



DRAFT ENVIRONMENTAL
MANAGEMENT PROGRAMME

13 March 2017

**PROPOSED TOWNSHIP DEVELOPMENT ON A PORTION OF
PORTION 48 OF THE FARM VALSCHFONTIN NO. 33,
REGISTRATION DIVISION JS, MPUMALANGA PROVINCE**

PROJECT DETAIL

LDEDET Reference No.:	1/3/1/16/1N-75
Project Title:	The proposed Township Development on a Portion of Portion 48 of the farm Valschfontein No. 33, Registration Division J.S., Mpumalanga Province
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Client:	Dr. J. S. Moroka Local Municipality
Report Status:	Draft Environmental Management Programme
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LIST OF ABBREVIATIONS

BA	Basic Assessment
BAR	Basic Assessment Report
DARLEA	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs
DWS	Department of Water and Sanitation
DRJSMLM	Dr. JS Moroka Local Municipality
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
DEIR	Draft Environmental Impact Report
EMPr	Environmental Management Programme
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
GNR	Government Notice Regulation
I&AP	Interested and affected party
IDP	Integrated Development Plan
ML	Mega Litres
Mitigate	Activities designed to compensate for unavoidable environmental damage.
NEMA	National Environmental Management Act No. 107 of 1998
NWA	National Water Act No. 36 of 1998

PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
WWTW	Waste Water Treatment Works

1 INTRODUCTION

The purpose of the Environmental Management Programme (EMPr) is to ensure that the potential social and environmental impacts, risks and liabilities identified during the Environmental Impact Assessment process is effectively managed during the construction and operational phases of the irrigation dam and cultivated lands. The EMPr specifies the mitigation and management measures to which the Dr. JS Moroka Local Municipality (DRJSMLM) is committed in relation to the establishment of the township development and its associated infrastructure, and shows how the project will mobilise organizational capacity and resources to implement these measures.

In order to comply with the requirements of GN R 982(23), an EMPr has been compiled as part of the Environmental Impact Report (EIR). The content of the EMPr is structured in such a way as to comply with the requirements of Appendix 4 to GN R 982.

1.1 BACKGROUND

This EMPr has been compiled for DRJSMLM for the mix use development of approximately 500 erven on 35 hectares on a Portion of Portion 48 of the Farm Valschfontein No. 33, Registration Division JS, Mpumalanga Province. This township development is proposed to consist of the following:

- Low- and high density residential development;
- Institutional development;
- Industrial developments;
- Open space; and
- Transportation services.

The Layout plan and Sensitivity map is included as part of the EMPr (refer to Figure 1 & 2) and indicates the township development and environmental sensitive areas.

Figure 1: Layout plan.

Figure 2: Sensitivity Map, indicating environmental sensitive areas and features.

1.2 OBJECTIVES OF THE EMPr

The key objectives of the EMPr are to:

- Formalise and disclose the programme for environmental and social management;
- Ensure that appropriate management and mitigation measures and requirements are implemented from the start of the project;
- Ensure compliance to environmental legislation;
- Manage identified impacts;
- Ensure precautions against damage and claims arising from damage are taken timeously;
- Provide a framework for the implementation of environmental and social management initiatives;
- Ensure sufficient resources are allocated on the project budget so that the scale of the EMPr related activities are consistent with the significance of project impacts; and
- Provide feedback for continual improvement in environmental performance.

Best practice principles require that every reasonable effort be made to reduce and preferably to prevent negative impacts, while enhancing positive benefits, especially within the communities directly affected by the proposed project. These principles have guided the Environmental Impact Assessment process and the compilation of the EMPr.

The EMPr covers information on the management and mitigation measures that will be implemented to address impacts in respect of the following phases of the development:

- Planning and design;
- Pre-construction and construction;
- Operation; and
- Rehabilitation and Post closure.

1.3 ENVIRONMENTAL IMPACTS

The proposed development was assessed to have an overall low impact on the receiving environment. Refer to Table 1-1 for potential impacts requiring specific mitigation within the development footprint as specified in this EMPr.

Table 1-1: Environmental impacts and management outcomes

Potential Impact	Significance (prior to mitigation)	Impact management outcomes
Construction phase		
Geology: Stability of excavations	Negative medium	To enhance the stability of the excavations.
The provision of services (Generation of waste)	Negative medium	To minimise construction waste.
Temporary employment opportunities	Positive medium	To enhance the use of local skills and uplift the local community.
Operational phase		
Pressure on existing infrastructure	Negative medium	To minimise the pressure on existing infrastructure.
Potential health and safety impacts	Negative medium	To educate the public on possible health and safety risks.
Increase in traffic	Negative medium	To improve the road infrastructure
Provision of quality housing	Positive medium	To enhance the effect of quality housing.

1.4 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Environamics was appointed by the applicant as the independent EAP to conduct the Environmental Impact Assessment Process and prepare all required reports such as the EMPr. All correspondence to the EAP can be directed to:

Contact person: Marélie Botha
Postal Address: PO Box 6484, Baillie Park, 2526
Telephone: 018-290 8228 (w) 086 762 8336 (f) 081 477 9545 (Cell)
Electronic Mail: marel@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the EIA. In terms of the independent status of the EAP a declaration was included as part of the Environmental Impact Assessment Report. This EMPr was prepared by Marélie Botha who has an Honour's degree in Environmental Management and more than 5 years of experience in environmental impact assessment (refer to Appendix A for the EAP's CV).

1.5 STRUCTURE OF THE REPORT

The implementation of an approved EMPr for the proposed activities is a requirement of the National Environmental Management Act (Act 107 of 1998) (NEMA) and will be a condition in the Environmental Authorisation (EA), should it be issued by the Mpumalanga Department of

Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA). As such, failure to comply with this EMPr will constitute an offence in terms of Section 24F of the NEMA and the holder of the EA (Applicant / Developer) may be liable for penalties and/or legal action. Therefore, it is important that all responsible parties understand their duties and undertake them with duty and care.

This report is structured in accordance with the prescribed contents stipulated in Appendix 4 of Regulation No.982. It consists of five sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1-2.

Table 1.2: Structure of the report

Requirements for the contents of an EMPr as specified in the Regulations		Section in report
Appendix 4(1) - An EMPr must comply with section 24N of the Act and include-		
(a)	details of -	1.4
	(i) The EAP who prepared the EMPr; (ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	
(b)	a detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description.	2.3
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	1.1
(d)	a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the EIA process for all phases of the development including-	1.2 & 1.3
	(i) Planning and design;	
	(ii) Pre-construction and Construction	
	(iii) Operation;	
	(iv) Rehabilitation; and (v) where relevant, decommissioning.	
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	1.3
(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -	2.8
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	

	(ii) comply with any prescribed environmental management standards or practices;	
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
	(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	2.6
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	2.6
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	2.2
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	2.8
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	2.4
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	4
(m)	An environmental awareness plan describing the manner in which—	3
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
	(ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	
(n)	any specific information that may be required by the competent authority.	Appendix B - I

This EMPr should form an integral part of the contract documents which will inform the Contractor(s) of their duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by the proposed activities associated with the project as stipulated in the EMPr. The Contractor(s) should note that conditions imposed by the EMPr are legally binding in terms of environmental legislation and that administrative and punitive actions can be taken against them should the conditions of the EMPr not be complied with. Furthermore, the EMPr is enforceable through additional conditions to the general conditions of contract that pertain to this project. It is expected that the Contractor(s) are conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which may be applicable to the contract.

The EMPr is a dynamic document that will be periodically reviewed and updated. As part of ongoing implementation, this EMPr will also be publicly disclosed during the Public Participation Process of this project. An opportunity will be offered to participating stakeholders to comment on it.

2 APPROACH TO THE EMPR

This section introduces the approach to impact management – refer to table 2-1. It also outlines the responsibilities of the Project Management Team. Table 2-3 to 2-7 details the range of approaches to be undertaken to manage project activities.

Table 2-1: Approach to Impact Management

Approach	Description
Avoidance	Avoiding activities that could result in adverse impacts and/or resources or areas considered sensitive.
Prevention	Preventing the occurrence of negative environmental impacts and/or preventing such an occurrence having negative impacts.
Preservation	Preventing any future actions that might adversely affect an environmental resource.
Minimization	Limiting or reducing the degree, extent, magnitude or duration of adverse impacts through scaling down, relocating, redesigning and/or realigning elements of the project.
Mitigation	Measures taken to minimise adverse impacts on the environment.
Enhancement	Magnifying and/or improving the positive effects or benefits of a project.
Rehabilitation	Repairing affected resources, such as natural habitats or water resources.
Restoration	Restoring affected resources to an earlier (possibly more stable and productive) state, typically 'background' or 'pristine' condition. These resources may include soils and biodiversity.
Compensation	Compensating for lost resources, and where possible, the creation, enhancement or protection of the same type of resource at another suitable and acceptable location.

2.1 KEY DEFINITIONS USED IN THIS EMPR

The key definitions used throughout this EMPr are listed in Table 2-2.

Table 2-2: Key definitions used in this EMPr

Term	Definition
Alien species	A species not indigenous to the area or out of its natural distribution range.
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
Assessment	The process of collecting, organising, analysing, interpreting and communicating information which is relevant.
Auditing	A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.
Competent	Combination of knowledge, qualifications and experience specific to the work or task being performed.
Construction	Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.
DARDLEA	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs
Decommissioning	To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.
DWS	Department of Water and Sanitation
Environment	As per definition in the NEMA.
Environmental Assessment Practitioner	An independent environmental consultant with experience in the management of EA applications in terms of the NEMA.
Environmental Authorisation (EA)	Means the authorisation issued by a competent authority (Department of Environmental Affairs) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.
Environmental	The ECO is appointed by the Developer to ensure compliance to the EMPr

Control Officer (ECO)	and conditions of the EA during construction and provides proof of compliance documentation to the Project Management Team. The role of ECO will be fulfilled by the Developer or its Agent's SHE Representative.
Environmental Impact	A change in the environment, whether adverse or beneficial, wholly or partly, resulting from an organisations' activities, products or services.
Environmental management	It is the responsibility of the entire Project Management Team to deal with environmental considerations during the management cycle of the project, i.e. policy, planning and design, implementation (preconstruction, construction and operation), monitoring and corrective action and review.
Interested and affected party (I&AP)	Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.
Incident	An undesired event that may result in a significant environmental impact, although can be managed through internal response and procedures.
Method Statement	A written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.
Monitoring	A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.
Plan	Sets out the intended method and/or specific measures required to mitigate and/or enhance the negative and positive impacts of the Project. A plan usually focuses on one project phase, i.e. construction, operation or closure.
Pre-construction	The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation
Project Management Team	The responsibility of the EMPr implementation resides on this team. This team includes the Developer and/or his appointed Agent as well as appointed contractors and consultants, including the ECO.
Programme	Identifies a series of interrelated measures (often contained in detailed plans) for managing the environmental effects of the Project. A programme provides broad direction and covers more than one project phase.
Reserve	In terms of the National Water Act (Act No. 36 of 1998), the Reserve is the quantity and quality of water required -

	<p>(a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be relying upon, taking water from, or being supplied from, the relevant water resource; and</p> <p>(b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.</p>
Safety, Health and Environmental Representative (SHE representative)	<p>A representative of the Developer or it's Agent, appointed as a SHE representative, assisting the construction manager on Health, Safety and Environmental aspects of the project on the construction site. The SHE representative will also perform the functions of the ECO for the project.</p> <p>Each Principal Contractor/s may also have their own SHE representative, but the SHE representative as referred to in this EMPr, refers to the SHE representative acting on behalf of the Developer and/or his appointed Agent.</p>
Sensitive Environmental Features	Environmental features protected by legislation (e.g. heritage resources), or identified during the EIA as sensitive through specialists' findings and input received from Interested and Affected Parties.
Watercourse	A geomorphological feature characterized by the presence of a streamflow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water. According to the National Water Act (Act 36 of 1998), a watercourse constitutes a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which, or from which, water flows, and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

2.2 KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT

The following legislation and guidelines are applicable to the development and have informed the scope and content of the EMPr:

- National Environmental Management Act (Act No 107 of 1998)
- National Water Act (No. 36 of 1998)
- EIA Regulations, published under Sections 24(5) and 44 of NEMA (GNR 982 – 985 in Government Gazette 38282 of 4 December 2014)

2.3 ROLES AND RESPONSIBILITIES

The roles and responsibilities of the different legal appointments anticipated for the construction of the proposed irrigation dam and preparation of the agricultural lands will be dependent on the final Method Statements as well as the Health and Safety Plan to be compiled prior to the commencement of any site clearing and construction activities. The roles and responsibilities mentioned in this section of the EMPr will act as a guide for the compilation of the Health and Safety Plan.

A high-level outline of the institutional arrangements for the implementation of the EMPr during the pre-construction and construction phases of the project, as well as the conditions of the Environmental Authorisation, is provided in Figure 4.

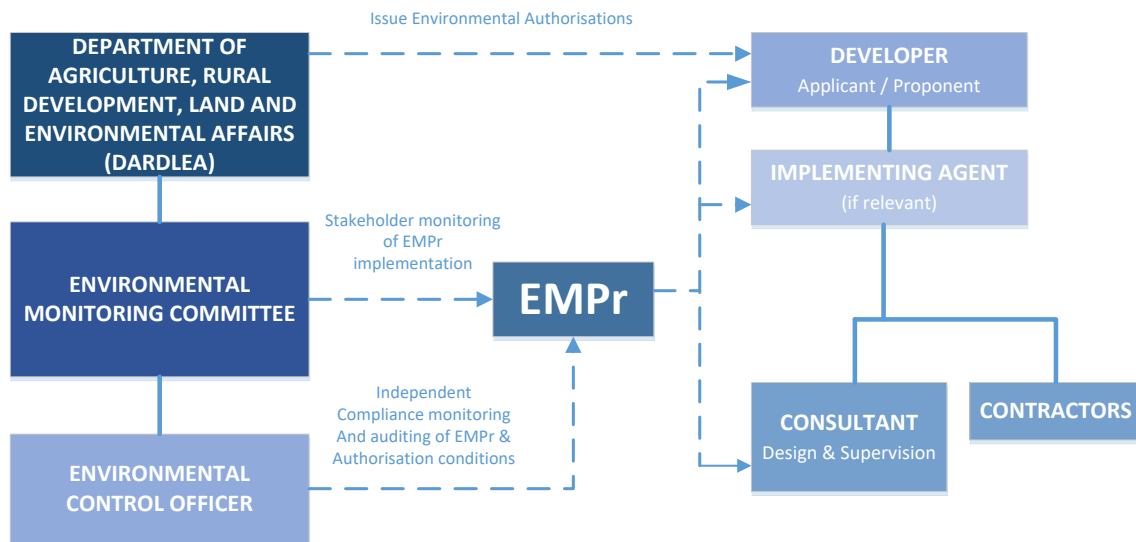


Figure 4: Institutional Arrangement - Roles & Responsibilities

2.3.1 Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)

DARDLEA is the mandated authority in terms of the National Environmental Management Act (No. 107 of 1998) that determines whether authorisation can be issued for the project, following a decision-making process conducted as part of the EIA. Conditions are included in the Environmental Authorisation, which need to be complied with by the project applicant.

DARDLEA also fulfils a compliance and enforcement role with regards to the authorisation. The Department may perform random inspections to check compliance. DARDLEA will also serve as an active member of the Environmental Monitoring Committee (EMC) and will review the monitoring and auditing reports compiled by the ECO.

Amendments may be required to the EMPr or the Environmental Authorisation, based on adaptive management to the site conditions and the technical requirements of the project. These amendments will need to be approved by DARDLEA.

2.3.2 Environmental Monitoring Committee

An EMC will be established before commencement of any construction activities, and will serve as an additional mechanism for monitoring the implementation of the EMPr and compliance with the Environmental Authorisation as well as for improving communication amongst key stakeholders. The committee will have an advisory, monitoring and “watch-dog” role for the duration of the construction phase of the project. This committee will report to the Director-General of DARDLEA.

Appropriate Terms of Reference for the EMC will need to be prepared, which will include roles and responsibilities, membership and functionality (amongst others).

2.3.3 Project Management Team

The following individuals form part of the Project Management Team and will be required to sign the policy before commencement of any work on site:

- The Developer or its appointed Agent;
- Principal contractors appointed for the development;
- Construction supervisor;
- Subcontractors; and
- Safety, Health and Environment (SHE) representative (acting as the ECO).

The Project Management Team will be responsible for the following:

- Ensuring that the Contractor(s) are aware of the specifications, legal constraints/requirements and the Developer’s policies pertaining to activities taking place regarding the proposed project;
- Monitoring and inspecting contractors’ written records to illustrate compliance with the EMPr;
- Familiarising themselves with the Environmental Impact Assessment reports and EMPr for this development, the conditions set out in the EA, and all relevant environmental legislation; and
- Ensuring that all commitments/conditions in the EMPr, EA, Water Use License and any other environmental permits are communicated and adhered to by all employees and contractors involved with the proposed development.

2.3.4 The Developer

The Developer as holder of the EA will be ultimately responsible for the implementation of all the relevant legislative requirements and compliance with the EMPr. To this end, the Developer will have the following responsibilities:

- The Developer will appoint Principal Contractor(s) for each logical project phase in writing to assume the role of Principal Contractor(s) as intended by the Construction Regulations and as determined by the Bills of Quantities;
- The Developer or its appointed Agent shall discuss and negotiate with the Principal Contractor(s) the contents of the Health and Safety Plan of the both Principal Contractor(s) and Sub-Contractor(s) for approval;
- The Developer or its appointed Agent will take reasonable steps to ensure that the Health and Safety Plan of both the Principal Contractor(s) and Sub-Contractor(s) is implemented and maintained. The steps taken will include periodic audits at intervals of at least once every month;
- The Developer or its appointed Agent will prevent the Principal Contractor(s) and/or the Sub-Contractor(s) from commencing or continuing with construction work should the Principal Contractor(s) and/or the Sub-Contractor(s) at any stage in the execution of the works be found to:
 - have failed to comply with any of the administrative measures required by the Construction Regulations in preparation for the construction project or any physical preparations necessary;
 - have failed to implement or maintain their Health and Safety Plan;
 - have executed construction work, which is not in accordance with their Health and Safety Plan.
- Act in any way which may pose a threat to the Health and Safety of any person(s) present on the site of the works or in its vicinity, irrespective of him/them being employed or legitimately on the site of the works or in its vicinity;
- The Developer or its appointed Agent will ensure compliance of all contractors and sub-contractors to the conditions set in the approved EMPr and EA; and
- The Developer needs to give 14 (fourteen) days written notice to inform the LDEDET that the activity will commence. The notification must include a date when the activity will commence as well as the reference number.

2.3.5 Principal Contractor(s)

The Principal Contractor(s) appointed for the construction of irrigation dam will be responsible for the following:

- Ensure that he/she is fully conversant with the requirements of the specifications of this EMPr and all relevant Health and Safety legislation. This EMPr is not intended to supersede the Occupational Health and Safety Act (Act 85 of 1993) (the Act) nor the Construction Regulations or any part of either. Those sections of the Act and the Construction Regulations which apply to the scope of work to be performed by the Principal Contractor(s) in terms of this contract (entirely or in part) will continue to be

legally required of the Principal Contractor(s) to comply with. The Principal Contractor(s) will in no manner or means be absolved from the responsibility to comply with all applicable sections of the Act, the Construction Regulations or any Regulations proclaimed under the Act or which may perceivable be applicable to this contract;

- Provide and demonstrate to the Developer a suitable and sufficiently documented Health and Safety Plan based on this EMPr, the Act and the Construction Regulations, which shall be applied from the date of commencement of and for the duration of execution of the works. This plan shall, as appendices, include the Health and Safety Plans of all sub-contractors for which he/she has to take responsibility in terms of this contract;
- Provide proof of his/her registration and good standing with the Compensation Fund or with a licensed compensation insurer prior to commencement with the works;
- In submitting his/her tender, the Principal Contractor(s) will demonstrate that he/she has made provision for the cost of compliance with the specified occupational health and safety requirements, the Act and Construction Regulations (Note: This shall have to be contained in the conditions of tender upon which a tenderer's offer is based.);
- Consistently demonstrate his/her competence and the adequacy of his/her resources to perform the duties imposed on the Principal Contractor(s) in terms of this Specification, the Act and the Construction Regulations;
- Ensure that a copy of his/her Health and Safety Plan is available on site and is presented upon request to the Client, an Inspector, Employee or Sub-contractors;
- Ensure that a Health and Safety file, which shall include all documentation required in terms of the provisions of this EMPr, the Act and the Construction Regulations, is opened and kept on site and made available to the Client or Inspector upon request. Upon completion of the works, the Principal Contractor(s) shall hand over a consolidated Health and Safety file to the Developer;
- Throughout execution of the contract, the Principal Contractor(s) will ensure that all conditions imposed on his sub-contractors in terms of the Act and the Construction Regulations are complied with as if they were the Principal Contractor(s);
- From time to time the Principal Contractors shall evaluate the relevance of the Health and Safety Plan and revise the same as required, following which a revised plan shall be submitted to the Developer and/or his/her Agent for approval;
- In terms of Construction Regulation 5(7), keep a Health and Safety file on site at all times that must include all documentation required in terms of the Act and Regulations and must also include a list of all Contractors and sub-contractors on site that are accountable to the Principal Contractor(s) and the agreements between the parties and details of work being done;
- Comply with the EMPr, Water Use License and EA commitments and any other legislative requirements as applicable to their workings;

- Adhere to any instructions issued by the Dr JS Moroka Local Municipality's Environmental Manager and/or the Developer and/or his/her Agent and/or the ECO / SHE Representative;
- Submit an environmental report on any environmental incidents that have occurred within 48 hours of the incident occurring; and
- Arrange that all employees and those of the sub-contractors receive appropriate training prior to the commencement of construction, taking cognisance of this EMPr and EA.

These functions will be performed by the Construction Supervisor of each Principal Contractor(s).

2.3.6 Construction Supervisor

The Construction Supervisor will be responsible for:

- Ensuring compliance with the EMPr and EA commitments and any other legislative requirements as applicable to their workings;
- Adhering to any instructions issued by the Dr JS Moroka Local Municipality's Environmental Manager and/or the Developer and/or his/her Agent and/or the ECO / SHE Representative; and
- Ensuring that all employees receive adequate training on the requirements of the conditions as set out in the EA and EMPr.

2.3.7 Sub-contractors

Sub-contractors are responsible for:

- Ensuring compliance of their workforce with the requirements of the conditions as set out in the EA and EMPr, and any other legislative requirements as applicable to their workings; and
- Reporting any health, safety and environmental incidents to the construction supervisor within 24 hours of the incident.

2.3.8 SHE Representative

The SHE Representative will be responsible for:

- Reporting to the Developer and/or it's Agent;
- Familiarising him / herself with the project and EMPr, and ensuring compliance with the relevant legislation applicable to the project and Dr JS Moroka Municipality's (DRJSMLM) Health, Safety and Environment Policy as well as the Health and Safety Specifications and procedures;

- Authorising the removal of personnel and / or equipment should they contravene the requirements of any applicable Health and Safety legislation and policies;
- Advising the Developer on environmental issues and recommendations for the proposed development;
- Arranging for liaison with interested and affected parties (I&APs) on environmental issues of concern, should the need arise;
- Ensuring that all environmental and health and safety conditions are undertaken by all staff and contractors on site; and
- Ensuring that corrective actions are followed up and closed out in accordance with the conditions set out in the EMPr.

2.3.9 ECO

The ECO is to be appointed prior to the commencement of any authorized activities. Once appointed, the name of the ECO must be submitted to the Director: Compliance Monitoring at the DARDLEA. This is the responsibility of the developer/owner. The ECO will be responsible for the following:

- Reporting directly to the Developer and/or its Agent;
- Familiarising him / herself with the project and EMPr, and ensuring compliance with the relevant legislation applicable to the project as well as the Health and Safety Specifications and procedures;
- Communicating the contents and conditions of the EMPr, Water Use License and EA to the Principal Contractor(s) and sub-contractor's employees. Training will be required to ensure all staff members are aware of the requirements of the EMPr;
- Monitoring the implementation of the conditions of the EMPr and EA throughout the project by means of site inspections and meetings;
- Undertaking regular monthly site inspections to assess compliance with the conditions of the EMPr and EA and take appropriate action to rectify non-conformances;
- Liaising with environmental statutory bodies, including but not limited to Dr JS Moroka Local Municipality's Environmental Manager, and the DARDLEA, where deemed necessary;
- Compiling monthly progress reports during the construction phase for submission to the Developer and/or his Agent;
- Advising the Developer on environmental issues and recommendations for the proposed development;
- Arranging for liaison with I&APs on environmental issues of concern, should the need arise;

- Ensuring that all environmental and health and safety conditions are undertaken by all staff and contractors on site; and
- Ensuring that corrective actions are promptly followed up and closed out.

2.3.10 Contractor's Environmental Officer

The primary role of the competent Environmental Officer (minimum of 3 years' experience) is to coordinate the environmental management activities of the Contractor on site. Specific responsibilities of the Environmental Officer, who will be on site, will include the following:

- Aiding the Contractor to comply with all the project's environmental management requirements;
- Assisting the Contractor in compiling Method Statements;
- Facilitating environmental activities and environmental awareness training of all persons on site;
- Exercise an internal compliance management system on behalf of the Contractor;
- Inspect the site as required to ensure adherence to the management actions of the EMPr and the Method Statements;
- Ensuring that environmental monitoring (air, noise, water quality) is being undertaken;
- Complete Site Inspection Forms on a regular basis;
- Provide inputs to the regular environment report to be prepared by the ECO (as required);
- Liaise with the construction team on issues related to implementation of, and compliance with, the EMPr;
- Maintain a record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; and
- Maintain a public complaint register in which all complaints are recorded, as well as actions taken.

2.4 LIFE CYCLE OF THE IRRIGATION DAM AND AGRICULTURAL LANDS

2.4.1 Construction

The EMPr has recommended mitigation and management measures to avoid or minimise negative impacts and optimise the benefits arising from the positive impacts during construction activities. The primary focus on project management for the construction phase will include:

- Transportation of equipment and machinery to the site location;

- Setting up a construction laydown area;
- Development of temporary materials and waste storage and control measures;
- Stripping of surface vegetation and removal of vegetation, building rubble and domestic waste from site to a licensed Landfill site; and
- Site rehabilitation following the construction phase, of areas that have been disturbed and are not part of the on-going operational phase of the proposed project.

2.4.2 Operation

The EMPr has recommended mitigation and management measures to avoid or minimise negative impacts and optimise the benefits arising from the positive impacts during operational activities. The operational phase of the irrigation dam and agricultural lands will involve the following:

- Accumulate a water reserve in the dam;
- Pumping water from the dam to the agricultural lands;
- Annual land preparation for crop cultivation;
- Crop cultivation and harvesting;
- Irrigation of croplands; and
- Dam wall inspections and maintenance.

2.4.3 Rehabilitation

Rehabilitation activities associated with irrigation dam and croplands are around the rehabilitation of disturbed areas outside of the infrastructure footprint, such as the areas around the dam and dam wall. The topsoil stripped during the construction phase of the project must be used to rehabilitate these disturbed areas.

The rehabilitation measures are to be undertaken in such a way that it ensures the rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed.

2.4.4 Decommissioning

Due to the permanent nature of the development, no decommissioning is foreseen.

2.5 CHECKING AND CORRECTIVE ACTION

Checking and implementing corrective action forms an important component of the EMPr management cycle. These ensure that:

- The required EMPr and EA conditions are being implemented on the site;
- The desired outcomes are being achieved and potential impacts managed;

- On-going weekly inspections of operational controls and general state of operation;
- Internal monthly audits to assess the compliance to the EMPr and EA or to focus on a particular performance issue; and
- Quarterly external audits by an independent professional for the duration of the construction phase.

Many potential impacts are difficult to monitor quantitatively, such as soil. However, an on-going, but pragmatic, inspection regime must be developed that allows for potential environmental transgressions to be identified proactively so that mitigation can be quickly and effectively implemented.

There are several mechanisms for implementing corrective action both during the construction and operational phases. The main instruments used to address non-compliances are the following:

- Verbal instructions – Minor transgressions from an established procedure;
- Written instructions – Normally following an audit; and
- Contract Notice – Following a breach in contract.

These instruments must be included in the contracts between the Developer and the Principal Contractors as a means of deterring personnel from contravening the conditions of the EA and the EMPr.

2.6 SITE DOCUMENTATION AND REPORTING

All non-conformances will be recorded and reported to the Developer and/or its Agent. These non-conformances will be rated according to a weighing methodology to be developed that will be used to determine the significance of each incident. Considering the transient nature of construction, continual daily visual inspections will be conducted by the SHE representative. The following documentation will be required on site:

- Complaints register;
- Environmental Incident Register;
- Disposal certificates of waste and waste water generated as a result of the proposed development;
- Monthly internal audit reports;
- Quarterly external audit reports;
- Method statements with potential environmental impacts included;
- Non-conformance reports;
- Written corrective action instructions;

- EA; and
- EMPr and associated amendments.

The findings of all inspections and internal audits will be structured into instructive reporting providing information to all members of the Project Management Team. Corrective actions must be clearly defined where required. Within the reporting function a structured review component must be enforced. This review function will assist in prescribing necessary corrective actions.

Within the reporting structure it will be necessary to incorporate a review function that continually assesses the reporting and prescribes any necessary corrective action. The purpose of the review function is for the Developer to review the environmental management performance during all phases, and to propose measures to improve performance focusing on continual improvement.

2.7 MONITORING

All programmes and plans forming part of this document will be subject to monitoring. The monitoring of the compliance with the conditions of the EA and the EMPr will be done on a monthly basis during construction by the ECO / SHE representative and annually during the operational phase by the Dr JS Moroka Local Municipality. Monitoring will have two elements namely:

- Routine monitoring against set standards or performance criteria; and
- Annual review or evaluation. This will focus on the assessment of the effectiveness of the plan or programme.

During the construction phase, the Project Management Team will be responsible for monitoring and inspecting contractors' written records to illustrate compliance with the EMPr. This falls under the inspection role of the SHE Representative / ECO. This compliance monitoring is to verify that the responsible parties are adhering to the procedures, management conditions, and specifications contained in this EMPr.

2.7.1 Programme Monitoring

The SHE Representative / ECO will monitor their programme implementation for the proposed development on a monthly basis during the construction phase. This will include, but not be limited to, the monitoring of:

- Occurrence of alien vegetation as well as any possible (albeit unlikely) sensitive species;
- Waste Management Programmes used to manage the generation and disposal of waste on site (especially during the Construction phase); and
- Rehabilitation of the construction sites, post construction and continually during operation.

2.8 MANAGEMENT REVIEW

The Developer will review the EMPr at annual intervals during the operational phase. The purpose of the management review is to ensure that the conditions of the EMPr are still relevant, and to propose measures for improving the performance in the spirit of continuous improvement.

2.9 MITIGATION AND MANAGEMENT MEASURES

The mitigation and management measures identified to address the anticipated and potential impacts identified during the Environmental Impact Assessment process is presented in Table 2-3 to Table 2-7.

Table 2-3: Proposed Mitigation Measures during the Planning and Design Phase

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING PLANNING AND DESIGN	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
General Management Measures			
Contractors and sub-contractors may not have sufficient knowledge and understanding of the potential impacts of construction or the requirements of the EMPr, leading to impacts identified under each aspect.	1. Compliance with the requirements of the EMPr will form part of the construction contract.	Upon appointment of Principal Contractors	Developer and/or appointed Agent
	2. A construction plan and method statement must be submitted by the Principal contractor and approved by the Developer and/or his appointed Agent prior to the start of activities on site. It should cover all aspects of site establishment, construction and site disestablishment and describe how the EMPr will be complied with.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
	3. Emergency action plans must be devised and approved by the Developer and/or his appointed Agent to deal with any risks identified, such as unplanned disruption of services.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
Impacts on the environment as a result of inappropriate design and planning.	1. Carry out a Hazardous Operating Procedures (HAZOP) assessment of the design to ensure that all practical measures to minimise the impact of operations on the environment have been included and to identify what emergency plans need to be developed.	Prior to issuing of EA	Developer and/or appointed Agent
Site demarcation and compliance	1. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barriers where applicable. 2. Any protected plants or trees in proximity to the construction area that will remain, should be marked clearly and must not be disturbed, defaced, destroyed or removed, unless otherwise specified by the Project	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING PLANNING AND DESIGN	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
General Management Measures			
	<p>Manager. Acquire the necessary permits under the National Forests Act (No. 84 of 1998) if avoidance of protected trees is not possible.</p> <ol style="list-style-type: none"> 3. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. 4. The Contractor and ECO must ensure compliance with conditions described in the EA. 5. Records of compliance/non-compliance with the conditions of the authorisation must be kept and be available on request. 6. Records of all environmental incidents must be maintained and a copy of these records be made available to the department on request throughout the project execution. 		
Establishment of a Construction camp	<ol style="list-style-type: none"> 1. Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site. 2. All construction equipment must be stored within this construction camp. 3. All associated oil changes etc. (no servicing) must take place within this camp on a sealed surface such as a concrete slab. 4. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment. 5. All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. 6. The Contractor must provide sufficient ablution facilities, in the form of 	<p>Prior to commencement of site preparation and construction</p>	<p>Developer and/or appointed Agent</p>

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING PLANNING AND DESIGN	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
General Management Measures			
	<p>portable/VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 50 meters of any surface water body or 1:100-year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area.</p> <p>7. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed.</p> <p>8. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter.</p>		
Appointment of labour	<ol style="list-style-type: none"> 1. Where reasonable and practical Dr JS Moroka Local Municipality should appoint local contractors, and implement a 'locals first' policy, especially for semi and low-skilled job categories. 2. Before the construction phase commences Dr JS Moroka Local Municipality should establish the existence of a skills database for the area. If such as database exists, it should be made available to the contractors appointed for the construction phase. 3. The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures Dr JS Moroka Local Municipality intends following for the construction phase of the project. 4. The recruitment selection process should seek to promote gender 	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING PLANNING AND DESIGN	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
General Management Measures			
	equality and the employment of women wherever possible.		
Training of site staff	<p>Ensure that all staff have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimization of environmental harm, by:</p> <ol style="list-style-type: none"> 1. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts. 2. Where feasible training and skills development programmes for local workers should be initiated prior to the initiation of the construction phase. 3. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks. 4. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. 5. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager. 6. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training. 7. Staff must be trained in the hazards and required precautionary measures for dealing with these substances. 8. Spillage packs must be available at construction areas. 	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
Public consultation regarding the	1. Provide a mechanism through which information could be exchanged	Pre-construction and construction	Principal Contractor

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING PLANNING AND DESIGN	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
General Management Measures			
Irrigation Dam and Croplands	<p>between the project proponent and stakeholders.</p> <ol style="list-style-type: none"> 2. Compile and implement a grievance mechanism procedure for the public. This procedure will include details of the contact person who will be receiving issues raised by I&APs, and the process that will be followed to address issues. 3. Identify relevant stakeholders and engage them at applicable stages of the EIA process. 4. Inform the public about the proposed development. 5. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. 6. Solicit views and concerns from the public and allow them to suggest mitigations and enhancement measures. 7. Determine stakeholder satisfaction levels. 8. Dr JS Moroka Local Municipality should consider the option of establishing a monitoring forum that includes local leaders and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site. 		
Site clearing	<ol style="list-style-type: none"> 1. Site clearing must take place in a phased, environmentally acceptable manner, as and when required. 2. Areas which are not to be constructed or cultivated on within two months must not be cleared to reduce erosion risks. 3. The area to be cleared must be clearly demarcated and this footprint strictly maintained to limit vegetation clearing. 4. Soil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. 	Site preparation prior to construction	Principal Contractor

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING PLANNING AND DESIGN	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
General Management Measures			
	5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.		

Table 2-4: Proposed Mitigation Measures during the Construction Phase

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Construction Camp			
Site of the construction camp	<ol style="list-style-type: none"> 1. The size of the construction camp should be minimised. 2. Adequate parking must be provided for site staff and visitors. The Contractor must attend to drainage of the camp site to avoid standing water and/or sheet erosion. 3. Suitable control measures over the Contractor’s yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. 4. The proposed site for the township development needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. 	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer
Storage of materials (including hazardous materials)	<ol style="list-style-type: none"> 1. Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. 2. Storage areas must be designated, demarcated and fenced if necessary. 3. Storage areas should be secure so as to minimise the risk of crime. They should also be safe from access by unauthorised persons i.e. children/animals etc. 4. Fire prevention facilities must be present at all storage facilities. 5. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be situated away from 	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>drainage lines in a site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events.</p> <ol style="list-style-type: none"> 6. All fuel storage areas must be roofed to avoid creation of dirty stormwater. 7. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of stormwater from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. 8. Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes. 9. Storage areas containing hazardous substances/materials must be clearly signposted. 10. Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures. 11. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. 12. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site. 13. All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately and the 		

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>cause of the spill investigated. Preventative measures must be identified and submitted to the Principal Contractor and ECO for information. Emergency response procedures to be followed and implemented.</p> <p>14. Emergency and spillage plans need to be developed and submitted to the relevant authorities for approval.</p>		
Drainage of the construction camp	<p>1. Surface drainage measures must be established in the Construction Camps so as to prevent:</p> <ul style="list-style-type: none"> • Ponding of water; • Erosion as a result of accelerated runoff; and • Uncontrolled discharge of polluted runoff. 	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer
Construction Traffic and Access			
Construction traffic	<ol style="list-style-type: none"> 1. Construction routes and required access roads must be clearly defined and carefully planned to limit any intrusion on the neighbouring property owners and road users and to limit any accident risks. 2. Delivery of equipment must be undertaken with the minimum number of trips to reduce the carbon footprint of these activities. 3. 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. 4. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. 5. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks, etc. 6. Servicing must be done in dedicated service areas on site or else off site if no such area exists. 7. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution. 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<ol style="list-style-type: none"> 8. Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels. 9. All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. 10. Vehicles carrying material that can be wind-blown should be covered with a suitable material. 11. Upgrading of the intersection of the R568 / Road C by means of: <ul style="list-style-type: none"> • Construction of a roundabout with a typical inside diameter of 30m and a 5m circular lane – preferred option (the dimensions of the roundabout should be confirmed during the detailed design thereof), or • Installation of a traffic signal with turning lanes along all approaches. 12. Construction of a public transport lay-by facility along the R568 at the intersection with Road C i.e. access to the existing industrial area and proposed township. The lay-by should be located on the downstream side of the intersection (both sides of the R568). 		
Access to the site	<ol style="list-style-type: none"> 1. The main routes on the site must be clearly signposted and printed delivery maps must be issued to all suppliers and Sub-contractors. 2. Planning of access routes to the site for construction purposes shall be done in conjunction with the Contractor and the Landowner. All agreements reached should be documented and no verbal agreements should be made. The Contractor shall clearly mark all access roads. Roads not to be used shall be marked with a "NO ENTRY for construction vehicles" sign. 3. The movement of all vehicles within the site must be on designated roadways. 4. Signage must be established at appropriate points warning of turning traffic and the construction site, identifying speed limits, travel restrictions and other standard traffic control information. All signage must be in accordance with the prescribed standards and must be appropriately 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	maintained for the duration of the construction period.		
Maintenance of the road	<ol style="list-style-type: none"> 1. Where necessary suitable measures shall be taken to rehabilitate damaged areas. 2. Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damages as soon as these develop. 3. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. 4. The contractor must ensure that damage caused by construction related traffic to the R518 tar road and gravel road to the site is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor. 5. Adequate traffic accommodation signage must be erected and maintained on either side of the access on the trafficked routes throughout the construction period. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Noise	<ol style="list-style-type: none"> 1. Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends. 	Construction phase	Principal Contractor and Environmental Liaison Officer
General mitigation regarding construction traffic and access	<ol style="list-style-type: none"> 1. The Contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place. 2. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken. 3. Care for the safety and security of community members crossing access roads should receive priority at all times. 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	4. No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the Contractor. 5. All relevant permits for abnormal loads must be applied for from the relevant authority (pre-construction).		
Environmental Education and Training			
Environmental training	1. The project manager must appoint an ECO prior to construction commencing. 2. Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Topics covered should include: <ul style="list-style-type: none"> • What is meant by “Environment” • Why the environment needs to be protected and conserved • How construction activities can impact on the environment • What can be done to mitigate against such impacts? • Awareness of emergency and spills response provisions • Social responsibility during construction e.g. being considerate to local residents 3. Training should be undertaken by a party such as the ECO who has sufficient expertise and knowledge of environmental issues. 4. It is the Contractor’s responsibility to provide the site foreman with no less than 1 hour’s environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff. 5. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary. 6. The need for a “clean site” policy also needs to be explained to the	Construction phase	Dr JS Moroka Local Municipality

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>workers.</p> <p>7. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks.</p>		
Monitoring of environmental training	<p>1. The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and/or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.</p>	Construction phase	Principal Contractor and Environmental Liaison Officer
Soils and Geology			
Mitigation for soil compaction	<p>1. The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted.</p> <p>2. All soils compacted as a result of construction activities falling inside the development footprint areas should be ripped and profiled after the construction phase.</p>	Construction phase	Principal Contractor and Environmental Liaison Officer
Chemical soil pollution	<p>1. All waste generated on site during construction should be stored in waste bins and removed from site on a regular basis.</p> <p>2. Vehicles accessing the site should regularly be checked for fuel and oil spills. In case of spillage, the contaminated soil should be removed and transported to a designated waste site.</p> <p>3. Refuelling points should be well managed and if any soils are contaminated, it should be stripped and disposed of at a registered hazardous waste dumping site.</p>	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Guidelines for the stripping and storage of topsoil	<ol style="list-style-type: none"> 1. The Contractor should, prior to the commencement of earthworks determine the average depth of topsoil, and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. 2. Care must be taken not to mix topsoil and subsoil during stripping. 3. Should any topsoil become polluted the Contractor must remove the polluted soil to the full depth of pollution and replace it at his own expense with clean topsoil. 4. Removed polluted topsoil should be transported to a licensed landfill site. 5. The topsoil must be conserved on site in and around the pit area. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Soil stripping	<ol style="list-style-type: none"> 1. No soil stripping must take place on areas within the site that the Contractor does not require for construction works or areas of retained vegetation. 2. Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur. 3. Subsoil and overburden in all construction and laydown areas should be stockpiled separately to be returned for backfilling in the correct soil horizon order. 4. Construction vehicles must only be allowed to utilise existing tracks or pre-planned access routes. 	Construction phase	Principal Contractor and Environmental Control Officer
Guidelines for soil stockpiles	<ol style="list-style-type: none"> 1. Stockpiles should not be situated such that they obstruct natural water pathways. 2. Stockpiles should not exceed 2m in height unless otherwise permitted by 	Construction phase	Principal Contractor and Environmental Control Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>the Engineer.</p> <ol style="list-style-type: none"> 3. If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or geo-fabric, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases. 4. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding. 5. Should topsoil be stockpiled for longer than 6 months it must be vegetated. 6. Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage/leakage occurs should be attained and given to the project manager. 7. Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them. 8. It must be ensured that topsoil stockpiles are located outside of any drainage lines and areas susceptible to erosion or siltation. 9. Stockpiles should also be placed away from areas known to contain hazardous substances such as fuel. 		
Storage of fuel on site	<ol style="list-style-type: none"> 1. Less than 80 cubic meters of fuel is permitted to be stored on site at any one time. 2. Topsoil and subsoil to be protected from contamination. This should be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities. 3. Fuel and material storage must be away from stockpiles. 4. Concrete and chemicals must be mixed on an impervious surface and provisions should be made to contain spillages or overflows into the soil. 5. Any storage tanks containing hazardous materials must be placed in 	Construction phase	Principal Contractor and Environmental Control Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material.		
Mixing of concrete on site	<ol style="list-style-type: none"> 1. The concrete batching plant must be contained within a bunded area. 2. Concrete mixing must only take place within designated areas. 3. Ready mixed concrete must be utilised where possible. 4. No vehicles transporting concrete to the site may be washed on site. 5. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Run-off from the batch plant must not be allowed to enter the stormwater system. 	Construction phase	Principal Contractor and Environmental Control Officer
Earth works	<ol style="list-style-type: none"> 1. Soils compacted during construction should be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil should be re-spread over landscaped areas. 2. It is recommended that a suitably qualified engineering geologist or geotechnical engineer inspect all foundation trenches prior to construction in order to identify and evaluate any soil characteristics in variance with that found during the detailed geotechnical investigation. 3. Normal foundations will be adequate on large portions of the site combined with proper compaction with a wacker or similar compactor of in situ soils below individual footings with soil at or near optimum moisture content, but special foundations where the use of reinforced steel strip foundations and articulation joints or soil rafts with the replacement of in situ soil with inert material may be required. 	Construction phase	Principal Contractor and Environmental Control Officer
Erosion Control			
Erosion control	<ol style="list-style-type: none"> 1. Sediment trapping, erosion and stormwater control should be addressed 	Construction phase	Environmental Control Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>by a hydrological engineer in a detailed stormwater management plan.</p> <ol style="list-style-type: none"> 2. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. 3. Other erosion control measures that can be implemented are as follows: <ul style="list-style-type: none"> o Brush packing with cleared vegetation; o Mulch or chip packing; o Planting of vegetation; and o Hydroseeding/hand sowing. 4. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented. 5. All erosion control mechanisms need to be regularly maintained. 6. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 7. Retention of vegetation where possible to avoid soil erosion. 8. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 9. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses. 10. Concurrent rehabilitation of disturbed areas should be an ongoing process of all exposed areas on the dam footpring and dam wall construction sites. 11. No impediment to the natural water flow other than approved erosion control works is permitted. 12. Protect sloping areas and drainage channel banks downstream and upstream of the dam footpring areas that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. 13. Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. 14. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage 		

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>system assessed accordingly. A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossings.</p> <p>15. Site drainage, a concrete apron of 1,0m around all structures and plumbing and service precautions are advised. It is classified as CR to C1R according the NHBRC guidelines (1995) & SAICE Code of practice (1995) and 1A2F according to the classification for urban.</p> <p>16. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.</p>		
Water Use and Quality			
Water use	1. Water must be used sparingly and reused, recycled or treated where possible.	Construction phase	Engineer
	1. Consultation with key stakeholders to understand any conflicting water use demands and the community's dependency on water resources and conservation requirements within the area.	Construction phase	Environmental Control officer
Management of water quality	<p>1. The quality and quantity of effluent streams discharged to the environment including stormwater should be managed and treated to meet applicable effluent discharge guidelines.</p> <p>2. Quality of water being discharged must be tested on a monthly basis.</p> <p>3. Efficient oil and grease traps or sumps should be installed and maintained at refuelling facilities, workshops, fuel storage depots, and containment areas and spill kits should be available with emergency response plans.</p>	Construction phase	Environmental Control officer
Stormwater management	1. The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and	Construction phase	Environmental Control officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>silt, insecticides or chemical pollutants.</p> <ol style="list-style-type: none"> 2. Silt fences should be used to prevent any soil entering the stormwater drains. 3. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration. 4. Promote a water saving mind set with construction workers in order to ensure less water wastage. 5. New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency. 6. Earth, stone and rubble is to be properly disposed of, or utilized on site so as not to obstruct natural water path ways over the site. i.e. these materials must not be placed in stormwater channels, drainage lines or rivers. 7. There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed. 8. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Untreated runoff from the batch plant must not be allowed to get into the stormwater system or nearby streams, rivers or erosion channels or dongas. 		
Protection of groundwater resources	<ol style="list-style-type: none"> 1. No unauthorised groundwater abstraction may occur on the site. 2. Should any water be discharged from site, the water is to comply with national effluent standards. No contaminated water may be discharged from site. 3. No activities shall be allowed to encroach into a water course or feature without a Water Use License being in place from the Department of Water and Sanitation (DWS). 	Construction phase	Environmental Control officer
Sanitation	<ol style="list-style-type: none"> 1. Adequate sanitary facilities and ablutions must be provided for 	Construction phase	Environmental

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<ul style="list-style-type: none"> 1. construction workers (1 toilet per every 15 workers) at appropriate locations on site. 2. The facilities must be regularly serviced and appropriately maintained to reduce the risk of surface or groundwater pollution. 3. Ablution or sanitation facilities should not be located within 50m of any water courses or features. 		Control officer
Concrete mixing	<ul style="list-style-type: none"> 1. Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth. 	Construction phase	Environmental Control officer
Public areas	<ul style="list-style-type: none"> 1. Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis. 2. The Contractor should take steps to ensure that littering by construction workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. 3. No washing or servicing of vehicles on site. 	Construction phase	Environmental Control officer
Surface and ground water			
Sanitation on site	<ul style="list-style-type: none"> 1. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). 2. Water saving devices and technologies such as the use of dual flush toilets should be considered. 3. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution. 	Construction phase	Principal Contractor and Environmental Control officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Use and storage of hazardous materials	<ol style="list-style-type: none"> 1. Use and or storage of materials, fuel and chemicals which could potentially leak into the ground must be controlled. 2. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. 3. Any hazardous substances must be stored at least 50m from any of the water bodies on site. 4. The Contractor (monitored by the Environmental Control or Liaison Officer) should be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry. 5. Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial facility. 	Construction phase	Principal Contractor and Environmental Control officer
Water resources	<ol style="list-style-type: none"> 1. Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. 2. Municipal water (or another source approved by the ECO) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc. 3. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments. 	Construction phase	Principal Contractor and Environmental Control officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Site specific mitigation measures for surface water	<ol style="list-style-type: none"> 1. Minimize soil exposure. 2. Manage water effectively on, to, within, and from this site. 3. Employ sediment capture techniques and stormwater attenuation techniques. 4. Identify areas of historic or potential vulnerability, such as geologically unstable materials or areas subject to flooding. 5. Minimize changes to natural drainage patterns and crossings to drainages. Drainage crossings are potentially problematic, so they must be well designed. Changes to natural drainage patterns or channels often result in either environmental damage or failures. 6. Perform scheduled maintenance to be prepared for storms. Insure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures. 7. Use deep-rooted vegetation for biotechnical stabilization on slopes. Use a mixture of good ground cover plus deep-rooted vegetative species, preferably native species, to minimize deep-seated mass instability as well as offer surface erosion control protection. 8. Appropriate measures must be taken to manage storm water run-off and potential flooding. 	Construction phase	Principal Contractor and Environmental Control officer
Site specific mitigation measures for groundwater	<ol style="list-style-type: none"> 1. Inventories should be made of all substances that are potentially hazardous to groundwater, which will be stored, used or transported over the sites. The risk of each substance to the groundwater should be considered. 2. All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely banded (impermeable floor and sides) to prevent accidental discharge to groundwater. 	Construction phase	Principal Contractor and Environmental Control officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Waste Management			
General considerations	<ol style="list-style-type: none"> 1. Construction methods and materials should be carefully considered in view of waste reduction, re-use and recycling opportunities. 2. Construction contractors must provide specific detailed waste management plans to deal with all waste streams. 3. Specific areas must be designated on-site for the temporary management of various waste streams. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of runoff, seepage and vermin control. 4. Adequate weather and vermin proof waste bins and skips (covered at minimum with secured netting or shade cloth) should be placed on site. Separate bins should be provided for general and hazardous waste. 5. Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any regulated waste. Waste disposal records must be available for review at any time. 	Duration of the activity	Principal Contractor
Litter management	<ol style="list-style-type: none"> 1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 2. The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. 3. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. 4. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. 5. Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. 	Construction phase	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<ol style="list-style-type: none"> 6. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 7. All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours. 8. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. 9. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 10. Under no circumstances may solid waste be burnt on site. 11. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. 		
Hazardous waste management	<ol style="list-style-type: none"> 1. All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of offsite at a licensed landfill site, where practical. Incineration may be used where relevant. 2. Contaminants to be stored safely to avoid spillage. 3. Machinery must be properly maintained to keep oil leaks in check. 4. All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated. 5. Ensure compliance with all national, regional and local legislation with regard to the storage handling and disposal of hydrocarbons, chemicals, solvents, and any other harmful and hazardous substances and materials. The onus is on the Contractor to identify and interpret the applicable legislation. 6. SABS approved spill kits to be available and easily accessible. 	Construction phase	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Sanitation	<ol style="list-style-type: none"> 1. The Contractor shall install mobile chemical toilets on the site. 2. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. 3. Ablution facilities shall be within 50m from workplaces. There should be enough toilets available to accommodate the workforce (minimum requirement 1:15 workers). Male and females must be accommodated separately where possible. 4. Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. 5. Toilets should be no closer than 50m or above the 1:100 year flood line from any natural or manmade water bodies or drainage lines or alternatively located in a place approved of by the Engineer. 6. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. 7. The construction of "Long Drop" toilets is forbidden, but rather toilets connected to the sewage treatment plant. 8. Potable water must be provided for all construction staff. 	Construction phase	Environmental Liaison Officer
Remedial actions	<ol style="list-style-type: none"> 1. An effective monitoring system must be put in place to detect any leakage or spillage during their transportation, handling, installation and storage. 2. Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance is identified. 3. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible. 4. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. 	Duration of the project	Environmental Liaison Officer and Principal Contractor

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<ol style="list-style-type: none"> 5. The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. 6. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. 7. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. 8. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 9. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal. 10. In the event of a major spill or leak of contaminants, the relevant administering authority must be notified immediately as per the notification of emergencies/incidents. 11. Routine servicing and maintenance of vehicles should not take place on site (except for emergencies, in which case an appropriate drip tray must be used to contain any fuel or oils). 12. Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste. 13. Any water that collects in bunds must not be allowed to stand. Should the water be contaminated, it is to be removed and treated as hazardous waste. Clean stormwater contained within the bunds may be reused. 14. The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files and applicable regulations and safety instructions. 15. Transport of all hazardous substances must be in accordance with the relevant legislation and regulations. 		

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	16. Upon completion of construction, the area must be cleared of potentially polluting materials.		
Flora			
Existing vegetation	<ol style="list-style-type: none"> 1. If possible all the protected plant species need to be relocated to a suitable site nearby before the construction phase. 2. Vegetation removal must be limited to the construction site. 3. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step. 4. Vegetation removal must be phased in order to reduce impact of construction. 5. The construction area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint. 6. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 7. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 8. No vegetation to be used for firewood. 9. Exotic and invasive plant species should not be allowed to establish, if the development is approved. 10. Areas to be cleared must be clearly fenced off to eliminate the potential for unnecessary clearing. 11. Strict and regular auditing of the construction process to ensure containment of the construction and laydown areas. 12. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora. 	Pre-construction and Construction phase	Environmental Liaison Officer
Rehabilitation	<ol style="list-style-type: none"> 1. All damaged areas shall be rehabilitated upon completion of the contract. 	Construction phase	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<ol style="list-style-type: none"> 2. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 3. All natural areas impacted during construction must be rehabilitated with locally indigenous grasses typical of the representative botanical unit. 4. Rehabilitation must take place in a phased approach as soon as possible. 5. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 6. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. 		
Utilisation of resources	<ol style="list-style-type: none"> 1. Gathering of firewood, fruit, multi-plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO. 	Construction phase	Environmental Liaison Officer
Exotic vegetation	<ol style="list-style-type: none"> 1. The prevention of the establishment and/or further spread of new populations of alien/invasive species should be discouraged. 2. The Contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. 3. The spread of exotic species occurring throughout the site should be controlled. 4. Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction, operational, closure/decommissioning and rehabilitation/maintenance phases. 	Construction phase	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<ol style="list-style-type: none"> 5. Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the development/ decommissioning footprint. 6. Institute strict control over materials brought onto site, which should be inspected for potential invasive invertebrate species and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual insecticides prior to transport to or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. 7. Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the Conservation of Agricultural Resources Act or in terms of Working for Water guidelines. 		
Herbicides & Pesticides	<ol style="list-style-type: none"> 1. Herbicide and pesticides use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used. 2. The use of pesticides and herbicides on the site must be discouraged as far as possible, as these impacts on important pollinator species of indigenous vegetation. 3. Care should be taken with the choice of herbicides to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicides used. Proper training should be given to contractors/applicators to avoid spraying indigenous vegetation. 	Construction phase	Environmental Liaison Officer
Fauna			

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Protection of fauna on site	<ol style="list-style-type: none"> 1. Demarcation of sensitive areas must be verified on site by the ECO prior to construction activities starting. 2. Use of appropriate construction techniques. 3. Rehabilitation to be undertaken as soon as possible after construction has been completed. 4. No trapping or snaring to fauna on the construction site should be allowed. 5. No faunal species must be disturbed, trapped, hunted or killed by maintenance staff during any routine maintenance at the development. 	Construction phase	Environmental Control Officer
Site specific mitigation measures for flora & fauna	<ol style="list-style-type: none"> 1. The removal of the indigenous trees and shrubs should only occur on the footprint area of the dam wall and croplands. No vegetation should be cleared on adjacent areas. 2. Conduct flora species search and rescue efforts before ground clearing of land for dam wall construction and croplands in order to reduce negative impacts on species of concern. 3. A monitoring programme should be implemented to ensure the rehabilitation of areas is done sufficiently. 4. The ECO should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation. 5. Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. 6. A detailed wetland delineation and management plan should be conducted. 	Construction phase	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<ol style="list-style-type: none"> 7. Use existing facilities (e.g., access roads, degraded areas) to the extent possible to minimize the amount of new disturbance. 8. Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive habitats on site during construction. 9. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas. 10. Construction activities must remain within defined construction areas and the road servitudes. No construction / disturbance will occur outside these areas. 		
Air Quality			
Dust control measures	<ol style="list-style-type: none"> 1. Wheel washing and damping down of un-surfaced and un-vegetated areas. 2. Retention of vegetation where possible will reduce dust travel. 3. Clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas. 4. Damping down of all exposed soil surfaces with a water dower or sprinklers when necessary to reduce dust. 5. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities. 6. A speed limit of 30km/h must not be exceeded on site. 7. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. 8. Any dirt roads that are utilised by the workers must be regularly 	Construction phase	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>maintained to ensure that dust levels are controlled.</p> <p>9. Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.</p>		
Odour control	<ol style="list-style-type: none"> 1. Regular servicing of vehicles in order to limit gaseous emissions. 2. Regular servicing of onsite toilets to avoid potential odours. 	Pre-construction and construction	Environmental Liaison Officer
Rehabilitation	<ol style="list-style-type: none"> 1. The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. 	Pre-construction and construction	Environmental Liaison Officer
Fire prevention	<ol style="list-style-type: none"> 1. No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. 2. No firewood or kindling may be collected from the site or the surrounds, without explicit approval from the ECO. 3. The Contractor shall have operational fire-fighting equipment available on site at all times. The level of fire-fighting equipment must be assessed and evaluated through a typical risk assessment process. All staff should be trained in fire-fighting and how to use the fire-fighting equipment. 4. A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site. 5. Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. 6. Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. 	Pre-construction, construction and operation	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Noise and Vibrations			
Mitigation of noise and vibrations	<ol style="list-style-type: none"> 1. The construction phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development. 2. Construction site yards, workshops, concrete batching plants, and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the Contractor(s), the sites must be evaluated in detail and specific measures designed into the system. 3. Truck traffic should be routed away from noise sensitive areas, where possible. 4. Noise levels must be kept within acceptable limits. 5. Noisy operations should be combined so that they occur where possible at the same time. 6. Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas should not be allowed. 7. Construction workers to wear necessary ear protection gear. 8. Noisy activities to take place during allocated construction hours. 9. Noise from labourers must be controlled. 10. Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site. 11. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. 12. Applying regular and thorough maintenance schedules to equipment and 	Pre-construction and construction	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine.		
Site specific mitigation measures for noise and vibration	<ol style="list-style-type: none"> 1. During construction, care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers. 2. Gravel roads used during construction of the plant should be kept in good order. Corrugations and drainage ruts should not be allowed to develop as these can contribute to mechanical rattling and banging noise on vehicles traversing these roads. 	Pre-construction and construction	Environmental Liaison Officer
Energy Use			
The use of energy and actions that need to be implemented	<ol style="list-style-type: none"> 1. Energy saving lighting must be implemented across the board. 2. Minimal lighting, while maintaining health and safety regulations, must be kept on during the night operations. 3. Equipment not in use must be switched off and unplugged to save on unnecessary energy costs. 	Construction phase	Environmental Liaison Officer
Employment			
Labour	<ol style="list-style-type: none"> 1. The use of labour intensive construction measures should be used where appropriate. 2. Training of labourers to benefit individuals beyond completion of the project. 3. No informal vending stations may be allowed on or near the construction site. 4. The DRJSMLM and the contractor(s) should develop a code of conduct for 	Construction phase	Principal Contractor

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>the construction phase. Contractors need to ensure that all workers sign this code of conduct before the construction phase starts. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation. By doing this, workers will be legally informed of the associated risks on the property and that they would be held liable for any damages or losses.</p> <p>5. A policy that no employment will be available at the gate should be implemented.</p>		
Recruitment plan	<ol style="list-style-type: none"> 1. Recruitment must comply with national employment and labour laws. 2. Where <u>reasonable and practical</u>, DRJSMLM service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. 3. The Project Manager must ensure that all staff working on the proposed project is in possession of a South African Identity Card or a relevant work permit. 4. The recruitment of skilled labour will follow standard advertising process in newspapers and interview based selection. 5. Record of official complaints by employees to authorities i.e. Labour and Social Security. 6. Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. 7. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. 8. Job seekers from the local community should be employed first. 9. Establish and maintain a healthy worker-management relationship. 	Construction phase	Principal Contractor
Occupational Health and Safety			

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Work health and safety	<ol style="list-style-type: none"> 1. All staff should undergo a general health and safety induction and simplified environmental awareness training. 2. Implementation of safety measures, work procedures and first aid must be implemented on site. 3. Workers should be thoroughly trained in using potentially dangerous equipment. 4. Contractors must ensure that all equipment is maintained in a safe operating condition. 5. A safety officer must be appointed. 6. A record of health and safety incidents must be kept on site. 7. Any health and safety incidents must be reported to the Project Manager immediately. 8. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures. 9. Workers have the right to refuse work in unsafe conditions. 10. The Contractor shall take all the necessary precautions against the spreading of disease such as measles, foot and mouth, etc. 11. A record shall be kept of drugs administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against DRJSMLM or the Contractor. 12. The Contractor must ensure that all construction workers are well educated about HIV/AIDS and the risks surrounding this disease. The location of the local clinic where more information and counselling is offered must be indicated to workers. 13. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers/local residents. 14. Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>reduce the risk posed to local family structures and social networks.</p> <p>15. It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.</p> <p>16. The drivers of the vehicles must be qualified and all vehicles must be road worthy. Drivers should also be made aware of the strict speed limits on and off site and the potential road safety issues on site.</p> <p>17. Vehicles that are used for the transportation of loose building materials, like sand, should be fitted with covers to avoid spillage.</p> <p>18. Measures for dust suppression should be implemented regularly to minimise dust pollution. An example hereof is the wetting of gravel roads. Authorisation to use groundwater for these purposes need to be gained.</p>		
Work facilities	<ol style="list-style-type: none"> Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness. Fires are not to be allowed outside controlled areas. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Hazardous substances	<ol style="list-style-type: none"> Working areas should be provided with adequate ventilation and dust/fume extraction systems to ensure that inhalation exposure levels for potentially corrosive, oxidizing, reactive or siliceous substances are maintained and managed at safe levels. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Machine and equipment	<ol style="list-style-type: none"> Use of contrast colouring on equipment/ machinery including the provision of reflective markings to enhance visibility. Use of moving equipment/machinery equipped with improved operator sight lines. Issuing workers with high visibility clothing. Use of reflective markings on structures, traffic junctions, and other areas with a potential for accidents. 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	5. Installing safety barriers in high risk locations.		
Fitness for work	1. Review shift management systems to minimise risk of fatigue. Establish alcohol and other drugs policy for the operation.	Construction phase	Principal Contractor and Environmental Liaison Officer
Travel and remote site health	1. Develop programs to prevent both chronic and acute illnesses through appropriate sanitation and vector control systems. 2. Where food is prepared on site, food preparation storage and disposal should be reviewed regularly and monitored to minimise risk of illness.	Construction phase	Principal Contractor and Environmental Liaison Officer
Protective gear	1. Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn where necessary i.e. dust masks, ear plugs etc. 2. No person is to enter the site without the necessary PPE.	Construction phase	Principal Contractor and Environmental Liaison Officer
Site safety	1. The construction camp must remain fenced for the entire construction period. 2. Potentially hazardous areas are to be demarcated and clearly marked. 3. Adequate warning signs of hazardous working areas. 4. Emergency numbers for local police and fire department etc. must be placed in a prominent area. 5. Firefighting equipment must be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank. 6. Suitable conspicuous warning signs in English and all other applicable languages must be placed at all entrances to the site.	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	7. All speed limits must be adhered to.		
Construction equipment safety	1. All equipment used for construction, including drills, TLB's must be in good working order with up to date maintenance records.	Construction phase	Principal Contractor and Environmental Liaison Officer
Hazardous material storage	<ol style="list-style-type: none"> All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. These areas should be roofed to avoid contamination of stormwater. Material Safety Data Sheets (MSDS) which contain the necessary information pertaining to a specific hazardous substance must be present for all hazardous materials stored on the site. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Procedure in the event of a petrochemical spill	<ol style="list-style-type: none"> A spill kit needs to be kept on site to address any unforeseen spillages. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, Contractor or ECO. The problem must be assessed and the necessary actions required will be undertaken. The immediate response must be to contain the spill. The source of the spill must be identified, controlled, treated or removed wherever possible. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Fire management	<ol style="list-style-type: none"> Firefighting equipment should be present on site at all times. All construction staff must be trained in fire hazard control and firefighting techniques. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<ol style="list-style-type: none"> 4. Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. 5. No open fires will be allowed on site. 6. Smoking may only be conducted in demarcated areas. 7. Road borders must be regularly maintained to ensure that vegetation remain short to serve as an effective firebreak. 		
Safety of surrounding residents	<ol style="list-style-type: none"> 1. All I&AP's should be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples of these are: <ul style="list-style-type: none"> • Blasting • Risk to residence along haulage roads/access routes 2. On-going communication with the affected and surrounding landowners is important to maintain during the construction and operational phases. 	Construction	Principal Contractor and Environmental Liaison Officer
Emergency evacuation plan	<ol style="list-style-type: none"> 1. Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency. 2. All permanent staff must undergo safety training. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Security			
Security actions that need to be implemented during construction	<ol style="list-style-type: none"> 1. If deemed necessary, a security company should be employed to guard the construction site and monitor access. This company should also be utilised for the operation phase. 2. Labour should be transported to and from the site to discourage loitering in adjacent areas and possible increase in crime or disturbance. 3. Unsocial activities such as consumption or illegal selling of alcohol, drug 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	<p>utilisation or selling and prostitution on site shall be prohibited. Any persons found to be engaged in such activities should receive disciplinary or criminal action taken against them.</p> <ol style="list-style-type: none"> 4. Only pre-approved staff must be permitted to stay within the staff accommodation if any is provided. 5. Construction workers should be easily identifiable by wearing uniforms and identification tags/induction cards. 6. The site shall be fenced, where necessary to prevent any loss or injury to persons during the construction phase. 7. No alcohol/ drugs to be present on site. 8. No harvesting of firewood from the site or from the business property adjacent to it without prior consent from the ECO. 9. Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden). 10. Trespassing on private/ commercial properties adjoining the site is forbidden. 11. Driving under the influence of alcohol is prohibited. 12. All employees must undergo the necessary safety training and wear the necessary protective clothing. 13. The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site. 14. Transportation for the construction workers need to be arranged by the contractor to ensure that there will be no trespassing of properties by any staff. Necessary arrangements to enable workers to return to their hometowns over weekends should also be arranged in order to reduce the risks posed to local family structures and social networks. 15. The proposed construction site should be fenced off and the movement of construction workers should be limited to the vicinity of the site. 		
Social Environment			

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Social actions that need to be implemented	<ol style="list-style-type: none"> 1. All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times. 2. A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This should be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor. 3. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of all damage and remedial actions shall be kept on site. 4. All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect. 5. Care must be taken not to damage irrigation equipment, lines, channels and crops. 6. Slijpsteen DRJSMLM should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. 7. Contractors appointed by DRJSMLM must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Influx of people	<ol style="list-style-type: none"> 1. Have clear rules and regulations for access to the construction site to control loitering. Consult with the local SAPS to establish standard operating procedures for the control and/or removal of loiterers at the construction site. 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Additional municipal infrastructure	<ol style="list-style-type: none"> 1. Where possible, construction workers should be housed within the local community to reduce the possible additional strain on local resources. 2. On site, sufficient portable services must be available (e.g. drinking water and portable toilet facilities) and serviced regularly to prevent contamination. 3. The use of local labour during construction will negate the need for additional housing; therefore, contractors are again urged to make use of as much local labour as possible. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Integration with local communities	<ol style="list-style-type: none"> 1. An aggressive STI and HIV/AIDS awareness campaign should be launched. 2. Local women should be empowered. This could be achieved by employing them to work on the project, which in turn would decrease their (financial) vulnerability. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Heritage Resources			
Impacts on potential archaeological artefacts	<ol style="list-style-type: none"> 1. Any finds must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act (Act No 25 of 1999) and to DEA. 2. Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area. 3. The Contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken. 4. Any discovered artefacts shall not be removed under any circumstances. The position of the find is to be marked (flag). The Principal Contractor and ECO are to be notified. The ECO is to inform the Developer and the Developer contacts the standby archaeologist and/or palaeontologist. 	Construction phase	Principal Contractor and Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	5. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.		
Palaeontology	<ol style="list-style-type: none"> 1. If during construction any archaeological, paleontological or other heritage resources are found, the operations must be stopped and a professional archaeologist or palaeontologist must be contacted for an assessment of the find. SAHRA must also be alerted immediately. If the newly discovered heritage resource/s is considered significant, a Phase 2 mitigation assessment with a permit from the responsible heritage authority may be required. 2. Should substantial fossil remains (e.g. well-preserved fossil fish, reptiles or petrified wood) be exposed during construction, the ECO should carefully safeguard these, preferably in situ, and alert SAHRA as soon as possible so that appropriate action (e.g. recording, sampling or collection) can be taken by a professional palaeontologist. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Visual Impact			
Visual impacts and actions that need to be implemented	<ol style="list-style-type: none"> 1. Carefully plan to reduce the construction period. 2. Locate laydown and storage areas in zones of low visibility i.e. behind tall trees or in lower lying areas. 3. Dust suppression is important as dust will raise the visibility of the development. 4. As far as possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. 5. Any additional external lighting of the facility will be limited. 6. New road construction should be minimised and existing roads should be used where possible. 	Construction phase	Environmental Liaison Officer

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING CONSTRUCTION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
	7. The contractor should maintain good housekeeping on site to avoid litter and minimise waste. 8. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. 9. Fires and fire hazards need to be managed appropriately.		

Table 2-5: Proposed Mitigation Measures during the Operational Phase

POTENTIAL ASPECTS RESULTING IN POTENTIAL ENVIRONMENTAL IMPACT DURING OPERATION	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Construction Site Decommissioning			
Removal of equipment	<ol style="list-style-type: none"> 1. All structures comprising the construction camp are to be removed from site. 2. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. 3. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document. 	Operation Township	Principal Contractor. Developer, Environmental Control officer and Environmental Liaison Officer
Temporary services	<ol style="list-style-type: none"> 1. The Contractor must arrange the cancellation of all temporary services. 2. Temporary roads must be closed and access across these, blocked. 3. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO. 	Operation Township	Principal Contractor. Developer, Environmental Control officer and Environmental Liaison Officer
Associated infrastructure	<ol style="list-style-type: none"> 1. Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer. 2. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. 3. All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. <u>Burying of construction rubble on site is prohibited.</u> 4. The site is to be cleared of all litter. 	Operation Township	Principal Contractor. Developer, Environmental Control officer and Environmental Liaison Officer

	<ol style="list-style-type: none"> 5. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer. 6. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. 7. All leftover building materials must be returned to the depot or removed from the site. 8. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management. 		
Rehabilitation plan	<ol style="list-style-type: none"> 1. Rehabilitate and re-vegetate cleared areas with indigenous plant species. 	Operation Township	Principal Contractor. Developer, ECO and Environmental Liaison Officer
Operation and Maintenance			
Maintenance	<ol style="list-style-type: none"> 1. All applicable standards, legislation, policies and procedures must be adhered to during operation of the dam. 	Operation Township	DRJSMLM
Public awareness	<ol style="list-style-type: none"> 1. The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise. 	Operational phase	DRJSMLM
Soil Erosion and Geology			
Soil erosion	<ol style="list-style-type: none"> 1. Avoid stripping land surfaces of existing vegetation. 2. To prevent the erosion of topsoil, management measures may include berms, soil traps, hessian curtains and stormwater diversion away from areas susceptible to erosion. 3. Storm water and run-off systems: install temporary drains and minimize concentrated water flows. Control storm water velocity where necessary with temporary energy dissipater structures. Divert run-off around trench excavations or disturbed areas. 	Operational phase	DRJSMLM

Monitoring and reporting	<ol style="list-style-type: none"> 1. Specific activities that should be monitored include: <ul style="list-style-type: none"> • Erosion potential (specifically in and around roads and stormwater discharge points). • Identified problem areas. 	Monthly	DRJSMLM
Geology	<ol style="list-style-type: none"> 1. Surface drainage should be provided to prevent water ponding. 2. Bulk infrastructure should be designed by a specialist. 	Operational phase	DRJSMLM
Surface and Groundwater			
Surface water	<ol style="list-style-type: none"> 1. The stormwater system on the proposed site needs to be regularly maintained to ensure effective working. 	Operational phase	DRJSMLM
Monitoring and reporting	<ol style="list-style-type: none"> 1. Specific activities that should be monitored include: <ul style="list-style-type: none"> • Erosion potential (specifically in and around roads and stormwater discharge points). • Stormwater management and design. • Identified problem areas. 2. Drainage measures must promote the dissipation of storm water run-off. 	Monthly	DRJSMLM
Biodiversity (Fauna and Flora)			
Vegetation	<ol style="list-style-type: none"> 1. Indigenous vegetation must be maintained on areas not used for the Township and all exotics removed as they appear and disposed of appropriately. 2. Re-vegetation of the disturbed construction site and areas outside of the Township are aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 3. Vegetative re-establishment shall, as far as possible, make use of indigenous or locally occurring plant varieties within a 20-metre radius of the site. Reseeding of local indigenous plant species should be done in all affected areas. 	Operational phase	DRJSMLM

	4. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas during and following rehabilitation.		
Waste Management			
Recycling and litter management	<ol style="list-style-type: none"> 1. The site should be kept clear of litter at all times. 2. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. 3. Solid waste should be collected on a regular basis and disposed of at the closest municipal landfill site. 4. No solid waste may be burned or buried on site or disposed of by any other method on site. 	Operational phase	DRSJMLM
Health and Safety			
Emergency evacuation plan	<ol style="list-style-type: none"> 1. Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the land users in the case of an emergency. 	Operational phase	DRJSMLM
Maintenance	<ol style="list-style-type: none"> 1. Upon The dam wall is to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept. 	Operational phase	DRJSMLM
Fire safety	<ol style="list-style-type: none"> 1. Firefighting equipment in the form of fire hydrants or fire extinguishers must be available on or near the site. These must be regularly maintained by an appropriate company. 	Operational phase	DRJSMLM

Table 2-6: Proposed Mitigation Measures during the Closure and Rehabilitation Phase

POTENTIAL ENVIRONMENTAL IMPACT DURING THE CLOSURE & REHABILITATION (NATURE OF THE IMPACT)	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Due to the permanent nature of the proposed development, it is unlikely that closure will be implemented. No impacts are therefore anticipated for the post closure phase of the proposed development at this stage. If the project is to be decommissioned the same mitigations contained in the construction phase will apply.			

Table 2-7: Proposed Mitigation Measures during the Post Closure Phase

POTENTIAL ENVIRONMENTAL IMPACT DURING POST CLOSURE (NATURE OF THE IMPACT)	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
Due to the permanent nature of the proposed development, it is unlikely that closure will be implemented. No impacts are therefore anticipated for the post closure phase of the proposed development.			

3 ENVIRONMENTAL AWARENESS PLAN

The successful implementation of the conditions of the EMPr and EA is dependent on the adequate distribution of the requirements of the said conditions to all stakeholder associated with the development. An Environmental Awareness Plan must be commissioned by the Developer prior to commencement of pre-construction activities, to familiarise all the members of the Project Management Team and their respective employees with the conditions of the EMPr and EA.

The implementation of the Environmental Awareness Plan should include the following:

- Compilation of summaries of the conditions of the EMPr and EA;
- Distribution of summaries and full documents to members of the Project Management Team;
- Induction of all employees (the SHE Representative should induct all construction workers) and visitors prior to commencement of site clearing and construction activities making them aware of:
 - Legal obligations as per NEMA, EMPr and EA;
 - Roles and responsibilities;
 - Mitigation measures applicable to their functions on site; and
 - Potential penalties for non-compliance.

The Environmental Awareness Plan must take into account the preferred language of the employees on site and must be presented in a language that they will understand.

4 AUDITING

The key to the successful implementation of the EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. In the event where discrepancies are identified, the problem must be investigated and attended to. All the results obtained during environmental monitoring must be documented for audit purposes.

An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards. Audits should be conducted during the construction phase of the facility to ensure compliance with the management measures contained in the EMPr. The construction audit schedule is as follows:

- Monthly internal audits by the SHE representative / ECO;
- Quarterly independent external audits during the construction and site establishment phase by an independent external auditor;
- One post-construction audit by an independent external auditor;
- Annual audits for the first five years of the operational phase of each of the five phases; and
- Audits every five years of the overall compliance to the EA and EMPr conditions and recommendations for amendments for the remainder of the life the development.

The audits will incorporate the monthly reports submitted by the SHE Representative. The frequency of the operational phase audits may be increased should the findings of the audits find that the conditions of the EMPr and EA are not being complied with.

5 EMPR AMENDMENT

Amendments to the EMPr may be required as the project proceeds. The EMPr must be reviewed annually during the operational phase and any proposed amendments to the EMPr, as may be specified in the audit reports, must be confirmed with the Developer prior to being issued as a formal amendment application to DARDLEA. Copies of the amendments will be issued to all registered I&APs.

Appendices

Appendix A: CV of the EAP

CURRICULUM VITAE

MRS. MARÉLIE BOTHA



PERSONAL DETAILS:

Name: Marelíe Botha
Date of Birth: 29 April 1990
Nationality: South African
Profession: Environmental Consultant

POSITION WITH ENVIRONAMICS:

Environmental Assessment Practitioner (EAP)

ACADEMIC QUALIFICATIONS:

*B.Sc Tourism, Geography and Zoology
Hons.Env.Man.
M.Sc. Env.Man.(In process)*

REGISTRATIONS:

IAIAsa

Environmental Assessment Practitioner

KEY QUALIFICATIONS:

Masters Degree in Environmental Management and Geography, North West University, SA (in progress)
Honors in Environmental Management (Hons.Env.Man.), North West University (NWU), SA (2012-2013)
B. Sc in Tourism, Geography & Zoology, North West University (NWU), SA (2009–2011)

Registered at:
International Association for Impact Assessment (IAIA)

PROJECT EXPERIENCE:

Involvement with environmental management projects and EIA applications:

Marelíe Botha has particular experience in Environmental Impact Assessment and (EIA) and Environmental Management Programmes (EMPr). Some of the projects are summarised below, which demonstrates her specialist competence:

- Environmental Management Programme for the Hawerklip Siding, near Delmas, Mpumalanga Province.
- Environmental Management Programme for the Diro Resources load out station near Kathu, Northern Cape Province.
- Fifteen (15) Basic Assessment projects in terms of the National Environmental Management Act (107/1998) and the Minerals and Petroleum Resources Act (28/2002).
- Thirty-four (35) EIA projects in terms of the National Environmental Management Act (107/1998) and the Minerals and Petroleum Resources Act (28/2002).

Marelíe Botha's experience with EIA processes and the intricacies around process management stems from her involvement in practice as well as research. Her main focus in her Master's research is of Environmental Impact Assessment debates in South Africa. She has extensive knowledge on Renewable Energy and more specific the environmental impacts surrounding photovoltaic solar energy facilities. She also has knowledge in environmental Impact Assessment in the mining industry, focusing on mining permits, prospecting rights and mining rights.