PROPOSED ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE PROVINCE

ENVIRONMENTAL MANAGEMENT PLAN


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FREE STATE PROVINCE

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1. INTRODUCTION

This document describes mitigation measures and is partly prescriptive, identifying specific people to undertake specific tasks, in order to ensure that impacts on the environment are minimized during the construction-, operational and decommissioning phases of the proposed establishment of the South African Technology Demonstration Centre, Xhariep district, Free State Province.

The aim of this Environmental Management Plan (EMP) is to integrate environmental planning, design, construction, and operational activities on the site. The EMP must form part of the contractual obligation between the Contractor and the Client.

2. PROPOSED MECHANISMS FOR MONITORING COMPLIANCE WITH THE EMP AN REPORTING THEREOF

2.1 Environmental Site Agent

The environmental site agent (ESA) is the person involved with the development project who is responsible for the implementation of the environmental management plan. This person is therefore responsible for the environmental issues involved with the construction phase of the project.

The ESA must be a person with adequate environmental knowledge to understand and implement this management plan. The ESA may not be someone appointed by the contractor, engineer or other party involved with the project. The ESA must report to the applicant only. The ESA has the authority to stop works if in his opinion there is a serious threat to or impact on the environment caused directly from the construction operations. This authority is to be limited to emergency situations where consultation with the engineer or applicant is not immediately available. In all such work stoppage situations the ESA is to inform the engineer and applicant of the reasons for the stoppage as soon as possible.

Upon failure by the contractor or his employee to show adequate consideration to the environmental aspects of this contract, the ESA may recommend to the engineer to have the contractor's representative or any employee(s) removed from the site or work suspended until the matter is remedied. No extension of time will be considered in the case of such suspensions and all costs will be borne by the contractor.

2.2 Environmental Awareness Training for Site Personnel

All contractor teams involved in work on the development are to be briefed on their obligations towards environmental controls and methodologies in terms of this EMP prior to work commencing. The briefing will usually take the form of an on site talk and demonstration by the ESA. The education / awareness program should be aimed at all levels of management within the contractor team. (See "Do's & Don'ts" summery sheet).

2.3 On Site Communication Procedure

2.3.1 Site Instruction Entries

The Site Instruction book entries will be used for the recording of general site instructions as they relate to the works on site. It will also be used for the issuing of stop work orders for the purposes of immediately halting any particular activities of the contractor in lieu of the environmental risk that they may pose.

2.3.2 ESA Diary Entries

The purpose of these entries will be to record the comments of the ESA as they relate to activities on the site. Each of these books must be available in duplicate, with copies for the Engineer and ESA. These books should be available to the authorities for inspection or on request. Contractors meeting minutes must reflect environmental queries, agreed actions and dates of eventual compliance. These minutes form part of the official environmental record.

2.3.3 Method Statements

Method statements from the Contractor will be required for specific sensitive actions on request of the authorities or ESA. A method statement forms the base line information on which sensitive area work takes place and is a “live document” in that modifications are negotiated between the Contractor and ESA / Engineer, as circumstances unfold. All method statements will form part of the EMP documentation and are subject to all terms and conditions contained within the EMP main document. A method statement describes the scope of the intended work in a step by step description in order for the ESA and Engineer to understand the Contractors intentions. This will enable them to assist in devising any mitigation measures, which would minimize environmental impact during these tasks. For each instance wherein it is requested that the Contractor submit a method statement to the satisfaction of the ESA, the format should clearly indicate the following:

- **What** - a brief description of the work to be undertaken;
- **How -** a detailed description of the process of work, methods and materials;
- **Where -** a description/sketch map of the locality of work (if applicable); and
- **When -** the sequencing of actions with due commencement dates and completion date estimates.

The Contractor must submit the method statement before any particular construction activity is due to start. Work may not commence until the method statement has been approved by the ESA.

2.3.4 Record Keeping

All records related to the implementation of this management plan (e.g. site instruction book, ESA diary, method statements) must be kept together in an office where it is safe and can be retrieved easily. These records should be kept for two years and should at any time be available for scrutiny by any relevant authorities.

2.3.5 Photographs

It is recommended that photographs are taken of the site prior to, during and immediately after construction as a visual reference. These photographs should be stored with other records related to this EMP. If captured in digital format hard copies must be kept with all other records relevant to the implementation of this EMP.

2.3.6 Environmental Completion Statement

An Environmental Completion Statement is a report by the ESA to the relevant authorities stating completion of the project and compliance with the EMP and conditions.

2.4 Basic Rules of Conduct

The following list represents the basic Do's and Don'ts towards environmental awareness, which all participants in this project must consider whilst carrying out their tasks. These are not exhaustive and serve as a quick reference aid. NOTE: **ALL new site personnel must** attend an environmental awareness presentation. Please inform your foreman or manager if you have not attended such a presentation or contact the ESA.

DO:

- Use the toilet facilities provided – report dirty or full facilities
- Clear your work areas of litter and building rubbish at the end of each day – use the waste bins provided and ensure that litter will not blow away.

- Report all fuel or oil spills immediately & stop the spill continuing.
- Dispose of cigarettes and matches carefully. (Littering is an offence.)
- Confine work and storage of equipment to within the immediate work area.
- Use all safety equipment and comply with all safety procedures.
- Ensure a working fire extinguisher is immediately at hand if any “HOT WORK” is undertaken e.g. welding, grinding, gas cutting etc.
- Prevent excessive dust and noise.

DO NOT:

- Make any fires.
- Enter any fenced off or marked area.
- Allow cement or cement bags to blow around.
- Allow waste, litter, oils or foreign materials into the storm water channels
- Litter or leave food laying around

3. IMPACTS AND MITIGATION MEASURES IDENTIFIED

A number of potential environmental impacts that may arise during the project have been identified. These are outline in the following table below, and guidelines and mitigation are proposed. The Contractor must familiarize himself with the requirements of the EMP, keeping in mind that this EMP specifies the minimum performance specifications and that other site-specific requirements and possible additional requirements from the Department of Tourism, Environment and Economic Affairs – Free State Province outlined in the Environmental Authorization, must be complied with.

3.1 Construction Phase

CONSTRUCTION PHASE ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE PROVINCE								
ACTIVITY	**ASPECT**	**IMPACT**	**MITIGATION MEASURE: (objective and target)**	**PERFORMANCE INDICATOR**	**RESPONSIBILITY**	**RESOURCES**	**SCHEDULE**	**VERIFICATION**
Establish main Site Office & Storage Site	Site layout planning	Negative impact of haphazard placement of infrastructure on the environment	**Objective:** To ensure acceptable impact & management of environmental issues at main site office and storage site during construction by proper planning of layout of infrastructure placement **Targets:** **1)** Draw up and submit for approval a Site Layout Master Plan. This plan must show the final positions and extent of all permanent and temporary site structures and infrastructure, **2)** The planning for layout must be done in consultation on-site with the ESA.	Site Layout Plan approved by the ESA	Contractor	Costs will be covered within the contract for implementation of the project	Site establishment stage	Engineering Contractor Environmental Site Agent
	Access	Hazards to animals, and security of materials	**Objective:** To secure the Contractor's camp area against unauthorized entry **Targets:** **1)** Fence or suitably secure main site office and material storage	Site Office & Material Storage Site is secure and there is no unauthorized entry	Contractor	Costs will be covered within the contract for implementation of the project	Site establishment stage	Engineering Consultant Environmental Site Agent

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			area.					
Establish main Site Office & Storage Site	Access route	Erosion and dilapidation of the access route	**Objective:** Prevent erosion and the dilapidation of the access road **Targets:** **1)** Upgrade the access road to an acceptable condition, **2)** Proper maintenance should be done to ensure the quality of the access road, **3)** Implement erosion protection works at identified problem areas.	The access road is in a acceptable condition	Contractor	Costs will be covered within the contract for implementation of the project	Site establishment stage	Engineering Consultant Environmental Site Agent
	Topsoil	Destruction or loss of topsoil	**Objective:** To retain topsoil for later use in closure **Targets:** **1)** Remove topsoil approximately 300mm deep from establishment area and stockpile areas, **2)** Provide containment and settlement facilities for effluents from concrete mixing and washing (concrete vehicle wash bag) facilities,	Sufficient topsoil for closure available No topsoil contaminated with cementitious materials, fuel or oil	Contractor	Costs will be covered within the contract for implementation of the project	Site establishment stage	Continuous by Contractor's Site Engineer Environmental Site Agent

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			3) Provide spill containment facilities for hazardous materials like fuel and oil.					
Establish main Site Office & Storage Site	Existing vegetative cover	Loss of vegetation	**Objective:** To avoid destruction of vegetation **Targets:** **1)** Minimize extent of removal of any vegetation, **2)** Do not remove any large tree, *Aloe* or *Haworthia* specie without permission from the ESA, **3)** No open fires permitted under trees.	No unnecessary loss of vegetation, Protection of valuable vegetation as indicated and marked/fenced off by the ESA.	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction stage	Continuous by Contractor's Site Engineer Environmental Site Agent
Construction and establishment of the South African Technology Demonstration Centre, Xhariep District	Fauna	Disturbance to the fauna in the area	**Objective:** To avoid disturbance to the fauna in the area. **Targets:** **1)** No hunting, snaring, shooting, nest raiding or egg collection by the construction staff should be allowed.	Protection of the fauna that may be in the area of construction	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction stage	Applicant Environmental Site Agent

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ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and target)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
Construction and establishment of the South African Technology Demonstration Centre, Xhariep District	Surface water and/or existing storm water systems	Contamination of storm water runoff with suspended solids	**Objective:** Contain soils and materials within defined areas and prevent contamination of storm water runoff. **Targets:** **1)** Ensure that excavation areas have a predetermined stockpile area for construction materials and excavated material, **2)** Disposal of waste excavated material at appropriate waste disposal sites, **3)** Concrete mixing to be carried out away from sensitive areas and on impermeable surfaces, **4)** Construct and operate the necessary collection facilities and storm water management systems such as diversion berms, ditches, drains, oil separation sumps, gross water ways etc. to prevent contamination of any water, **5)** Provide suitable and sufficient ablution facilities,	Correct stockpiling of excavated material on site, No pollution of water courses.	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction stage	Applicant Environmental Site Agent

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			6) Do not locate any site toilet, sanitary convenience, septic tank or French drain within the 1:100 year floodline, or within a horizontal distance of 100m (whichever is greater) of a watercourse or drainage line, **7)** Combine drinking water facilities with hand washing facilities near site toilet.					
Construction and establishment of the South African Technology Demonstration Centre, Xhariep District	Loss of vegetation	Destruction of vegetation and conserving worthy trees and shrubs	**Objective:** Prevent destruction of vegetation **Targets:** **1)** Proper planning of road alignment and width of road- minimum area to be disturbed still enabling practical execution of operation, **2)** Physical marking of trees and sensitive vegetation to be protected. No large trees, *Aloe* or *Haworthia* species may be removed without the permission of the ESA,	No unnecessary destruction of riparian vegetation	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction phase	Applicant Environmental Site Agent

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			3) No open fires permitted under trees, **4)** Rehabilitate denuded areas with appropriate species as per specifications.					
Construction and establishment of the South African Technology Demonstration Centre, Xhariep District	Soil Erosion	Erosion	**Objective:** Prevent erosion of areas **Targets:** **1)** Ensure correct drainage of areas, **2)** All the areas disturbed during construction work needs to be landscaped to a standard similar or better than before on completion of the works before replacement of topsoil, **3)** The layout of the area should be optimized to limit the erosion potential, **4)** The design of all works shall include measures to prevent erosion resulting from concentration, **5)** Rehabilitate denuded areas especially slopes with appropriate	Construction site erosion free	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction phase	Applicant Environmental Site Agent

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			species and erosion protection measures i.e. geotextiles, rocks: topsoil mixtures as per specifications.					
Construction and establishment of the South African Technology Demonstration Centre, Xhariep District	Waste Handling	Pollution of environment with waste materials	**Objective:** To avoid pollution of environment with waste materials **Targets:** **1)** Provide adequate waste bins on-site equipped with a lid to ensure no pollution, **2)** Set up system for regular waste removal to an appropriate waste disposal site, **3)** Minimize waste by sorting wastes into recyclable and non recyclable wastes, **4)** No solid waste may be burned on site, **5)** Contain chemical spills, and arrange for cleanup / control by the supplier, or by professional pollution control personnel, **6)** Hazardous substances, e.g.	Appropriate management of wastes	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction stage	Applicant Environmental Site Agent

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			diesel, oil, etc. required by the contractors shall be stored in dedicated areas developed to minimize spills and protect the environment. All storage areas, spillage containment areas, containers of hazardous substances and dangerous equipment shall be clearly and prominently marked as such.					
Construction and establishment of the South African Technology Demonstration Centre, Xhariep District	Health and Safety	Hazardous working conditions for workers	**Objective:** Provide adequate measures to ensure workers are not placed at undue risk. **Targets:** **1)** Ensure that PPE is available to workers, **2)** Adhere to the Occupational Health and Safety Act, **3)** Keep a first aid room stocked, **4)** Issue all workers with necessary health and safety items, **5)** Provide warning signs to motorists, in advance, of the	Safe working conditions for workers	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction stage	Applicant Environmental Site Agent

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			working area.					
Construction and establishment of the South African Technology Demonstration Centre, Xhariep District	Air Quality	Dust nuisance from the excavated and stockpiled materials	**Objective:** To avoid dust nuisance from excavated materials or construction materials **Targets:** **1)** Implement dust suppression measures e.g. regular watering, **2)** Concrete mixing to be carried out away from sensitive areas, **3)** Build a settling dam off the concrete vehicle wash.	Appropriate management of dust No complaints from workforce	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction stage	Applicant Environmental Site Agent
	Fire	Uncontrolled fire outbreak	**Objective:** Provide adequate measures to ensure no fire risks. **Targets:** **1)** Establish and maintain fire breaks around the Work Sites if as and when specified by the ESA and as required by applicable legislation and the local authority. **2)** Ensure Work Site and the contractor's camp is equipped with adequate fire fighting	No fires as a result of Works on site: the Contractor will be held liable for any damage to property adjoining the Site as a result of any fire caused by one of his employees	Contractor	Costs will be covered within the contract for implementation of the project	Throughout construction stage	Applicant Environmental Site Agent

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			equipment. This includes at least rubber beaters when working in veld areas, and at least one fire extinguisher of the appropriate type irrespective of the site, **3)** No open fires are permitted anywhere on site. Restrict contained fires for heating and cooking (i.e. in a fire drum) to designated areas on site, **4)** Prevent employees from creating fires randomly outside designated areas, **5)** Do not store any fuel or chemicals under trees, **6)** Do not store gas and liquid fuel in the same storage area, **7)** Do not permit any smoking within 3m of any fuel or chemical storage area, or refuelling area.					
Construction and establishment of the South	Noise	Noise nuisance from construction equipment	**Objective:** To avoid noise nuisance from construction equipment **Targets:**	No noise nuisance as a result of the construction equipment.	Contractor	Costs will be covered within the contract for implementation	Throughout construction stage	Applicant Environmental Site Agent

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African Technology Demonstration Centre, Xhariep District			**1)** Limit working hours of noisy equipment to daylight hours, **2)** Fit silencers to equipment, **3)** Unless otherwise specified by the ESA, normal work hours will apply (i.e. from 06:30 to 16:15, Mondays to Fridays), **4)** Ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours.			of the project		

3.2 Operational phase

The intention, of providing an EMP for the operational phase, is merely to provide Management with guidelines to be used in the management of the South African Technology Demonstration Centre, to safeguard the environment against negative environmental impacts.

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Operation of the South African technology demonstration centre, Xhariep District.	Surface water and/or existing storm water systems	Management of storm water systems	**Objective:** Ensure the proper working status of all storm water channels. **Targets:** **1)** Management of all storm water systems to keep them in working condition, **2)** Storm water handling to be done according to prevent erosion.	No pollution of water courses	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent
	Soil erosion	Erosion	**Objective:** Prevent erosion of areas **Targets:** **1)** Ensure correct drainage of areas, **2)** The layout of the area should be optimized to limit the erosion potential,	Proposed site erosion free	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent

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			3) Rehabilitate denuded areas especially slopes with appropriate species and erosion protection measures i.e. geotextiles, rocks: topsoil mixtures as per specifications,					
Operation of the South African technology demonstration centre, Xhariep District.	Aesthetic view of the area	Aesthetic pollution	**Objective:** To avoid visual pollution **Targets:** **1)** Treat man made surfaces to blend in with the surrounding landscape i.e.1:3 slopes, usage of colouring compounds on concrete like permean, **2)** Demolition of all temporary infrastructure should be done, **3)** Ripping and landscaping of compacted areas should be done,	The aesthetic view of the area is not affected by the proposed construction.	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent
	Weed and invader plant control	Deterioration of the area due to the invasion of weed and/or invader plants	**Objective:** To avoid the invasion of problem plants **Targets:** **1)** A weed and invader control program needs to be	No weed or invader plants will be present at the proposed site.	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent

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			implemented.					
Operation of the South African technology demonstration centre, Xhariep District.	Alien fish specie control	Pollution of natural water sources with alien fish species	**Objective:** To avoid the pollution of natural water sources with alien fish species. **Targets:** **1)** A risk assessment should be done and approved by the appropriate competent authority prior to the introduction of alien fish species at the site, **2)** Proper prevention systems should be incorporated to ensure that no natural water sources are contaminated with alien fish eggs/species. Examples to be considered consist out of: ◆ Ultraviolet light irradiation, ◆ Heat treatment, ◆ High-powered ultrasound, ◆ Chlorine, ozone and hydrogen peroxide applications.	No alien fish species/eggs will be released into natural water sources.	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent

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Operation of the South African technology demonstration centre, Xhariep District.	Diesel spillage	Contamination of soil and water courses due to diesel spillage	**Objective:** To avoid the pollution of soil and water courses due to diesel spillage. **Targets:** **1)** The storage tank must be erected inside a bund wall with sufficient capacity to contain 110% of the volume of the contents of a full tank. The bund wall system must be impenetrable and be in accordance with SANS 10089:1, **2)** All equipment on site must be inspected for diesel leaks before it is operated, **3)** Leakages must be repaired as soon as possible and drip trays must be placed underneath machinery until such leakages have been repaired, **4)** Soil contaminated with oil, diesel, petrol or other foreign matter must be excavated as far as contaminated and	No contamination of soil or water due to diesel spillages.	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent

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			disposed of at a licensed hazardous waste disposal site, **5)** Topsoil and subsoil must be protected from contamination by means of proper site management, for example collect and recycle lubricants and avoid accidental spills of pollutants, **6)** Vehicles and machinery may not be serviced on site, **7)** Polluted runoff water must be isolated and not be allowed to enter drainage lines, wetland areas or storm water canals.					
Operation of the South African technology demonstration centre, Xhariep District.	Fire hazard caused by diesel tank	Increased fire hazard due to the presence of the above ground diesel tank	**Objective:** To minimize the fire hazard caused by the diesel tank. **Targets:** **1)** To avoid possible ignition of the diesel, any ignition source such as cigarettes, human and vehicle activity and open flames must be kept at least 20m away from the storage	Minimizing the fire hazard of the site, Improving the safety of the site.	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent

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			site, **2)** The Fire Department of the local municipality, if applicable, must be notified about the commissioning of the diesel storage facility, **3)** The storage tank, pipe work, valves and pumps must be inspected thoroughly to ensure that there are no diesel leaks, **4)** The fire fighting equipment, as specified in the detail engineering design, must be kept ready in case of fire, **5)** A trained team of people with clear responsibilities must perform the commissioning, **6)** En Emergency Plan must be compiled for the operation of the diesel storage facility, **7)** All personnel at the site must be trained in the application of the Emergency Plan, **8)** The storage tank must be					

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			equipped with a clear signboard that indicates its flammability hazard.					
Operation of the South African technology demonstration centre, Xhariep District.	Contamination of water courses	Contamination of water courses due to coal and coal by-products	**Objective:** To prevent the contamination of water courses by coal or coal by-products. **Targets:** **1)** The coal storage area must be designed to impede any wind blown coal dust stormwater pollution, **2)** The storage and use of coal ash on the Gariep Hatchery site must not pollute stormwater, **3)** Stormwater must be protected from contamination by means of proper site management, **4)** Pollution runoff water must be isolated and not be allowed to enter the Orange River, drainage lines, wetland areas or storm water canals.	No water courses contaminated by coal or coal by-products.	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent

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ACTIVITY	**ASPECT**	**IMPACT**	**MITIGATION MEASURE: (objective and target)**	**PERFORMANCE INDICATOR**	**RESPONSIBILITY**	**RESOURCES**	**SCHEDULE**	**VERIFICATION**
Operation of the South African technology demonstration centre, Xhariep District.	Carbon footprint	Increased carbon footprint due to the burning of coal as a fuel source for the boiler.	**Objective:** To lessen the carbon footprint of the proposed activity. **Targets:** **1)** Trees should be planted to compensate for the CO_2 to be produced during the burning of coal as a fuel source for the boiler, **2)** The manufacturer of the coal fired hot water boiler must apply intelligent boiler control technology in its design to minimise CO_2 emissions.	The trees to be planted will compensate for the increased CO_2 production by the site.	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent
	Disposal of ash	Build up of ash at the site	**Objective:** To avoid the build up of ash at the site **Targets:** **1)** Ash from the boiler could be used to upgrade and repair access roads to the sites, **2)** The applicant should enter into a service level agreement with the local municipality, to ensure an offset area for any excess	No ash stockpiled at the site.	Applicant	Costs will be covered within the contract for operation of the project	Throughout the live span of the activity	Applicant Environmental Site Agent

OPERATIONAL PHASE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE PROVINCE								
ACTIVITY	**ASPECT**	**IMPACT**	**MITIGATION MEASURE: (objective and target)**	**PERFORMANCE INDICATOR**	**RESPONSIBILITY**	**RESOURCES**	**SCHEDULE**	**VERIFICATION**
			ash, **3)** If ash is stored on site for a period longer than a week a waste permit should be obtained from DEAT, **4)** Implement dust suppression measures e.g. regular watering when necessary.					

3.3 Decommissioning Phase

The objective of providing guidelines during the decommissioning phase is to prevent structures being left to deteriorate. Therefore it is imperative that non-functional structures be removed as soon as possible and the area rehabilitated to its former natural state. If non-functional structures are not needed anymore, or not removed, it must be maintained as if it is used to prevent the environmental degrading of the area. To ensure the integrity of the area, this aspect must also form part of the checklist of the annual environmental audit.

4. IDENTIFICATION OF PERSONS RESPONSIBLE FOR IMPLEMENTATION OF THE EIR AND EMP

4.1 Construction Phase

The construction contractor will:

- Be held responsible for the implementation of the EMP,
- Be responsible to have the EMP available on site at all times,
- Identify the need/extent, and be responsible for the implementation on of an environmental awareness-training program for construction staff, to be conversant with EMP content and their responsibilities before the commencement of construction,
- Be held responsible for compliance with all relevant aspects of the EMP,
- Be held responsible for all environmental issues on site, for one raining season after finishing of the construction phase to determine the effectiveness of the storm water control measures,
- Provide the applicant with a “Method Statement” which will indicate the procedures that will be applied in order to meet the requirements of any aspect of the EMP,
- Ensure that all problems identified during environmental inspections, are addressed and rectified as soon as reasonable possible,
- After ceasing of construction activities, an environmental audit should be done, by the ESA, before commencing with the operational phase, to determine compliance with the EMP. The results to be sent to DTEEA-FS in writing.

4.2 Operational Phase

During this phase the applicant, Department of Agriculture will be responsible to prevent negative environmental impacts, and as such will be responsible for:

- Providing a budget for maintenance,
- Maintaining all approved infrastructure in good working order to effectively fulfil its intended purpose and to prevent negative environmental impacts,
- Not construct any additional buildings, infrastructure, etc. contrary to the approved Environmental Authorization, without performing an environmental impact assessment to evaluate alternatives and environmental impacts,
- To immediately remedy any factors that contribute to negative environmental impacts,
- To do an annual environmental audit and to have the results in writing available at the administration offices of the Department of Agriculture.

4.3 Decommissioning

The objective to provide guidelines during the decommissioning phase is to prevent structures being left to deteriorate. Therefore it is imperative that non-functional structures are removed as soon as possible and the area is rehabilitated. If non-functional structures are not required any longer, and not removed, it must be maintained as if it is in used to prevent the environmental degrading of the area.

The Applicant is responsible for:

- Removal of the construction building rubble to a suitable disposal facility,
- Ensure that suitable arrangements be made to protect the environment against long term negative impacts,
- Minimize negative visual impacts,
- Maintain the storm water channels in a working condition,
- To clean up contaminants of the environment,
- Prevent erosion through regular monitoring and rehabilitation of degraded areas.

EMP: CONTRACTORS RESPONSIBILITY ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE				
MITIGATION MEASURE: (Objective and Targets)	**PERFORMANCE INDICATOR**	**COMPLIANCE & COMMENTS**	**DATE**	**SIGNATURE**
Objective: To ensure acceptable impact & management of environmental issues at main site office and storage site during construction by proper planning of layout of infrastructure placement **Targets:** **1)** Draw up and submit for approval a Site Layout Master Plan. This plan must show the final positions and extent of all permanent and temporary site structures and infrastructure, **2)** The planning for layout must be done in consultation on-site with the ESA.	➢ Site Layout Plan approved by the ESA			
Objective: To secure the Contractor's camp area against unauthorized entry **Targets:** **1)** Fence or suitably secure main site office and material storage area.	➢ Site Office & Material Storage Site is secure and there is no unauthorized entry			
Objective: Prevent erosion and the dilapidation of the access road **Targets:** **1)** Upgrade the access road to an acceptable condition, **2)** Proper maintenance should be done to ensure the quality of the access road,	➢ The access road is in a acceptable condition			

EMP: CONTRACTORS RESPONSIBILITY ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE				
MITIGATION MEASURE: (Objective and Targets)	**PERFORMANCE INDICATOR**	**COMPLIANCE & COMMENTS**	**DATE**	**SIGNATURE**
Implement erosion protection works at identified problem areas.				
Objective: To retain topsoil for later use in closure **Targets:** **1)** Remove topsoil approximately 300 mm deep from establishment area and stockpile areas, **2)** Provide containment and settlement facilities for effluents from concrete mixing and washing (concrete vehicle wash bag) facilities, **3)** Provide spill containment facilities for hazardous materials like fuel and oil.	➢ Sufficient topsoil for closure available ➢ No topsoil contaminated with cementitious materials, fuel or oil			
Objective: To avoid destruction of vegetation **Targets:** **1)** Minimize extent of removal of any vegetation, **2)** Do not remove any large tree, *Aloe* or *Haworthia* specie without permission from the ESA, **3)** No open fires permitted under trees.	➢ No unnecessary loss of vegetation ➢ Protection of valuable vegetation as indicated and marked/fenced off by the ESA			
Objective: To avoid disturbance to the fauna in the area. **Targets:** **1)** No hunting, snaring, shooting, nest raiding or egg collection by the construction staff should be	➢ Protection of the fauna that may be in the area of construction			

EMP: CONTRACTORS RESPONSIBILITY ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE				
MITIGATION MEASURE: (Objective and Targets)	**PERFORMANCE INDICATOR**	**COMPLIANCE & COMMENTS**	**DATE**	**SIGNATURE**
allowed.				
Objective: Contain soils and materials within defined areas and prevent contamination of storm water runoff. **Targets:** **1)** Ensure that excavation areas have a predetermined stockpile area for construction materials and excavated material, **2)** Disposal of waste excavated material at appropriate waste disposal sites, **3)** Concrete mixing to be carried out away from sensitive areas and on impermeable surfaces, **4)** Construct and operate the necessary collection facilities and storm water management systems such as diversion berms, ditches, drains, oil separation sumps, gross water ways etc. to prevent contamination of any water, **5)** Provide suitable and sufficient ablution facilities, **6)** Do not locate any site toilet, sanitary convenience, septic tank or French drain within the 1:100 year floodline, or within a horizontal distance of 100m (whichever is greater) of a watercourse or drainage line, **7)** Combine drinking water facilities with hand washing	➢ Correct stockpiling of excavated material on site ➢ No pollution of water courses			

EMP: CONTRACTORS RESPONSIBILITY ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE				
MITIGATION MEASURE: (Objective and Targets)	**PERFORMANCE INDICATOR**	**COMPLIANCE & COMMENTS**	**DATE**	**SIGNATURE**
facilities near site toilet.				
Objective: Prevent destruction of vegetation **Targets:** **1)** Proper planning of road alignment and width of road- minimum area to be disturbed still enabling practical execution of operation, **2)** Physical marking of trees and sensitive vegetation to be protected. No large trees, *Aloe* or *Haworthia* specie may be removed without the permission of the ESA, **3)** No open fires permitted under trees, **4)** Rehabilitate denuded areas with appropriate species as per specifications.	➢ No unnecessary destruction of vegetation			
Objective: Prevent erosion of areas **Targets:** **1)** Ensure correct drainage of areas, **2)** All the areas disturbed during construction work needs to be landscaped to a standard similar or better than before on completion of the works before replacement of topsoil, **3)** The layout of the area should be optimized to limit the erosion potential,	➢ Construction site erosion free			

EMP: CONTRACTORS RESPONSIBILITY ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE				
MITIGATION MEASURE: (Objective and Targets)	**PERFORMANCE INDICATOR**	**COMPLIANCE & COMMENTS**	**DATE**	**SIGNATURE**
4) The design of all works shall include measures to prevent erosion resulting from concentration, **5)** Rehabilitate denuded areas especially slopes with appropriate species and erosion protection measures i.e. geotextiles, rocks: topsoil mixtures as per specifications.				
Objective: To avoid pollution of environment with waste materials **Targets:** **1)** Provide adequate waste bins on-site equipped with a lid to ensure no pollution, **2)** Set up system for regular waste removal to an appropriate waste disposal site, **3)** Minimize waste by sorting wastes into recyclable and non recyclable wastes, **4)** No solid waste may be burned on site, **5)** Contain chemical spills, and arrange for cleanup / control by the supplier, or by professional pollution control personnel, **6)** Hazardous substances, e.g. diesel, oil, etc. required by the contractors shall be stored in dedicated areas developed to minimize spills and protect the environment. All storage areas, spillage containment areas, containers of hazardous	➢ Appropriate management of wastes			

EMP: CONTRACTORS RESPONSIBILITY ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE				
MITIGATION MEASURE: (Objective and Targets)	**PERFORMANCE INDICATOR**	**COMPLIANCE & COMMENTS**	**DATE**	**SIGNATURE**
substances and dangerous equipment shall be clearly and prominently marked as such.				
Objective: Provide adequate measures to ensure workers are not placed at undue risk. **Targets:** **1)** Ensure that PPE is available to workers, **2)** Adhere to the Occupational Health and Safety Act, **3)** Keep a first aid room stocked, **4)** Issue all workers with necessary health and safety items, **5)** Provide warning signs to motorists, in advance, of the working area.	➢ Safe working conditions for workers			
Objective: To avoid dust nuisance from excavated materials or construction materials **Targets:** **1)** Implement dust suppression measures e.g. regular watering, **2)** Concrete mixing to be carried out away from sensitive areas, **3)** Build a settling dam off the concrete vehicle wash.	➢ Appropriate management of dust ➢ No complaints from workforce			

EMP: CONTRACTORS RESPONSIBILITY ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT, FREE STATE				
MITIGATION MEASURE: (Objective and Targets)	**PERFORMANCE INDICATOR**	**COMPLIANCE & COMMENTS**	**DATE**	**SIGNATURE**
Objective: Provide adequate measures to ensure no fire risks. **Targets:** **1)** Establish and maintain fire breaks around the Work Sites if as and when specified by the ESA and as required by applicable legislation and the local authority. **2)** Ensure Work Site and the contractor's camp is equipped with adequate fire fighting equipment. This includes at least rubber beaters when working in veld areas, and at least one fire extinguisher of the appropriate type irrespective of the site, **3)** No open fires are permitted anywhere on site. Restrict contained fires for heating and cooking (i.e. in a fire drum) to designated areas on site, **4)** Prevent employees from creating fires randomly outside designated areas, **5)** Do not store any fuel or chemicals under trees, **6)** Do not store gas and liquid fuel in the same storage area, **7)** Do not permit any smoking within 3m of any fuel or chemical storage area, or refuelling area.	➢ No fires as a result of Works on site: the Contractor will be held liable for any damage to property adjoining the Site as a result of any fire caused by one of his employees			

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MITIGATION MEASURE: (Objective and Targets)	**PERFORMANCE INDICATOR**	**COMPLIANCE & COMMENTS**	**DATE**	**SIGNATURE**
Objective: To avoid noise nuisance from construction equipment **Targets:** **1)** Limit working hours of noisy equipment to daylight hours, **2)** Fit silencers to equipment, **3)** Unless otherwise specified by the ESA, normal work hours will apply (i.e. from 06:30 to 16:15, Mondays to Fridays), **4)** Ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours.	➢ Appropriate management of noise levels			

5. EMERGENCY RESPONSE PLAN

The objective of this section is to provide a brief summary of options available to the project manager. The details of the design will reside with the designers, but cognizance should be taken of the design philosophy and key aspects given in the guidelines to problem solving given below.

5.1 Typical remedial work options

The following table is provided to assist the inspector and project manager with problem solving:

OBSERVATION OR EVENT	ACTION BY INSPECTOR OR OBSERVER	ACTION BY PROJECT MANAGER
Spillage of diesel or hydrocarbons on soil	**Report to Project Manager and continue observations.** **<u>Also check:</u>** ➢ **That the source causing the spillage is decommissioned, and that the affected area is isolated to prevent spreading of the hazardous substance.**	**Action will be required ASAP by following the next steps:** ➢ **Dig down into the soil to see how far down the pollution penetrated,** ➢ **If less than 300mm penetration:** **a. Turn the soil over to expose it to the air,** **b. Apply Mono Ammonium Phosphate (MAP) at a rate of 58gr/m² to the dug up soil** **c. Water enough to keep the soil moist.** ➢ **If penetration is greater than 300mm:** **a. Remove the affected soil and spread in a layer not more than 300mm thick,**

OBSERVATION OR EVENT	ACTION BY INSPECTOR OR OBSERVER	ACTION BY PROJECT MANAGER
		b. Apply MAP at a rate of 50gr/m² **c. Water enough to keep the soil moist.** ➢ **Repeat the above steps every 6 weeks or until the soil is clean.**
Erosion of access road	**Report to Project Manager and continue observations.** **<u>Also check:</u>** **That all vehicular movement is restricted to existing access routes to prevent crisscrossing of tracks through undisturbed areas.**	**Action will be required ASAP:** ➢ **Implement erosion protection works at identified problem areas,** ➢ **Implement remedial works to be done at affected areas in order to restore the area to its previous or better status.**

6. INCIDENT REGISTER

INCIDENT REGISTER ESTABLISHMENT OF THE SOUTH AFRICAN TECHNOLOGY DEMONSTRATION CENTRE, XHARIEP DISTRICT					
NAME OF PERSON REPORTING THE INCIDENT	**INCIDENT**	**DATE OF INCIDENT IDENTIFIED**	**HOW WAS INCIDENT ADDRESSED?**	**DATE OF RECTIFICATION**	**SIGNATURE**

7. RELOCATION OF PROTECTED SPECIES

Relocation refers to the moving of a plant to a new location. The establishment of populations of native plants in the wild:

- Should replicate as closely as possible the pre-settlement vegetation at that site,
- Once established, should be able to survive & reproduce with minimum human intervention.

Some *Aloe* and *Haworthia* species were identified at the site, close to the proposed site earmarked for the construction of the demonstration centre. Although these species are not endangered species they are protected in the Free State and may therefore not be damaged during the construction period of the demonstration centre. If situated within the area earmarked for construction the plants should be relocated to a similar habitat.

Aloes and *Haworthias* have fibrous roots and the next steps need to be followed during the relocation of the species:

1. Identify individual plants to be relocated,
2. Identify area where plants will be relocated to,
3. Prepare holes:
   - *Aloe* sp. – 500cm deep. The width of the plant should serve as an indication of the width required for the hole,
   - *Haworthia* sp. – 10cm (deep) x 20cm (width),
4. Add some potting soil to prepared hole,
5. Collect plants to be relocated. Caution should be taken not to damage the roots as they grow shallow but wide,
6. Place collected plants into prepared holes and water,
7. Relocated *Aloe* plants should be anchored. A wire covered with tube can be placed around the plant, acting as a fixing point for anchor cables.

In the event of any uncertainties Enviroworks can be contacted at the following contact details – 051 447 8159 (Tel).