution</p>	<p>No pollution of the environment</p> <p>No litigation due to transgression of pollution control acts</p>	As required	

Phase of development	CONSTRUCTION			
Impact / issue	PLANT (D)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>D1 Eating areas and camp followers</p> <p>The contractors must provide and maintain a method statement for construction lay down areas".</p> <p>The Contractor must, in conjunction with the EO, designate restricted eating areas for eating during normal working hours. Adequate closed refuse bins must be provided and cleaned on a daily basis.</p> <p>No fires are to be lit outside of a facility designed to contain fires. The adequacy and positioning of these structures must be determined in consultation with the EO and ECO.</p> <p>The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited.</p> <p>Litter and concrete bags, etc. must be picked up daily and put into suitably closed bins.</p>	<p>Control potential influx of vermin and flies</p> <p>Neat work place and hygienic environment</p> <p>Minimise negative social impacts to local residents and businesses</p>	<p>No visual sign of vermin and flies</p> <p>No complaints from I&APs</p>	<p>Once off, monitor daily</p>	

Phase of development	CONSTRUCTION			
Impact / issue	PLANT (D)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><u>D2 Toilets and ablution facilities</u></p> <p>The contractor is responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet must be provided per 15 persons.</p> <p>Sanitary arrangements must be to the satisfaction of the ECO and the local authority. Toilets must be of the chemical type. The contractor must keep the toilets in a clean, neat and hygienic condition. The contractor must supply toilet paper at all toilets at all times. Toilet paper dispensers must be provided in all toilets.</p> <p>Toilets provided by the contractor must be easily accessible and a maximum of 50m from the works area to ensure they are utilised. All toilets will be located within the contractor's camp. Should toilets be needed elsewhere, their location must first be approved by the ER, EO or ECO.</p> <p>The contractor (who must use reputable toilet-servicing company) must be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) must ensure that all toilets are cleaned and emptied before the builders' or other public holidays.</p> <p>Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times.</p>	<p>Ensure proper sanitation is achieved which will encourage the workforce to utilise toilets provided and not the surrounding habitat</p> <p>Minimise potential of diseases on site</p> <p>Minimise potential to pollute soils, water resources and natural habitats</p>	<p>Workforce use toilets provided</p> <p>No complaints received from I&APs as well as members of the workforce</p> <p>No visible or measurable signs pollution of the environment (soils, ground and surface water)</p>	<p>As and when required</p>	
<p><u>D3 Waste management</u></p> <p>The contractors must provide and maintain a method statement for "solid waste management". The method statement must provide information on proposed licensed facility to be utilised and details of proposed record keeping for auditing purposes.</p> <p>Waste must be separated into recyclable and non-recyclable waste, and must be separated as follows:</p> <ul style="list-style-type: none"> <i>Hazardous waste: including (but not limited to) old oil, paint, etc.;</i> 	<p>Sustainable management of waste by recycling</p> <p>To keep the site neat and tidy</p> <p>Minimise litigation and complaints by I&APs</p> <p>Reduce visual impact</p>	<p>Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying on site</p> <p>Site is neat and tidy</p> <p>No complaints from surrounding residents and businesses</p> <p>Sufficient containers available on site</p>	<p>Daily</p>	

Phase of development	CONSTRUCTION			
Impact / issue	PLANT (D)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<ul style="list-style-type: none"> • <i>General waste: including (but not limited to) construction rubble;</i> • <i>Reusable construction material; and</i> • <i>Recyclable waste must preferably be deposited in separate bins. The contractor is advised that "Collect-a-Can" collect tins, including paint tins, chemical tins, etc. and "Consol" collect glass for recycling.</i> <p>Any illegal dumping of waste must not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request.</p> <p>Bins must be clearly marked for ease of management.</p> <p>All refuse bins must have a lid secured so that animals cannot gain access.</p> <p>Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's wastes generated on the site.</p> <p>Subcontractor(s) must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP. Proof of this undertaking must be issued to the ECO.</p> <p>All solid and chemical wastes that are generated must be removed and disposed of at a licensed waste disposal site. The contractor is to provide proof of such to the EO and ECO.</p> <p>Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site.</p> <p>A skip, with a cover, must be used to contain refuse from campsite bins, rubble and other construction material.</p>	<p>Control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment</p> <p>Minimise potential to pollute soils, water resources and natural habitats</p>	<p>No visible or measurable signs of pollution of the environment (soils, ground and surface water)</p> <p>Method statement</p>		

Phase of development	CONSTRUCTION			
Impact / issue	PLANT (D)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>D4 Dust</p> <p>The contractors must provide and maintain a method statement for “dust control”. The method statement must provide information on the proposed source of water to be utilised.</p> <p>Potable water must not be used as a means of dust suppression, and alternative measures must be sourced.</p> <p>The use of ‘grey’ water must be investigated as an alternative. The contractor will be responsible to source this water and obtain the required approvals to utilise this water for the purpose of dust suppression.</p> <p>The construction camp must be watered during dry and windy conditions to control dust fallout.</p> <p>Dust production must be controlled by regular watering of roads and works area, should the need arise. Concrete bags must not be allowed to blow around the site and spread cement dust.</p> <p>In addition to the standard dust suppression measures and where these measures are not sufficient, main access roads and site camps must be surfaced with a temporary surface such as gravel to assist with dust suppression.</p> <p>At the end of construction, the site camp must be fully rehabilitated by removing the temporary surface, ripping the area to loosen the soil and the area must be re-vegetated with locally indigenous vegetation only, according to the specialist recommendation.</p> <p>All vehicles transporting material that can be blown off (e.g. soil, rubble etc.) must be covered with a tarpaulin, and speed limits of 20 km/h must be adhered to.</p> <p>Excessive dust conditions must be reported to the ECO.</p>	<p>Reduce dust fall out</p> <p>Reduce visual impact</p> <p>Minimise loss of valuable soil material</p>	<p>No visible signs of dust</p> <p>No complaints from interested and Affected parties</p> <p>No incidences reported to ECO</p> <p>No visible evidence of dust contamination on the surrounding environment</p> <p>Method statement</p> <p>Baseline targets not exceeded during regular monitoring of dust counts</p>	<p>Monitored daily</p>	

Phase of development	CONSTRUCTION			
Impact / issue	PLANT (D)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Regular monitoring of dust fallout must be carried out and the records kept on site. Baseline dust measures must be sampled and approved by the ER and ECO prior to the commencement of construction activities.</p> <p>All forms of dust pollution must be managed in terms of the National Environmental Mangement Air Quality Act, Act No 39 fo 2004 (NEMAQA).</p>				
<p>D5 Workshop equipment, maintenance and storage</p> <p>The contractors must provide and maintain a method statement for “workshop maintenance and cleaning of plant”.</p> <p>All maintenance and washing of vehicles and equipment will not be allowed to take place on site.</p> <p>Leaking equipment must be repaired immediately or be removed from site to facilitate repair. All potentially hazardous and non-degradable waste must be collected and removed to a registered waste site.</p> <p>Workshop areas must be monitored for oil and fuel spills and such spills must be cleaned and remediated to the satisfaction of the EO or ER. Cleaning and remediation must be done with products that are in line with best environmental practice i.e. SUNSORB.</p> <p>A method statement is required from the Contractor, tendering for the project to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage.</p> <p>The Contractor must be in possession of an emergency spill kit that is complete and available at all times on site.</p> <p>The Contractor must ensure that senior and other relevant members of the workforce are trained in dealing with spills by using emergency spill kits.</p> <p>All contaminated soil / yard stone shall be removed and disposed of as hazardous waste at a registered facility or placed in containers to be taken to</p>	<p>Prevent pollution of the environment</p> <p>Minimise chance of transgression of the acts controlling pollution</p> <p>Disposal of hazardous substances in an appropriate manner</p>	<p>No pollution of the environment</p> <p>No litigation due to transgression of pollution control acts</p> <p>Method statement</p>	<p>Monitor daily</p>	

Phase of development	CONSTRUCTION			
Impact / issue	PLANT (D)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>one central point where bio-remediation can be done. (Bio-remediation should only be an option if an Environmental Authorisation has been issued).</p> <p>A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site.</p> <p>All spills of hazardous substances must be reported to the ESO, EO, ER or ECO.</p> <p>The contractor must comply with the regulations of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA).</p>				
<p>D6 Noise</p> <p>All construction vehicles must be in a good working order to reduce possible noise pollution.</p> <p>Work hours during the construction phase (8am-17:00pm) must be strictly enforced unless permission is given.</p> <p>Permission must not be granted without consultation with the local residents and businesses by the EO.</p> <p>Noise reduction is essential and Contractors must endeavour to limit unnecessary noise, especially loud talking, shouting or whistling, radios, sirens or hooters, motor revving, etc. The use of silent compressors is a specific requirement.</p> <p>Noisy activities must take place only during working hours. The EO must inform the residents of houses and businesses adjacent to the development in writing 24 hours prior to any planned activities that will be unusually noisy or any other activities that could reasonably have an impact on the adjacent sites. These activities could include, but are not limited to, blasting, piling, use of pneumatic jack-hammers and compressors, bulk demolitions, etc.</p>	<p>Maintain noise levels below “disturbing” as defined in the National Noise Regulations</p> <p>Minimise the nuisance factor of the development</p>	<p>No complaints from surrounding landowners or I&APs</p>	<p>As and when required</p>	

Phase of development	CONSTRUCTION			
Impact / issue	Construction (E)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><u>E1 Crew camps</u></p> <p>The contractors must provide and maintain a method statement for “Crew camps and construction lay down areas”.</p> <p>Camps should be limited to disturbed areas on the most disturbed areas. This should be done in consultation with the ECO prior to such time.</p> <p>Accommodation for members of the workforce is not permitted on site unless authorisation has been given in terms of the EA issued for the site.</p> <p>The contractor’s camp must be monitored for dust fallout and dust suppression applied as required. This may include the laying of gravel. The use of grey water can be considered as an option if the required permits have been acquired.</p> <p>The contractor’s camp, offices and storage facilities must be located within the site boundaries. No person must be allowed to stay on neighbouring sites, unless it is cleared with the owner. In such an event all requirements contained herein for the contractor’s camps will apply.</p> <p>The contractor must provide labourers plastic bags to clean up the contractor’s camp and construction site on a daily basis. These areas must then be inspected by the contractor or his/her ESO to ensure compliance with this requirement, equipment, residual litter and building materials at the end of the construction period and, the topsoil restored in areas where landscaping is to take place.</p> <p>The contractor is responsible for cleaning the contractor’s camp and construction site of all structures.</p> <p><u>E2 Fires</u></p> <p>The contractors must provide and maintain a method statement for “fires”, clearly indicating where and for what fires will be utilised plus details on the fuel to be utilised.</p>	<p>Minimise water pollution</p> <p>Minimise dust fallout</p> <p>Minimise unwarranted environmental damage outside the footprint</p> <p>Maintain a clean and healthy working environment</p> <p>Minimise impact to surrounding environment</p> <p>Minimise risk of veldt fires</p> <p>Minimise destruction of natural fauna and flora</p> <p>Maintain safety on site</p>	<p>No signs of water or soil pollution</p> <p>No complaints from surrounding landowners or I&APs</p> <p>No visible signs of litter</p> <p>Method statements</p> <p>No veldt fires started by the contractor’s workforce</p> <p>No claims from landowners for damages due to veldt fires</p> <p>Method statement</p>	<p>Monitor daily</p> <p>Monitor daily</p>	

Phase of development	CONSTRUCTION			
Impact / issue	Construction (E)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Absolutely no burning of waste is permitted.</p> <p>Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air.</p> <p>No wood is to be collected, chopped or felled for fires from private or public property as well as from no-go or sensitive areas within the site and any surrounding natural vegetation.</p>				
<p><u>E3 Erosion and sedimentation</u></p> <p>The disturbance of steep slopes, for example by the removal of vegetation, may result in slope instability and erosion by rain and surface run-off. A erosion management plan must be implemented to this effect and monitored</p> <p>A Geotechnical Report has been compiled and it was found that water was encountered from around 0,3m to 2,0m in test pits, including sidewall instabilities being noted. Please refer to Appendix G for a Geotechnical Report.</p> <p>All slopes that are disturbed during construction must immediately be stabilised to prevent erosion. Where re-vegetation of slopes is undertaken, this must be done in accordance with the landscape architect (or appointed landscaper).</p> <p>To reduce the loss of material by erosion, the contractor must ensure that disturbance on site is kept to a minimum. The contractor is responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed.</p> <p>These areas must be cordoned off so that vehicles or construction personnel cannot gain access to these areas.</p>	<p>Minimise erosion damage</p> <p>Minimise impeding the natural flow of water</p> <p>Minimise scarring of the soil surface and land features</p> <p>Minimise disturbance and loss of topsoil</p> <p>Re-growth of disturbed areas</p>	<p>No erosion scars</p> <p>No loss of topsoil</p> <p>No interference with the natural flow of water</p> <p>No visible erosion scars once construction is completed</p> <p>The footprint has not exceeded the agreed boundaries</p> <p>All damaged areas successfully rehabilitated</p>	<p>As and when required</p>	

Phase of development	CONSTRUCTION			
Impact / issue	Construction (E)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>E4 Fauna</p> <p>All activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962).</p> <p>The transformed and fragmented nature of the wetlands accompanied by the high density housing within the catchment resulted in the wetlands being utilised less as faunal corridors.</p> <p>All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake, a specialist must be called in to safely relocate the animal if the EO or ECO is not able to.</p> <p>Environmental induction training and awareness must include aspects dealing in safety with wild animals into and on site. Focus on animals such as snakes and other reptiles that often generate fear by telling workers how to move safely away and to whom to report the sighting. Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones, etc.</p> <p>Should animals be encountered on site, they should be dealt with in a responsible manner. Animals must be re-located on site with the assistance of an EO or ECO.</p> <p>Should any Red Data species or those of Conservation concern i.e. South African Hedgehog, Brown Hyena, Flat Rock Scorpion, Grass Owl be encountered, the relevant Authority should be notified immediately.</p>	<p>Minimise disturbance to animals</p> <p>Minimise interruption of breeding patterns of birds</p> <p>Minimise destruction of habitat</p>	<p>No complaints from Nature Conservation</p> <p>No litigation concerning applicable animal protection acts</p> <p>No measurable or visible signs of habitat destruction</p>	<p>Monitor daily</p>	

Phase of development	CONSTRUCTION			
Impact / issue	Construction (E)			
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>E5 Flora</p> <p>Both the conservation priority and agricultural potential of the proposed site unit is low. No red data species were found within this ecological unit.</p> <p>Permanent wetland areas contained <i>Phragmites australis</i>, <i>Typha capensis</i> and <i>Persicaria sp.</i> with a mixture of facultative and terrestrial species (mostly graminoids and weeds) dominating the seasonal and temporary wetland areas.</p> <p>The presence of wetlands has been confirmed in the Wetland Report.</p> <p>Once construction is complete, rehabilitation of un-built areas must be undertaken in order to restore the aesthetic & ecological value of the area. A qualified botanist and the ECO must be consulted with regard to the most appropriate rehabilitation vegetation and structures. Active re-vegetation must take place with locally indigenous vegetation under the supervision of the ECO and in accordance with a re-vegetation and habitat rehabilitation plan.</p> <p>No open fires shall be allowed on site under any circumstances, fires will only be permitted in adequate facility within the crew camp, Forest Act, 1984 (Act No. 122 of 1984).</p>	<p>Minimal disturbance to vegetation where such vegetation does not interfere with construction in terms of approvals from the relevant authority</p> <p>Prevent litigation concerning removal of vegetation</p> <p>Encourage natural habitat fauna</p> <p>Minimise scarring of the soil surface and land features</p> <p>Minimise disturbance and loss of topsoil</p> <p>Minimise risk of veldt fires</p> <p>Minimise risk of fauna and flora destruction</p>	<p>No litigation due to removal of vegetation without necessary permission</p> <p>No exotic plants used for landscaping</p> <p>No visible erosion scars once construction is completed</p> <p>The footprint has not exceeded the agreed boundaries</p> <p>All damaged areas successfully rehabilitated</p> <p>No veldt fires started by contractors work force</p> <p>No claims from landowners for damages due to veldt fires</p> <p>Method statement</p>	<p>As and when required</p>	

Phase of development	CONSTRUCTION				
Impact / issue	Construction (E)				
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES	
<p><u>E6 Heritage</u></p> <p>Should any archaeological artefacts be exposed during construction activities, work on the area where the artefacts were found must cease immediately and the ECO must be notified within 24 hours.</p> <p>Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist.</p> <p>Under no circumstances must archaeological artefacts be removed, destroyed or interfered.</p> <p>Any archaeological sites exposed during demolition or construction activities must not be disturbed prior to authorisation by the South African Heritage Resources Agency (SAHRA) on the appropriate provincial heritage resource agency.</p>	<p>Limit the destruction of the country's heritage resources</p> <p>The preservation and appropriate management of new archaeological finds should these be discovered during construction</p>	<p>No destruction of or damage to known archaeological sites</p>	<p>Monitor Daily</p>		
<p><u>E7 Access roads</u></p> <p>Access negotiations take place with the relevant land owners prior to construction and site demarcation.</p> <p>No unauthorised access is permitted and the suitable landowner consent must be obtained. Any authorised clearing for access roads must be done under the supervision of the ECO.</p> <p>Any damage or degradation will be investigated and fines issued, the affected areas must be immediately rehabilitated.</p> <p>Access roads for earthmoving-equipment must be clearly designated and be positioned as close as possible to the proposed development site. No driving off from the marked roads is permitted and designated parking areas must be identified and demarcated with applicable signage.</p>	<p>Minimise loss of topsoil and enhancement of erosion</p> <p>Minimise fauna and flora displacement by destruction of natural habitats</p>	<p>No erosion on access roads after completion of construction</p> <p>No loss of topsoil due to run-off water on access roads</p>	<p>As required, monitor daily</p>		
<p><u>E8 Crime, safety and security</u></p>		<p>No incidences reported</p>	<p>Monitor daily</p>		

Phase of development	CONSTRUCTION				
Impact / issue	Construction (E)				
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES	
<p>No site staff, other than security personnel and skeleton staff will be housed on site unless otherwise stipulated in the EA.</p> <p>The access to the site must be controlled so as to restrict unauthorised personnel from entering the site. The workers on site must retain some means of identification. The ESO and the contractor are responsible for ensuring that only authorised personnel are on site at all times.</p> <p>No site staff or construction workers will be allowed on site after or before working hours (08:00am to 17:00pm) unless permission is given from the landowner.</p> <p>The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations.</p> <p>The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc.</p> <p>The contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site.</p> <p>The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at prominent locations around the construction site and the construction crew camps.</p>	<p>Reduce the risk of potential incidences.</p> <p>Minimise the potential impact on the environment.</p>				
<p>E9 Visual impact</p> <p>Shade cloth must be utilised to conceal and minimise the visual impact of contractor camps, lay down and storage areas.</p> <p>Landscaping must enhance the aesthetic appeal of the development.</p>	Minimise visual impact	No complaints from I&APs	Monitor daily		

Phase of development	CONSTRUCTION				
Impact / issue	Construction (E)				
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES	
Rubble and litter must be removed every day and be disposed of at a registered landfill.					
<p><u>E10 Geotechnical</u></p> <p>Founding conditions for individual structures must be confirmed by a qualified Geotechnical Engineer / Structural Engineer / Geologist.</p> <p>All trenches and excavation works must be properly backfilled and compacted.</p> <p>Mechanical methods of rock breaking will have noise and dust impacts that must be managed. Method Statements for chemical breaking must be provided by the ER.</p> <p>A Geotechnical Report has been compiled and it was found that water was encountered from around 0,3m to 2,0m in test pits, including sidewall instabilities being noted. Please refer to Appendix G for a Geotechnical Report.</p>	<p>Minimise potential structural faults</p> <p>Minimise trench collapse</p>	No visible signs of backfill deterioration or trench collapse	As and when required		
<p><u>E11 Aquatic Ecosystem</u></p> <p>Erect silt curtains on the downslope sides of all construction areas in close proximity to water resources, including wetlands.</p> <p>The temporary storage of topsoil, inert spoil, fill, etc. should be above the 20 year floodline or at least 20m from the top of the bank of any drainage lines, whichever is the maximum or as agreed with the ECO.</p> <p>To prevent erosion of material that is stockpiled for long periods, the material must be retained in a bermed area.</p> <p>Mulch, roughen or sterile grass seeding can be used on any batter or topsoil stockpile that is to be maintained for longer than 28 days.</p> <p>Construct an earth bank around the upslope portion of any stockpiles in order to redirect runoff and prevent scouring of stockpiles.</p>	Minimise the aquatic ecosystem impact	Limit the impact of the proposed activity on the natural environment.	As and when required		

Phase of development	CONSTRUCTION				
Impact / issue	Construction (E)				
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES	
<p>Erect a silt fence around any stockpiles in order to trap sediment and prevent stockpile sediment loss.</p> <p>Stockpiles should not be higher than 2m to avoid compaction, and single handling is recommended.</p> <p>Dust suppression is necessary for stockpiles older than a month – with either water or a biodegradable chemical binding agent.</p> <p>Construction vehicles are to be maintained in good working order, to reduce the probability of leakage of fuels and lubricants.</p> <p>A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide and insecticides, as appropriate, in well-ventilated areas.</p> <p>Storage of potentially hazardous materials should be above any 100-year flood line, or as agreed with the ECO. These materials include fuel, oil, cement, bitumen etc.</p> <p>Sufficient care must be taken when handling these materials to prevent pollution.</p> <p>Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils.</p> <p>Oil residue shall be treated with oil absorbent such as Drizit or similar and this material removed to an approved waste site.</p> <p>Concrete, if used, is to be mixed on mixing trays only, not on exposed soil;</p> <p>Concrete and tar shall be mixed only in areas which have been specially demarcated for this purpose.</p>					

Phase of development	CONSTRUCTION				
Impact / issue	Construction (E)				
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES	
<p>All concrete and tar that is spilled outside these areas shall be promptly removed by the Contractor and taken to an approved dumpsite.</p> <p>After all the concrete/ tar mixing is complete all waste concrete/ tar shall be removed from the batching area and disposed of at an approved dumpsite.</p> <p>Storm water shall not be allowed to flow through the batching area. Cement sediment shall be removed from time to time and disposed of in a manner as instructed by the Consulting Engineer.</p> <p>All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring.</p> <p>Portable septic toilets are to be provided and maintained for construction crews. Maintenance must include their removal without sewage spillage.</p> <p>Portable septic toilets are to be located outside of the 1-100year floodline.</p> <p>Under no circumstances may ablutions occur outside of the provided facilities.</p> <p>At all times care should be taken not to contaminate surface water resources.</p> <p>No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority.</p> <p>In the case of pollution of any surface or groundwater, the Regional Representative of the DWA must be informed immediately.</p> <p>Where construction in close proximity to sewer lines is unavoidable then excavations must be done by hand while at all times ensuring that the soil beneath the sewer lines is not destabilised.</p> <p>Store all litter carefully so it cannot be washed or blown into any of the water courses within the study area.</p>					

Phase of development	CONSTRUCTION				
Impact / issue	Construction (E)				
MITIGATION MEASURE AND RESPONSIBLE PERSON	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES	
<p>Provide bins for construction workers and staff at appropriate locations, particularly where food is consumed.</p> <p>The construction site should be cleaned daily and litter removed.</p> <p>Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering.</p> <p>Backfill must be compacted to form a stabilised and durable blanket; and the current load above the sewer lines must at no time be exceeded.</p>					
<p>E12 Soil</p> <p>The contractors must provide and maintain a method statement for "management of topsoil".</p> <p>Topsoil must be stripped from all areas that are to be utilised during the construction period.</p> <p>Topsoil must be deemed to be the top layer of soil containing organic material, nutrients and plant seeds. For this reason it is an extremely valuable resource for the rehabilitation and vegetation of disturbed areas.</p> <p>Ripping must be done to a depth of 250 mm in two directions at right angles. Topsoil must be placed in the same soil zone from which it has been stripped.</p> <p>At the beginning of the construction phase, topsoil removed for vegetation clearance must be stripped to a minimum depth of 150 mm and stockpiled on the demarcated topsoil stockpile areas.</p> <p>All topsoil must be removed and stockpiled on the site.</p> <p>However, the use of topsoil for rehabilitation contaminated by the seed of alien vegetation (e.g. blackjacks, etc.) must not be permitted unless a programme to germinate the seed and eradicate the seedlings is drawn up and approved, or some other mitigatory feature is found. This must be approved by the ECO.</p>	<p>Minimise scaring of the soil surface and land features</p> <p>Minimise disturbance and loss of soil</p> <p>Minimise construction footprint</p> <p>Minimise sedimentation of nearby drainage lines</p> <p>Maintain the integrity of topsoil's for future landscaping and rehabilitation</p> <p>Containment of invasive plant growth</p>	<p>No visible erosion scars once construction is completed</p> <p>The footprint has not exceeded the agreed site in terms of EA, etc.</p> <p>Minimal invasive weed growth</p> <p>No signs of sedimentation and erosion</p> <p>Method statement</p>	Daily		

Phase of development	CONSTRUCTION				
Impact / issue	Construction (E)				
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Single handling is recommended. Stockpiles must not be higher than 2m to avoid compaction.</p> <p>Backfilling must be undertaken in such a way that the final contours blend with the surrounding environment.</p> <p>Remediated slopes must be graded to preferably 1:7.</p> <p>Slopes can then be capped with topsoil. This requires a minimum layer of 100 mm in most areas.</p> <p>Disturbed surfaces to be rehabilitated must be ripped and the area must be backfilled with excavated material from the site.</p>					

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>F1 Wetland Delineation</p> <p>The design of drainage systems must ensure there is no contamination, eutrophication or increased erosion of the wetland areas. Drainage systems should be maintained regularly in order to minimise the runoff of harmful chemical substances into the wetland areas.</p> <p>Develop a schedule of routine inspections of all storm water infrastructure. This will include assessing the system for any blockages due to litter and sediment build up and subsequent cleaning if necessary.</p> <p>The construction of surface stormwater drainage systems during the construction phase must be done in a manner that would protect the quality and quantity of the downstream system. The use of swales, which could then be grassed for the operational phase, is recommended as the swales can form part of a stormwater attenuation plan for the road upgrade.</p>		<p>To minimise the runoff of harmful chemical substances into the wetland areas.</p> <p>To minimise the impact of storm water network in terms of flooding, sediment, and erosion, and pollution.</p> <p>Removal of blockages and litter.</p>	<p>No runoff of harmful chemical substances into the wetland areas.</p> <p>No flooding, sedimentation, and erosion, and pollution.</p> <p>No blockages and litter.</p> <p>No negative impact on the wetland system.</p>	Regularly	

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Perform regular maintenance of the vegetated components of the system. Of particular importance will be grass cutting in the swales which is largely dependent on the grass type planted.</p> <p>Due to the social dynamic of the area it is unlikely that litter load into the system will decrease with any formal induction process. The litter traps will therefore need to be inspected and cleaned frequently (possibly even on a weekly basis during wet periods) to prevent any blockages in the system that may arise to flooding.</p> <p>Attenuation facilities (i.e. sediment ponds) should be monitored, particularly in the wet season for changes in water levels and pollution control from upstream areas. Sediment ponds should be cleaned out routinely. This will involve excavating the trap, and replanting if necessary. The routine for this should be based on its effectiveness in terms of pollution and sediment control.</p> <p>Perform post construction inspection of the downstream areas to assess the impact of the storm water network in terms of flooding, sediment, and erosion, and pollution control.</p> <p>Where possible, try to include community participation in inspecting and maintaining the facilities, and in particular the removal of blockages and litter.</p> <p>Stormwater outflows should not enter directly into a wetland. The velocity of water that may reach wetlands should be slowed before it is intercepted by virgin soils using a siltation and erosion control structure such as swales.</p> <p>Re-vegetation of disturbed areas must be undertaken with site indigenous species and in accordance with the instructions issued by the ECO. Areas where soil compaction or ruts developed should be rehabilitated. The following species could be utilised in each of the different wetland zones for rehabilitation:</p> <ul style="list-style-type: none"> ✓ Temporary zone: <i>Aristida junciformis</i>; <i>Conyza ulmifolia</i>; <i>Eriocaulon dregei</i>; <i>Fingerhuthia sesleriiformis</i>; <i>Gunnera perpensa</i>; <i>Helichrysum mundii</i>; <i>Imperata cylindrica</i>; <i>Miscanthus capensis</i>; <i>Miscanthus junceus</i>; <i>Paspalum scrobiculatum</i>; <i>Pennisetum macrourum</i>; 					

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p><i>Pennisetum sphacelatum; Ranunculus meyeri; Ranunculus multifidus and Setaria sphacelata.</i></p> <p>✓ Seasonal zone: <i>Andropogon appendiculatus; Arundinella nepalensis; Carex acutiformis; Carex cognata; Cladium mariscus; Cyperus digitatus; Cyperus latifolius; Cyperus longus; Eriocaulon dregei; Fimbristylis complanata; Fimbristylis dichotoma; Fingerhuthia sesleriiformis; Gunnera perpensa; Helichrysum mundii; Isolepis costata; Juncus dregeanus; Juncus exsertus; Juncus oxycarpus; Juncus punctorius; Kniphofia linearifolia; Limosella longiflora; Ludwigia palustris; Paspalum scrobiculatum; Pennisetum macrourum; Phragmites mauritianus; Pycreus mundii; Pycreus nitidus; Ranunculus meyeri; Ranunculus multifidus; Sacciolepis chevalieri; Schoenoplectus decipiens; Scleria welwitschii; Setaria sphacelata; Xyris capensis and Xyris congensis.</i></p> <p>✓ Permanent zone: <i>Arundinella nepalensis; Carex acutiformis; Carex cognata; Cladium mariscus; Cyperus digitatus; Cyperus latifolius; Fimbristylis dichotoma; Gunnera perpensa; Isolepis costata; Juncus dregeanus; Juncus exsertus; Juncus oxycarpus; Juncus punctorius; Kniphofia linearifolia; Limosella longiflora; Ludwigia palustris; Phragmites australis; Pycreus mundii; Pycreus nitidus; Ranunculus meyeri; Ranunculus multifidus; Sacciolepis chevalieri; Schoenoplectus decipiens and Scleria welwitschii.</i></p> <p>After completion of the construction phase, a wetland monitoring program must be initiated that ensure that all wetland protection infrastructure and storm-water systems are properly installed and that all affected wetland areas are adequately rehabilitated.</p> <p>Avoid construction activities in wetlands at all cost through proper demarcation and appropriate environmental awareness training. The Contractor has a responsibility to inform all staff of the need to be vigilant against any practice that will have a harmful effect on wetlands. This information shall form part of the Environmental Education Programme to be effected by the Contractor, including the following:</p>					

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<ul style="list-style-type: none"> ✓ No construction shall take place in areas of high sensitivity such as wetlands i.e. "NO-GO Areas". All no-go areas must be demarcated with red tape under guidance of the ECO. ✓ Any proclaimed weed or alien species that germinates during the contract period shall be cleared by hand before flowering. ✓ Infilling, excavation, drainage and hardened surfaces (including buildings and asphalt) should not occur in any of the wetland zones (i.e. permanent, seasonal or temporary), or within 30m of a wetland. ✓ Should construction be contained to non-wetland areas, caution must be taken to ensure building materials are not dumped or stored within a delineated wetland buffer zone of 30m. ✓ Imported fill material should be monitored during and after construction for the presence of any alien species. Any such species should be removed immediately. ✓ Emergency plans must be in place in case of spillages into wetland systems. ✓ All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds. It should also only be stored for the minimum amount of time necessary. ✓ Erosion control of all banks must take place so as to reduce erosion and sedimentation into river channels or wetland areas. ✓ Silt traps and culverts should be regularly maintained and cleared so as to ensure effective drainage. ✓ Littering and contamination of water sources during construction must be mitigated by effective construction camp management ✓ All construction materials including fuels and oil should be stored in a demarcated area that is contained within a bunded impermeable surface to avoid spread of any contamination (outside of wetlands or wetland buffer zones) ✓ Cement and plaster should only be mixed within mixing trays. Washing and cleaning of equipment should also be done within a bermed area, in order to trap any cement or plaster and avoid excessive soil erosion. These sites must be rehabilitated prior to commencing the operational phase. 					

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>The proposed placement of the free span bridge are well located at a narrow point in the valley (partly the result of historic infilling) which would facilitate the placement of supporting pillars outside of the macro stream channel.</p> <p>A wetland monitoring program should be initiated at the start of the construction phase. The monitoring program should be designed in situ with the wetland rehabilitation plan by a wetland specialist. The ECO should be briefed by a wetland specialist on specific monitoring issues. Appropriate mitigation needs to be implemented after consultation with relevant specialist if any problems are detected.</p>					
<p>F2 Geotechnical</p> <p>Founding conditions for individual structures must be confirmed by a qualified Geotechnical Engineer / Structural Engineer / Geologist.</p> <p>All trenches and excavation works must be properly backfilled and compacted.</p> <p>Mechanical methods of rock breaking will have noise and dust impacts that must be managed. Method Statements for chemical breaking must be provided by the ER.</p> <p>Foundation design by a registered engineer should be considered.</p> <p>The precautionary measures to reduce water ingress must be implemented as changes in moisture content can cause ground movement.</p> <p>Excavations (for foundations and underground services) must be inspected on the site during construction.</p> <p>The in situ materials are generally considered suitable for use in layer works. However, this will require some selection as the materials are fairly variable.</p> <p>It is recommended that all construction materials should be imported.</p> <p>Only limited excavation problems are foreseen if a large excavator is used. Some hardpan ferricrete and weathered granite rock is present close to surface. Some</p>		<p>Minimise potential structural faults.</p> <p>Minimise trench collapse.</p> <p>Reduction of water ingress.</p> <p>Minimisation of impact to the geotechnical characteristics of the proposed area.</p>	<p>No visible signs of backfill deterioration or trench collapse.</p> <p>No water ingress.</p> <p>No impact to the geotechnical characteristics of the proposed area.</p>	<p>During construction</p>	

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
granite rock outcrops are visible in the drainage feature. Limited blasting and pneumatic breaking may be required. All excavations deeper than 1,5m must be shored.					
<p><u>F3 Heritage Impact Assessment</u></p> <p>Should any archaeological artefacts be exposed during construction activities, work on the area where the artefacts were found must cease immediately and the ECO must be notified within 24 hours.</p> <p>Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist.</p> <p>Under no circumstances must archaeological artefacts be removed, destroyed or interfered.</p> <p>Any archaeological sites exposed during demolition or construction activities must not be disturbed prior to authorisation by the SAHRA on the appropriate provincial heritage resource agency.</p>		<p>Protection of possible archaeological, cultural and historic sites within the proposed development area.</p> <p>Prevent potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources.</p> <p>Limit the destruction of the country's heritage resources.</p> <p>The preservation and appropriate management of new archaeological finds should these be discovered during construction.</p>	No destruction of or damage to known archaeological sites	Monitor Daily during construction	
<p><u>F4 Traffic Impact Assessment (TIA) Report</u></p> <p>The missing link of the Ingonyama Road must be implemented with the provision that the proposed road upgrading measures are implemented.</p> <p>The construction of the missing link of Ngonyama Road, west of Ubuntu Road, will allow access to all accesses off Ingonyama Road. Thus access management along this section of Ngonyama Road should be enforced upon the upgrade of the adjoining roads.</p> <p>In order to promote the use of public transport, public transport stops should not be placed more than 300m part.</p>		The access roads are in an acceptable condition.	No traffic impacts	During construction	

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>The acceptable configuration of public transport operators along Ngonyama Road should be discussed between public transport operators, local authority and the JMPD to obtain consensus on the most suitable location and the preferred public transport stop configuration.</p> <p>Construction routes must be clearly defined.</p> <p>Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure.</p> <p>The construction trucks routes and times of operation should be carefully planned.</p> <p>Wheel washing and damping down of un-surfaced roads must be implemented to reduce dust.</p> <p>Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.</p> <p>Servicing must be done off-site.</p> <p>Oil changes must take place on a concrete platform or on a drip tray.</p> <p>Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels.</p> <p>A Traffic Management Plan must be implemented.</p> <p>The Contractor shall properly mark all access roads. Markers shall show the direction of travel to which the road leads. Roads not to be used shall be marked with a "NO ENTRY" sign. Where required, speed limits shall be indicated on the roads. All speed limits shall be strictly adhered to at all time.</p>					
<p><u>F5 Flood Hydrology/Surface water/Hydrological Assessment Report</u></p>				Regularly	

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Develop a schedule of routine inspections of all storm water infrastructure. This will include assessing the system for any blockages due to litter and sediment build up and subsequent cleaning if necessary.</p> <p>Perform regular maintenance of the vegetated components of the system. Of particular importance will be grass cutting in the swales which is largely dependent on the grass type planted.</p> <p>Due to the social dynamic of the area it is unlikely that litter load into the system will decrease with any formal induction process. The litter traps will therefore need to be inspected and cleaned frequently (possibly even on a weekly basis during wet periods) to prevent any blockages in the system that may arise to flooding.</p> <p>Attenuation facilities (i.e. sediment ponds) should be monitored, particularly in the wet season for changes in water levels and pollution control from upstream areas.</p> <p>Sediment ponds should be cleaned out routinely. This will involve excavating the trap, and replanting if necessary. The routine for this should be based on its effectiveness in terms of pollution and sediment control.</p> <p>Perform post construction inspection of the downstream areas to assess the impact of the storm water network in terms of flooding, sediment, and erosion, and pollution control.</p> <p>Where possible, try to include community participation in inspecting and maintaining the facilities, and in particular the removal of blockages and litter.</p> <p>It is restated that without ensuring proper maintenance of the system, it is unlikely to operate to its full capacity and will result in less favourable site conditions in terms of surface water management.</p> <p>General clearing of the reeds in the watercourse will improve the hydraulic capacity of the river as a whole. It will achieve the freeboard requirements for a culvert option, and it will lower flood line in the area as a whole. However, the reeds provide an important sediment and water quality control function at present, and there may be other important environmental factors. There will also be a</p>		<p>Provide for the removal of urban pollutants and debris from drains and outfalls.</p> <p>Have a neutral to positive impact on the natural (in particular the receiving wetland) and human environment.</p>	<p>No debris not pollutants from the stormwater attenuation system.</p>		

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
maintenance burden as the reeds are likely to regrow and will need to be removed on a regular basis.					
<p><u>F6 Aquatic Impact Assessment Report</u></p> <p>Erect silt curtains on the downslope sides of all construction areas in close proximity to water resources, including wetlands</p> <p>The temporary storage of topsoil, inert spoil, fill, etc. should be above the 20 year floodline or at least 20m from the top of the bank of any drainage lines, whichever is the maximum or as agreed with the ECO</p> <p>To prevent erosion of material that is stockpiled for long periods, the material must be retained in a bermed area</p> <p>Mulch, roughen or sterile grass seeding can be used on any batter or topsoil stockpile that is to be maintained for longer than 28 days</p> <p>Construct an earth bank around the upslope portion of any stockpiles in order to redirect runoff and prevent scouring of stockpiles</p> <p>Erect a silt fence around any stockpiles in order to trap sediment and prevent stockpile sediment loss</p> <p>Stockpiles should not be higher than 2m to avoid compaction, and single handling is recommended</p> <p>Dust suppression is necessary for stockpiles older than a month – with either water or a biodegradable chemical binding agent.</p> <p>Construction vehicles are to be maintained in good working order, to reduce the probability of leakage of fuels and lubricants.</p> <p>A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide and insecticides, as appropriate, in well-ventilated areas.</p>		Determine possible impacts on the associated aquatic ecosystem as a result of the proposed activity.	Less negative impacts on the aquatic ecosystem.	During construction activities, on a regular basis.	

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Storage of potentially hazardous materials should be above any 100-year flood line, or as agreed with the ECO. These materials include fuel, oil, cement, bitumen etc.</p> <p>Sufficient care must be taken when handling these materials to prevent pollution.</p> <p>Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils.</p> <p>Oil residue shall be treated with oil absorbent such as Drizit or similar and this material removed to an approved waste site.</p> <p>Concrete, if used, is to be mixed on mixing trays only, not on exposed soil.</p> <p>Concrete and tar shall be mixed only in areas which have been specially demarcated for this purpose.</p> <p>All concrete and tar that is spilled outside these areas shall be promptly removed by the Contractor and taken to an approved dumpsite.</p> <p>After all the concrete/ tar mixing is complete all waste concrete/ tar shall be removed from the batching area and disposed of at an approved dumpsite.</p> <p>Storm water shall not be allowed to flow through the batching area. Cement sediment shall be removed from time to time and disposed of in a manner as instructed by the Consulting Engineer.</p> <p>All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring.</p> <p>Portable septic toilets are to be provided and maintained for construction crews. Maintenance must include their removal without sewage spillage.</p> <p>Portable septic toilets are to be located outside of the 1-100year floodline.</p>					

Phase of development	CONSTRUCTION AND OPERATION	EAP			
Impact / issue	Specialist requirements (F)	Proponents signature			
MITIGATION MEASURE AND RESPONSIBLE PERSON		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	FREQUENCY OF ACTION	NOTES
<p>Under no circumstances may abluitions occur outside of the provided facilities.</p> <p>At all times care should be taken not to contaminate surface water resources.</p> <p>No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority.</p> <p>In the case of pollution of any surface or groundwater, the Regional Representative of the DWA must be informed immediately.</p> <p>Where construction in close proximity to sewer lines is unavoidable then excavations must be done by hand while at all times ensuring that the soil beneath the sewer lines is not destabilised.</p> <p>Store all litter carefully so it cannot be washed or blown into any of the water courses within the study area.</p> <p>Provide bins for construction workers and staff at appropriate locations, particularly where food is consumed.</p> <p>The construction site should be cleaned daily and litter removed.</p> <p>Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering.</p> <p>Backfill must be compacted to form a stabilised and durable blanket; and the current load above the sewer lines must at no time be exceeded.</p>					

ANNEXURE 1 (SAMPLE)

DECLARATION OF UNDERSTANDING BY THE DEVELOPER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

ANNEXURE 2 (SAMPLE)

DECLARATION OF UNDERSTANDING BY THE ENGINEER

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

ANNEXURE 3 (SAMPLE)

DECLARATION OF UNDERSTANDING BY THE CONTRACTOR

I, _____

Representing _____

Declare that I have read and understood the contents of the Environmental Management Programme for:

Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness2: _____

ANNEXURE 4 A (SAMPLE)-to be repeated for every Method Statement

METHOD STATEMENT: **Solid Waste Management**

CONTRACT:..... **DATE:**.....

WHAT WORK IS TO BE UNDERTAKEN? [Give a brief description of the works to be undertaken on site that will generate waste (hazardous and non-hazardous wastes)]: * Note: please attach extra pages if more space is required.

***Insert additional pages as required**

WHERE ARE THE WORKS TO BE UNDERTAKEN? (Where possible, provide an annotated plan and a full description of the extent of the works): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

METHOD STATEMENT: **Solid Waste Management (contd.)**

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:..... **End Date:**.....

HOW IS WASTE TO BE MANAGED ON SITE? (Provide as much detail as possible, including annotated sketches and plans where possible): * Note: please attach extra pages if more space is required

***Insert additional pages as required**

DECLARATIONS for Method Statement Solid Waste Management (contd.) (SAMPLE)

1) ENGINEER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

(Signed)

(Print name)

Dated: _____

2) ECO

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

(Signed)

(Print name)

Dated: _____

2) CONTRACTOR

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to and with approval by the Engineer, and that the SHE Coordinator, Construction Manager and ECO will audit my compliance with the contents of this Method Statement

(Signed)

(Print name)

Dated: _____

ANNEXURE 5 (SAMPLE)**INCIDENT AND ENVIRONMENTAL LOG**

ENVIRONMENTAL INCIDENT LOG				
Date	Env. Condition	Comments <i>(Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)</i>	Corrective Action Taken <i>(Give details and attach documentation as far as possible)</i>	Signature

4 ON-SITE IMPLEMENTATION

This EMP is specifically compiled for the period of time prior to commencement of, and activities associated with construction of the above mentioned activity.

4.1 Organisational Structure

The organisational structure identifies and defines the responsibilities and authority of the various role-players (individuals and organisations) involved in the project. All instructions and official communications regarding environmental matters shall follow the organisational structure shown in Figure 1 below. The organisational structure reflected in below has been developed to ensure that:

- There are clear channels of communication;
- There is an explicit organisational hierarchy for the proposed project; and
- Potential conflicting or contradictory instructions are avoided.

4.2 Environmental Roles and Responsibilities Matrix

In order for the EMP to be successfully implemented, all the role players involved in the project need to co-operate. For this to happen, role players must clearly understand their roles and responsibilities in the project, must be professional, form respectful and transparent relationships, and maintain open lines of communication.

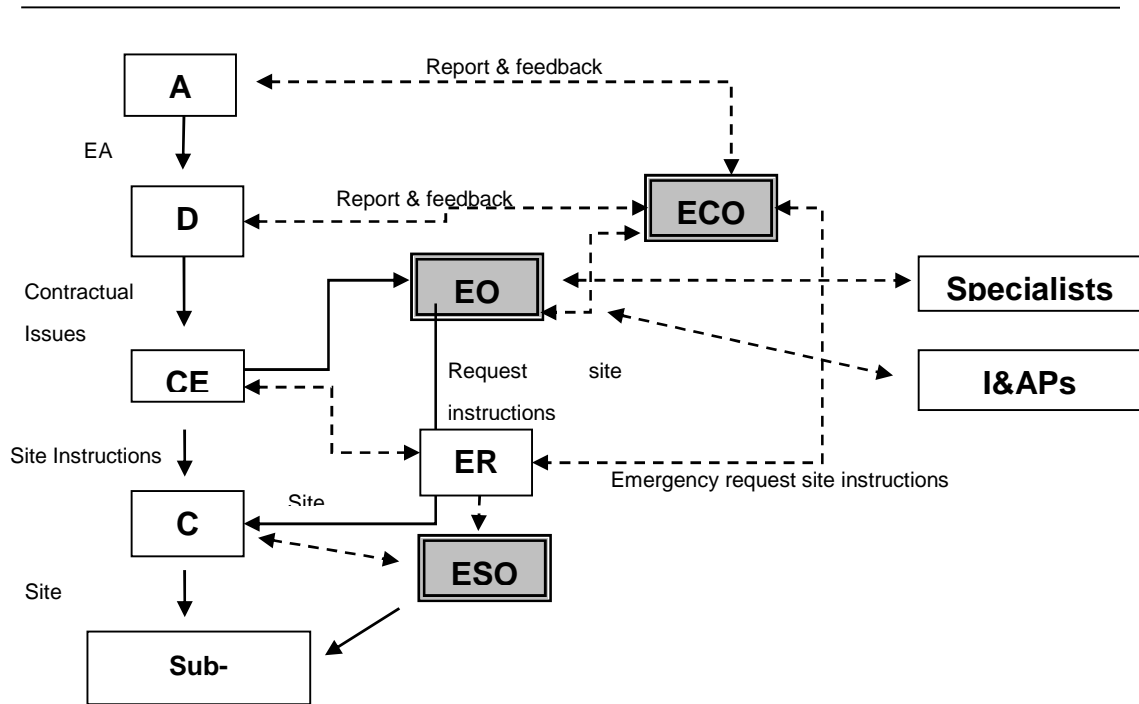
Pre-EA- Potential role players or project teams will include the Authorities (A), Other Authority (OA), Developer/Proponent (D), Consulting Engineers (CE), Engineers Representative (ER), Environmental Site Officer (ESO), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C), Environmental Assessment Practitioner (EAP). Further; landowners, interested and affected parties (I&APs) and the relevant environmental and project specialists are also important role players. Roles and Responsibilities will be revised pending authorisation.

Table 1: Functions and Responsibilities of the Project Team

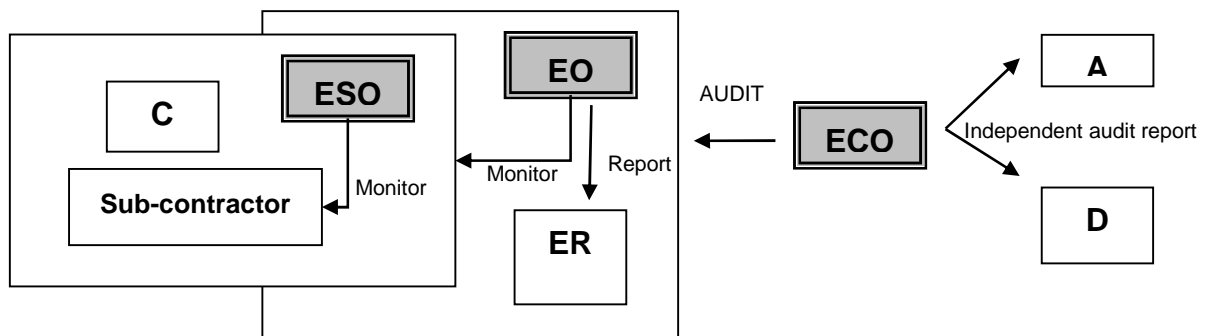
KEY	FUNCTION	RESPONSIBILITY
D	Developer	Proponent ultimately accountable for ensuring compliance to the EMP and conditions contained in the EA. The ECO must be contracted by the developer (full time or part time depending on the size of the project) as an independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of Environmental Authorisations (EA's), and the EMP for the project. The developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities. The developer must ensure that the ECO is integrated as part of the project team.
CE	Consulting Engineer	Contracted by the developer to design and specify the project engineering aspects. Generally the engineer runs the works contract. The CE may also fulfil the role of PM on the proponent's behalf (See PM).
PM	Project Manger	The PM has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any

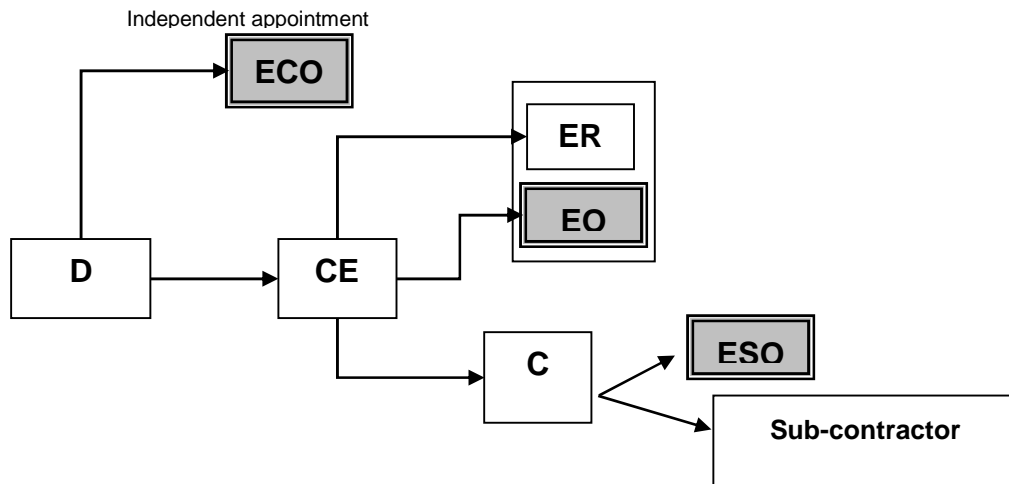
KEY	FUNCTION	RESPONSIBILITY
		construction activity in contravention of the EMP in accordance with an agreed warning procedure.
ER	Engineers Representative	The consulting ER on site. Has the power/mandate to issue site instructions and in some instances, variation orders to the contractor, following request by the EO or ECO. The ER oversees site works, liaison with Contractor and ECO.
ECO	Environmental Control Officer	<p>An independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of EA's, and the EMP for the project. The ECO must be on site prior to any site establishment and must endeavour to form an integral part of the project team.</p> <p>The ECO must be proactive and have access to specialist expertise as and when required, these include botanists, ecologists, etc. Further, the ECO must also have access to expertise such as game capture, snake catching, etc.</p> <p>The ECO must conduct audits on compliance to relevant environmental legislation, conditions of EA, and the EMP for the project. The size and sensitivity of the development, based on the EIA, will determine the frequency at which the ECO will be required to conduct audits. (A minimum of a monthly site inspection must be undertaken).</p> <p>The ECO must be the liaison between the relevant authorities and the project team. The ECO must communicate and inform the developer and consulting engineers of any changes to environmental conditions as required by relevant authoritative bodies. The ECO must ensure that the registration and updating of all relevant EMP documentation is carried out.</p> <p>The ECO must be suitably experienced with the relevant environmental management qualifications and preferably competent in construction related methods and practices.</p> <p>The ECO must handle information received from whistle blowers as confidential and must address and report these incidences to the relevant Authority as soon as possible.</p>
C	Contractor	<p>The principle contractor, hereafter known as the 'Contractor', is responsible for implementation and compliance with the requirements of the EMP and conditions of the EA's, contract and relevant environmental legislation. The Contractor must ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMP.</p> <p>The contractor is required, where specified, to provide Method Statements setting out in detail how the management actions contained in the EMP will be implemented.</p>
ESO	Environmental Site Officer	<p>The ESO is employed by the Contractor as his/her environmental representative to monitor, review and verify compliance with the EMP by the contractor. This is not an independent appointment; rather the ESO must be a respected member of the contractor's management team.</p> <p>Dependent on the size of the development the ESO must be on site one week prior to the commencement of construction. The ESO must ensure that he/she is involved at all phases of the construction (from site clearance to rehabilitation).</p>
A	Lead Authority	The authorities are the relevant environmental department that has issued the Environmental Authorisation. The authorities are responsible for ensuring that the monitoring of the EMP and other authorisation documentation is carried out, this will be achieved by reviewing audit reports submitted by the ECO and conducting regular site visits.
OA	Other Authority	Other authorities are those that may be involved in the approval process of an EMP. Their involvement may include reviewing EMP's to ensure the accuracy of the information relevant to their specific mandate.

KEY	FUNCTION	RESPONSIBILITY
		Other authorities may be involved in the development, review or implementation of an EMP. For example if a specific development requires a water use licence for the relevant national authority then that authority should review and comment on the content of the particular section pertaining to that mandate.
EAP	Environmental Assessment Practitioner	The definition of an EAP in Section 1 of NEMA is "the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments introduced through regulations".



MONITORING, AUDITING AND REPORTING (Pre-EA)





ENVIRONMENTAL APPOINTMENTS (Pre-EA)

Figure 1: Recommended lines of communication, reporting and monitoring

4.3 Enforcement, monitoring and auditing

The ECO must conduct, at a frequency as determined by the Department and stipulated in the relevant EA for the project, independent environmental audits. The audits are to verify the projects compliance with the EMP and conditions of the EA.

Before any construction activities commence, the ECO must compile, for the approval by the Department, an audit checklist based on the contents of this EMP and conditions of the EA. The ECO must at the request of the Department forward audit reports to the Department at a frequency determined by the Department which must be stipulated in the EA.

Evidence of the following as key performance indicators, must be included in the audit reports where required:

- Complaints received from landowners and actions taken.
- Environmental incidents, such as, concrete spills, etc. and actions taken (litigation excluded).
- Incidents leading to litigation and legal contraventions.
- Environmental damage that needs rehabilitation measures to be taken.

A copy of all ESO and EO monitoring reports, contractor method statements and pro forma documentation must be held by the ESO and/or the EO on site and be made available to the Department and or the ECO upon request.

4.4 Non-Compliance

The Contractor is deemed NOT to have complied with the EMP if:

- within the boundaries of the site there is evidence of contravention of the EMP confirmed and verified by the ECO;
- environmental damage ensues due to non-compliance of EMP requirements;
- the Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time, and
- the Contractor fails to respond adequately to complaints from the public in line with requirements of this EMP.

4.5 General guidelines

The following measures provide guideline solutions to frequently anticipated issues on most development activities.

- The prevention of any site degradation due to non-compliance, administrative or financial problems, and inactivity during the construction phase, illegal activities, delays caused by archaeological finds, etc. is ultimately the responsibility of the applicant/developer. Section 28, NEMA.
- The study area must be clearly defined and surveyed according to the project authorisation. All workforce members and other construction personnel are not to go beyond the fenced footprint.
- The Contractors must adhere to agreed and approved access points.
- No camping is allowed on any private property.
- Damage to private or public property such as fences, gates and other infrastructure may occur at any time. All damage to be repaired immediately and to the satisfaction of the owner.
- Relevant landowners and businesses must be informed of the starting date of construction as well as the phases in which the construction shall take place.
- The Contractor must adhere to all conditions of contract including this EMP.
- Proper planning of the construction process must be undertaken to allow for disruptions due to rain and very wet conditions.
- Where existing private roads to be utilised as access are in a bad state of repair, such roads' condition must be well documented, including photographs, before they are used for construction purposes. If necessary some repairs must be done to prevent damage to equipment and plant.
- All private and public manmade structures near the project site must be protected against damage at all times and any damage must be rectified immediately.
- Proper site management and regular monitoring of site works.

- Proper documentation and record keeping of all complaints and actions taken.
- Regular site inspections and good control over the construction process throughout the construction period.
- A positive attitude towards Environmental Management by all site personnel must be motivated through regular and effective awareness and training sessions.
- An ESO, on behalf of the Contractor, is to be appointed to implement this EMP. The EO and not the Contractor or his/her ESO is to deal with any landowner related matters.

Environmental Audits to be carried out during and upon completion of construction.

4.6 Awareness training

The EO or ESO are responsible for ensuring everyone on site is given an environmental awareness induction session which not only clearly defines what the environment is and gives specifics detailing the local environment but outlines the requirements of the EMP as a management tool to protect the environment. The EO or ESO must ensure daily toolbox talks include alerting the workforce to particular environmental concerns associated with the tasks for that day or the area/habitat in which they are working. Awareness posters and a hand out must be produced to create awareness throughout the site.

4.7 Environmental Contact Persons

Johannesburg Development Agency

Leonard Visagie

The Bus Factory, 3 President Street, Newtown

PO Box 61877, Marshalltown

2107

Tel Number: 011 688 7839

Email Address: lvisagie@jda.org.za

4.8 Emergency Numbers

Police: 10111

APPENDIX A

Site Layout Plans and Stormwater Management Plan

APPENDIX B

Environmental Authorisation