ENVIRONMENTAL MANAGEMENT PLAN FOR THE WATERBERG DISTRICT MUNICIPALITY

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Compiled by

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1. INTRODUCTION

This draft Environmental Management Plan (EMP) has been compiled by Hluli Environmental Consultants and Engineers. The Terms of Reference for this project was to finalise the EMP based on the baseline information and issues of concern previously compiled. Baseline information is reported in a separate report (Annexure 1). However, the current baseline environmental studies do not provide the detailed information that is required to inform municipal specific strategies. Limited information is tabulated in Table 1, which was obtained from the Integrated Development Plans of the six local municipalities.

An assessment of the state of cultural heritage resources was undertaken within the scope of this project as no information had been gathered (Annexure 2).

Additional detailed baseline information will need to be obtained during the next review of the EMP.

Workshops were held with key stakeholders on 23 August 2006 and 18 September 2006. The draft EMP was workshopped and comment and input received at the workshops was incorporated into the final EMP (Annexure 3).

1.1 Objectives

An EMP is a plan or programme for protection of the environment that seeks to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment, will be mitigated, controlled, and monitored.

The EMP will address the environmental impacts during the design, implementation and operational phases of a project. In order to achieve this, a number of environmental specifications/recommendations are made. These are aimed at ensuring that the developer maintains adequate control over the project in order to:

- Minimise the extent of impact during project implementation.
- Ensure appropriate restoration of areas affected by implementation.
- Prevent long term environmental degradation.

Implementing instruments for an EMP include:

- Institutional capacity building
- Training and technical assistance
- Public participation and stakeholder engagement
- EMP implementation schedule
- EMP funding.

The section proposes guidelines, processes and procedures that ensure that the environment is not detrimentally affected by development.

Strategic objectives have been formulated as a means to manage and minimise the impact of development on the environment. The approach used includes formulating management criteria that will retain the environmental opportunities as well as setting requirements to ensure that environmental constraints are identified early in the development cycle. Management requirements follow best practise approaches and minimum requirements from a legal compliance point of view.

Table 1: Summary of environmental issues identified in the local municipality IDPs

Issues	Local Municipality					
	Bela-Bela	**Lephalale**	**Modimolle**	**Mogalakwena**	**Mookgophong**	**Thabazimbi**
Potential environmental risks	Poor management of landfill site Inadequate sanitation systems Informal settlements Veld fires Chemical spills and/or other hazardous accidents Droughts	Establishment of a new power station Pollution from Matimba Power Station Fly ash from the mine at Zwartwater Burning of waste dumps Poor waste management Invader plants Reed invasion Inadequate sanitation systems Informal settlements Littering	Poor management of landfill site Inadequate sanitation systems Informal settlements Veld fires Chemical spills and/or other hazardous accidents Droughts High usage of fuelwood for cooking and heating	Veld and forest fires Chemical spills and/or other hazardous accidents Drought and other natural disasters Informal settlements Soil erosion Inadequate solid waste disposal Urban sprawl Degradation of environment through firewood collection Limited monitoring of factory effluent Inadequate sanitation systems	Informal settlements Illegal dumping Inadequate sanitation systems Invader plants Groundwater pollution around informal settlements Veld fires Land degradation	Lack of properly managed landfill sites Mining pollution Inadequate sanitation systems Informal settlements
Environmentally sensitive areas	Wetland areas next to Bospoort stream and Klein Kariba River Mabula Game reserve Mabalingwe Nature Reserve Bonwa Phala Game Reserve Kunkuru Game Reserve Sondela Nature Reserve	Waterberg Biosphere Golden Horseshoe D'Nyala Nature Reserve Mokolo Dam Nature Reserve Mogol River	Marakele National Park Nyl River Floodplain Doorndraai Dam Nylsvley Nature Reserve	Waterberg Biosphere Moepel Farms Makapansgat 90% of municipal area supplied with groundwater	Golden Horseshoe Waterberg Biosphere Mosdene Private Nature Reserve	Waterberg Biosphere Marakele National Park Ben Alberts Nature Reserve Atherstone Nature Reserve

Issues	Local Municipality					
	Bela-Bela	**Lephalale**	**Modimolle**	**Mogalakwena**	**Mookgophong**	**Thabazimbi**
Mitigation activities		Joint pollution management programme with Grootegeluk Coal Mine, Municipality and Matimba Power Station Establishment of Lephalale Environmental Management Committee Annual environmental awareness and education programme		Environmental education for schools run by Lapalala Wilderness Environmental School		

Environmental management does not fall within the competency of the Environmental Health Officers, who are responsible for waste management at the local municipality although their inputs will be required for certain areas of concern, such as air quality. Currently, limited capacity is available at the municipalities to address environmental issues. A post for an environmental officer is included in the organisational structure at Mogalakwena but the position is vacant.

2. STRATEGIC OBJECTIVES

2.1 Physical Environmental Objectives

2.1.1 Geology

Geotechnical investigation and related studies should be undertaken in the area where development will occur in order to determine the specific measures necessary to mitigate impacts such as blasting, cracking, and collapse. Only development that is suitable to the site should be supported.

2.1.2 Soils

The following strategic objectives are proposed:

- No soil loss from exposed or disturbed areas should occur. Erosion control techniques must be implemented in areas likely to erode including exposed surfaces, channel banks, sloping areas, un-vegetated areas, and areas that have been degraded or disturbed.
- Development on soils must be suited to overcome the constraints of the site. This will include the use of suitable foundations, adequate drainage, and appropriate service provision (i.e. sewage).
- The original soil profile should be replaced during construction activities or where other forms of excavation occur.
- Topsoil shall be removed from all areas where physical disturbance of the surface would occur and shall be stored and adequately protected.
- The contractor shall provide for the stripping and stockpiling of topsoil from the site for later re-use.
- The Contractor shall ensure that minimal amounts of topsoil lost due to erosion, either by wind or water be replaced by unused garbage.
- Areas to be topsoiled and grassed shall be done so systematically to allow for quick cover and reduction in the chance of heavy topsoil losses due to unusual weather patterns.
- The Contractor's programme shall clearly show the proposed rate of progress of the application of topsoil and re-vegetation (should re-vegetation be necessary). The Contractor shall be held responsible for the replacement, at his own cost, for any unnecessary loss of topsoil due to his failure to work according to the progress plan approved by the Environmental Control Officer (ECO).
- The Contractor's responsibility shall also extend to the clearing of drainage or water systems that may have been affected by such negligence within and beyond the boundaries of the construction sites.
- Top soil should be stockpiled separately to sub-soils to allow for the re-application process.
- Suitable infrastructure and appropriate development practises should be encouraged that are compatible with the type of soil that is present at the particular area.
- Development on Mispah soil must be limited due to the presence of rock and shallow soils. Blasting activities will therefore be required and these impacts will need to be managed and mitigated. Similarly, owing to the shallowness of the soil and the often steep slopes upon which this soil occurs, it will be necessary to ensure adequate and appropriate storm water control to limit erosion.
- Where blasting activities are required for development purposes, a detailed EMP must be compiled by the developer. This must specify how the blasting is to be controlled, when it is proposed to occur, equipment that will be used and the potential impact on the surrounding property owners and members of the public. The local authority must be notified of the date and times when the blasting activities are to occur.
- A storm water management plan should be drawn up for all development sites.

2.1.3 Topography

The following strategic objectives are proposed:

- Significant cut and fill should be discouraged unless it can be adequately mitigated.
- Cut and fill slopes shall be shaped and trimmed to approximate the natural condition and contours as closely as possible and, where possible, be undulating.
- Levels incongruous to the surrounding landscape shall be reshaped using a grader and other earthmoving equipment.
- All cut and fill slopes shall be left as rough as possible, and shall contain ledges to facilitate the accumulation of topsoil. The ledges shall be dug at random to appear natural.
- Linear impacts (i.e. pipelines, power lines, gas pipes, roads, and railway lines) should be discouraged in the sensitive areas and adequate mitigation to minimise their impact must be implemented.
- The existing demarcation of the Protected Natural Environment must be maintained. Low impact development activities should be supported within this demarcation. This would include for instance compliance to the regulations published under Administrator's Notice 127 (4 May 1994) of Section 16(2) of the Environment Conservation Act (73 of 1989).
- The development of ridges should be prevented. This should prevent activities from breaking the skyline, becoming visually obtrusive or occurring on steep slopes. Lighting should be focused downward (i.e. not dispersive lighting).
- Development activities should not be supported on slopes greater or equal to 8°.
- Activities that generate significant noise should not be encouraged on ridges that would create nuisance noise in down slope areas.
- The gradient of the midslope should be used to determine the appropriate type of development.
- River floodplains should be retained as a natural corridor within the 1:100 year flood line level. Development activities outside this zone should be compatible with the surrounding area. The floodplain should be rehabilitated in order to improve the quality of the area. The habitat integrity within the entire River course should be maintained.
- All exotic species growing within the River Floodplain should be removed.
- Development activities should be limited until adequate and suitable service provision is made available.
- The planting of indigenous trees and shrubs should be encouraged.
- An EMP should be compiled when bulk infrastructure is constructed across rivers.
- The natural stream and stream tributary flood plains should be retained in their existing state. Efforts to remove exotic species should be encouraged. Erosion protection and storm water control should be implemented in areas where localised flooding and erosion occur.
- Floodplains of stream and tributaries that have already been altered by development activities should be rehabilitated. This should include the use of retention ponds, gabions, and planting indigenous trees & shrubs.
- Development that occurs on the fringes of floodplains should be green.
- An adequate "buffer area" should separate the floodplain from developments.
- All exotic woody species and invader plants should be removed.
- Storm water control points, such as gabions, retention ponds and riffle beds should be inserted in appropriate positions to limit the impact of peak flows.
- Planting of kikuyu as lawns on properties adjacent to streams and rivers should be prevented.

- Erosion and siltation should be controlled.
- Development activities should not obstruct or significantly undermine the ambience of the area.

2.1.4 Hydrology

The following strategic objectives are proposed:

- No alteration of stream or river courses should be made (including damming/water impoundments) without approval from the relevant authorities (DWAF).
- Pollution control should be identified for all development areas. Pollution control in these areas should be regularly enforced by the relevant authorities.
- Point and non-point pollution sources must be addressed in an effort to improve water quality.
- Measures to control siltation should be taken on an on-site basis so that impacts further downstream can be mitigated.
- A storm water management plan for the study area should be compiled.
- Gabions and retention ponds must be constructed to limit the impact of peak flows in areas prone to erosion (steep slopes and vertical soils).
- Soil erosion and siltation on development sites and within the study area should be controlled.
- Exotic and invader species within the floodplains of the streams should be removed.

2.1.5 Water Resources

The following strategic objectives are proposed:

- Development activities should include controls on the management of sewage and waste where runoff can impact on water quality.
- Control should be exercised on the use of fertilisers in the study area, especially along the banks of waterways.
- Groundwater quantity and quality must be protected. The uncontrolled abstraction of ground water from the aquifer must be prevented.
- Borehole use must be registered and appropriate studies by professional parties must be undertaken to motivate the need and assess the impact of ground water abstraction.
- All developments proposed in non-serviced areas must submit proposed water services information for the development.
- Wetlands should be maintained and incorporated into development where possible.
- Wetlands should not be drained for agricultural purposes.
- Diversion and damming of streams/rivers should follow the correct legislated procedures.
- Development should not be allowed to encroach upon pans. A buffer area should be determined to protect the pan from surrounding land uses and activities. Pans should not be drained or used for storm water runoff collection points.

2.2 Biological Strategic Objectives

2.2.1 Ecological Systems

The following strategic objectives are proposed:

- A detailed inventory of all core areas and connector areas should be compiled.
- Core areas should be used for the purpose of environmental awareness.

- The ecological integrity of core areas must be maintained by preventing degradation, erosion, loss of biodiversity, accumulation of waste, inappropriate development, etc.
- A management framework for the protection and utilisation of core areas and connector areas should be established.
- Public-Private initiatives should be considered to maintain these areas.
- Connector areas must be protected against developmental damage and disturbed areas must be rehabilitated. Riverine vegetation must be conserved and sufficient buffer areas must be maintained between the connector and the surrounding development.
- Intermediate areas should be conserved as open spaces with limited recreation orientated development. The role of intermediate areas in the open space system must be re-assessed should development be proposed in these areas.

2.2.2 Fauna

The following strategic objectives are proposed:

- The habitats and potential occurrence of sensitive species should be assessed before development is approved. Suitable habitats should be conserved where possible or mitigation measures provided to decrease impacts.
- Conservation of sensitive species can be conveyed to the public by developing educational outings and volunteer 'watch dog' organisations.
- A list of Red Data fauna for the study area must be compiled. This should list those species under threat, reasons for their demise and measures that must be taken to ensure for their continued existence, including access to adequate and appropriate areas of suitable habitat condition.
- Areas that serve as habitat for sensitive fauna must be protected.

2.2.3 Flora

The following strategic objectives are proposed:

- Areas that are disturbed and devoid of natural vegetation should be rehabilitated with indigenous species.
- Alien/invasive species should be removed, either mechanically or chemically, from sites. National programmes such as the Department of Water Affairs & Forestry Working for Water programme should be used to assist in this.
- Individual landowners should be encouraged to remove exotic species from their properties.
- A fire management system is required in areas subject to frequent fires.
- A vegetation assessment, including a Red Data scan, should be completed if development is proposed in sensitive vegetation type.
- Habitat connectivity between properties should be maintained.
- Appropriate mitigation measures that protect suitable sensitive species habitat must be derived.
- The public should be educated and informed about the legislated guidelines and status of the various exotic species in order to regulate the already existing ones and their spread.
- Medicinal plant species should be protected *in situ*. Alternatively protected plants may be relocated to a similar habitat in the site (in the open space areas) or to a natural area in close proximity to the site.

2.3 Cultural/Historic Features

The following strategic objectives are proposed:

- The cultural/historic features of the area should be retained in their current form and/or rehabilitated to ensure for their preservation. Efforts to better integrate development with the occurrence of these features should be encouraged.
- An inventory of all the cultural historic sites in the study area should be compiled and the significance determined.
- Strategies for managing the rehabilitation and utilisation of cultural features should be formulated.
- Appropriate cultural historic features should be moved to sites where they can be viewed and accessed (i.e. museums).

2.4 Social Features

The following strategic objectives are proposed:

- Employment opportunities should be created.
- Adequate infrastructure, housing of suitable standard, appropriate services, and crime prevention activities should be provided.
- A healthy living environment, environmental education, and greening of urban and residential area initiatives should be promoted.

2.5 Air Quality

The following strategic objectives are proposed:

- Accurate and up-to-date information on the baseline characteristics of air quality in the study area is required.
- Air quality should be maintained according to requirements of the relevant authorities.
- Industries should adhere to the National Air Quality Guidelines.
- No biomass burning shall be permitted without a permit.
- Exposed surfaces must be wetted or kept wet during windy periods to reduce dust.
- Soil that is transported must be suitably covered to prevent dust escape.
- Veld fires and the burning of fossil fuels for domestic purposes should be controlled and minimised.
- Encourage the use of renewable energy sources.
- A strategy to control pollutants within the study area should be developed.
- Regular reports concerning the state of air quality should be compiled.

2.6 Land Use

The following strategic objectives are proposed:

- The preparation of a sub-division policy, which should include a basic infra-structural framework for future roads and services and clarity on the legal process to be followed.
- The preparation of a housing strategy in order to address the short fall of housing in the area, ensure that housing is well located, and minimise the possibility of further backyard and shack development.
- Preparation of a policy to protect areas adjacent to sensitive zones defined by slope, ecological characteristics, ands the like from inappropriate land use;

3. EVALUATION AND REPORTING SYSTEMS

A list of some common approaches is provided below that can be used to assess environmental performance:

- Reporting of the various environmental attributes in the area (including water quality, air quality, and loss of agricultural land).
- Assessment of the nature and type of development applications (i.e. EIAs, Scoping Reports, Exemption Applications).
- Records on the progress of applications and problems experienced.
- Records on the nature of environmental problems in the study area.
- Records of non-compliance.
- Regular meetings with representative organisations that are affected by development planning.

It will be necessary to establish the roles and responsibilities for the reporting functions and to determine the frequency of reporting that is possible with the available municipal capacity.

4. GENERIC IMPACTS AND ASSOCIATED MITIGATION MEASURES

This section provides a brief description of the most common impacts resulting from most projects and developments and a description of the associated mitigation measures (Table 2).

These list of impacts and mitigation measures are not exhaustive but are provided as a guide to assist the Municipality and those involved in activities and projects that may impact on the environment, and developing or reviewing an Environmental Management Plan to understand which issues should be addressed as minimum requirement.

Table 2: Generic impacts and associated mitigation measures

Impact	Project phase	Mitigation measures	Performance specifications
Soil			
Loss of top soil: (the essential substrate for plant growth and hence rehabilitation) Erosion; Compaction and crusting Changes in soil properties (e.g. acidification and salinisation) Chemical contamination Invasion of exotic biota	Pre-implementation; Implementation; Operation	a) Prior to earthing operations all topsoil (top 300mm as a minimum must be stripped and stockpiled separately from subsoil and rocky material. Soil must be stripped in a phased manner so as to retain vegetation cover for as long as possible. b) Stockpiled topsoil should not be compacted and should be replaced as the final soil layer. No vehicles may be allowed access onto the stockpiles after they have been placed. c) Stockpiled soil must be protected by erosion- control berms if exposed for a period of greater than 14 days during the wet season. d) To prevent topsoil from being spread out or mixed with the other spoil during the construction, soil stockpiles must not take the form of windrows. e) Topsoil stripped from different sites must be stockpiled separately and clearly identified as such. f) Topsoil stockpiles must not be contaminated with oil, diesel, petrol, waste or any other foreign matter, which may inhibit the later growth of vegetation and micro-organisms in the soil. g) Soil must not be stockpiled on drainage lines or near watercourses. h) Topsoil obtained from sites with different soil types i) Soil must be exposed for the minimum time possible once cleared of invasive vegetation. The timing of clearing and grubbing should be co-ordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion. j) Stockpiled topsoil must be either vegetated with indigenous grasses or covered with a suitable fabric to prevent erosion and invasion by weeds. k) All cut and fill surfaces need to be stabilised with appropriate material or measures when major civil works are complete. l) Erosion and Donga crossings must be dealt with as river crossings. Appropriate soil erosion and control procedures must be applied to all embankments that area disturbed and destabilised. m) Only limited vehicular access is allowed across rocky outcrops and ridges. n) All equipments must be inspected daily for oil or fuel leaks before it operated. Leakages must be repaired on mobile equipment or containment trays placed	Site establishment Access roads Combat erosion Vegetation clearance Topsoil Erosion control Slope protection Storage facilities Pollution prevention

Impact	Project phase	Mitigation measures	Performance specifications
		underneath immobile equipment until such leakage has been repaired. o) Soil contaminated with oil must: be dug up to 30cm below the saturated oil mark; or disposed at a permitted landfill site; or the soil can be	
Water			
Altered hydrology Contamination of water resources Sedimentation Salinisation Eutrophication of rivers or impoundments Groundwater contamination Surface water pollution Barriers to migration of fish, aquatic vertebrates and invertebrates	Implementation; Operation	a) Adequate sedimentation control measures must be instituted at the any river crossings when excavations or disturbance of drainage lines of wetland may take place. b) Adequate sedimentation control measures must be instituted at the any river crossings when excavations or disturbance of riverbeds takes place. c) The batching plant must be positioned away from drainage lines, and measures to ensure that no polluted water enters a natural stream, i.e. more than 20m from the nearest stream/ river channel. d) All runoff from batching areas must be strictly controlled. e) Cement contaminated water must be collected, stored and disposed of at a site approved by Site Engineer. f) Waste concrete and cement sludge must be scraped off the site of batching plant daily and removed to an approved landfill site. g) Concrete shall not be mixed directly on the ground. Plastic liners or mixing trays are to be used. h) All fuel, chemical, oil, etc spills must be confined to areas where the drainage of water can be controlled. Use appropriate structures and methods to confine spillages such as the construction of berms and pans, or through the application of surface treatments that neutralise the toxic effects prior i) Vehicle traffic across wetland areas must be avoided. j) No dumping of foreign material in streams, rivers and/or wetland areas is allowed. k) Oil absorbent fibres must be used to contain oil split in water. l) A wetland area and/or river must not be drained, filled or altered in any way including alteration of a bed and/or, banks, without prior consent from DWAF and the relevant DEAT office. The necessary licenses must be obtained fro DWAF in terms Section 21 and 22 of the National Water Act, (Act 36 of 1998). m) No fires or open flames are allowed in the vicinity of the wetland, especially during the dry season.	Site establishment Vegetation clearance Erosion control Water quality monitoring Offices & other structures Storage facilities Pollution prevention

Impact	Project phase	Mitigation measures	Performance specifications
		n) No swimming, washing (including vehicles and equipment), fishing or related activity is permitted in a wetland or a river without written permission from Environmental officer. o) The contractor must install and maintain mobile toilets at work sites. p) Maintain soil erosion structures such as stone pitching, gabions, etc to enable effectiveness. q) The contractor must provide adequate and approved facilities for the storage and recycling of used oil and contaminated hydrocarbons. Such facilities must be designed and situated with the intention of preventing pollution of the surrounding area and environment. r) All vehicles must be serviced in the designated area within the contractor camp. s) All chemical spills must be contained and cleaned up by the supplier or professional pollution control personnel.	
Flora			
Loss of individuals of rare or endangered species Damage to the integrity of the ecosystem functioning Heavier utilisation of medicinal and/or protected plants Invasion of alien vegetation	Implementation	a) All rare flora and seeds must be rescued and removed from the site. b) Protected plants must not be cut or damaged in any way. c) The felling and/or cutting of trees and clearing of bush must be minimised. d) Any incident of unauthorised removal of plant material, as well as accidental damage to priority plants, must be documented. e) Transplanting of indigenous plants must be encouraged at all times. Trees and shrubs must be planted so that their stems or trunks are at the same depth as in the original location. f) Transplanted plants must be watered once a week for 5 weeks and therefore once every 2 weeks. g) If any protected tree, identified in the site specific study, is felled, cut, pruned and/or, in the opinion of the environmental officer, is unduly damaged by the contractor, the contractor will pay a penalty (amount stipulated by DEAT) per tree h) Trees selected for preservation in the site-specific study within or adjacent to the works areas must be fenced around their drip line. The fence must be clearly marked with danger tape. No open fires may be lit within this fenced area.	Site establishment Access roads Vegetation clearance Planting Fencing & gates Destumping Landscape rehabilitation

Impact	Project phase	Mitigation measures	Performance specifications
Fauna			
Loss of individuals of rare or endangered species Disturbance of fauna (e.g. disrupted breeding of fish in dammed areas, and disturbed bird nesting areas)	Implementation; Operation	a) No species of animal may be poached, snared, hunted, captured or wilfully damaged or destroyed. b) Fishing is only allowed with the written consent of the landowner and only when anglers are in possession of a Provincial Fishing License. c) Snakes and other reptiles that may be encountered on the construction site must not be killed unless the animal endangers the life of the employee. d) Anthills that occur must not be disturbed unless it is unavoidable for construction purposes. e) Any incidents of poaching wilfully disturbance or damage to wild animals, as well as accidental damage to or death of wild animals must be recorded by the CR and made available to the EA on a weekly basis. f) Nesting sites of birds must not be disturbed. g) The contractor's representatives and environmental officer must ensure compliance with the relevant Nature Conservation Ordinances. h) The contractor's representative must ensure that domestic and native animals belonging to the Local Community are kept away from unprotected works. i) All animals injured on account of construction activities must be taken to the local SPCA. Dead animals must be disposed at a permitted landfill site. j) No pesticides must be used unless approved by the environmental officer, and may only be applied by an approved specialist. k) If water is dammed, an ichthyologist must be consulted, during the site-specific study, to establish the impact on breeding patterns of the affected fish species. The environmental officer must ensure compliance with the findings of the investigation. l) Particular care must be taken to avoid nesting, m) No breeding and roaming sites of animals in or adjacent to wetlands areas.	Site establishment Protection of fauna
Dust			
Odours, exhaust fumes; waste material; smoke	Implementation, Operation	a) Speed limits must be enforced in all areas, including public roads and private property to limit the levels of dust pollution. b) Dust must be suppressed on access roads and construction sites during dry periods by the regular applications of water or a biodegradable soil stabilisation	

Impact	Project phase	Mitigation measures	Performance specifications
		agent. Water used for this purpose must be used in quantities that will not result in the generation of run-off. c) Suitable screening and containment measures must be in place prevent wind blown contamination. d) The site-specific investigation must quantify the impact of dust on nearby wetlands, rivers and dams in terms of sedimentation. All mitigation measures identified during the site specific study must be implemented. e) The environmental officer must notify all people living within 50m of the construction site of the proposed activities. f) In the event of serious levels of dust pollution, the implementation of constant dust monitoring by qualified consultants must be undertaken. g) Waste must be allowed to stand on site to decay, resulting in malodours and attracting vermin. Waste must be disposed of at a municipal transfer station, skip or on a permitted landfill site. h) The contractors must stick to normal working hours between 07h00 and 17h00 Monday to Friday. i) The contractors must inform all adjacent landowners of any after-hour construction activities and any other activity that could cause nuisance e.g. the application of chemicals to the work surface j) The environmental officer or contractors' representative must ensure that all vehicles comply with the SABS 0181 standards. k) Vehicles used on, or entering, the site must be serviced regularly to ensure that they do not emit smoke or fumes.	
Noise			
Noise levels	Implementation	a) Noise control measures must be implemented. All noise level must be controlled at the source. If the noise level at the boundaries of the site exceeds 7Db above ambient levels, the local health authorities must be informed. b) All employees must be given the necessary ear protection gear. c) Affected parties must be informed of the excessive noise factors. d) Pumps must be housed in a brick building to help reduce any noises when the pump is in operation. e) Affected livestock farmers must be informed of excessive noisy activities a month in advance. This will enable them to take appropriate steps to prevent	Noise control Blasting

Impact	Project phase	Mitigation measures	Performance specifications
		disturbance and possible injury to livestock e.g. moving the livestock to distant camps. f) The relevant by-laws and regulations must be adhered to. These laws include: Environmental Conservation Act, 73 of 1989, Occupational Health and Safety Act, 85 of 1983 and Provincial and local by-laws. These laws regulate noise control. g) Soft explosives and/or noise mufflers must be used during blasting to minimise the impact on humans and animals. h) No loud music is allowed on site and in construction camps.	
Aesthetics			
Reduced sense of place and tourism potential of the area; Reduced visual integrity	Implementation, Operations	a) Damage to the natural environment must be minimised. b) Trees and tall woody shrubs must be protected from damage to provide a natural visual shield. Excavated material must not be placed on such plants and movement across them must not be allowed. c) The clearing of sites must be kept to a minimum and surrounding vegetation must be left intact as a natural shield. d) At construction sites in densely vegetated areas, the vegetation must be cut at angles of 45 degrees from the bottom to minimise any visual impact. e) Marking for surveying and other purposes must only be done with pegs and beacons. Painting and marking of natural features must not be allowed. f) All waste concrete/cement shall be removed together with contaminated soil after the completion of the project. g) Where existing access routes and borrow pits have been overgrown with vegetation such surfaces must not be graded. h) Borrow pits must be shaped to have undulating slopes and surfaces such that they blend into the natural landscape as much as possible.	Access roads Combat erosion Vegetation clearance Slope protection Shaping and trimming Aesthetics Offices & other structures Blasting Landscape rehabilitation
		i) Blasted areas and cut and fill slopes must be as rough as possible such that the natural surroundings are emulated as far as possible and that the jagged ledges facilitate the accumulation of soil and the subsequent establishment of vegetation. j) Where possible, concrete surfaces on embankments and storm water gullies must be undulated to minimise surface reflection.	

Impact	Project phase	Mitigation measures	Performance specifications
		k) Excavated material must be flattened (not compacted) or removed from site. No heaps of soil material must be left on site once the Contractor has moved to a new construction site. l) Littering on site and the surrounding areas is prohibited. Clearly marked litterbins must be provided on site. The contractor's representative must monitor the presence of litter on the work sites as well the construction campsite. All bins must be cleaned of litter on a daily basis. m) Excess concrete, building rubble or other material must be disposed of in areas designated specifically for this purpose and not indiscriminately over the construction site. n) All plastic material must be removed from area where livestock could swallow it. o) Contaminated soil must be treated and disposed at a permitted waste disposal site, or be removed and the area rehabilitated immediately.	
Disturbance of archaeological areas			
	Implementation	a) Work in areas where artefacts are found must cease immediately. The Environmental Officer must be notified immediately and Global Positions System reading must be taken. b) The excavation must be examined by an archaeologist as soon as possible. The EA will advise the Contractor of necessary actions to be taken after receiving advice from the archaeologist. All necessary actions to ensure that delays are minimised must be taken. c) Under no circumstances must the contractor, his employees, his sub-contractor's employee remove, remove, destroy or interfere with archaeological artefacts. Any person who causes intentional damage to archaeological or historical sites or artefacts could be penalised or legally prosecuted in terms of the National Heritage Resources Act (Act 25 of 1999). d) All known and identified archaeological and historical sites must be left untouched. No stones or rocks must be removed from such sites. e) The contractor's representative must ensure that employees do not gain access to any archaeological areas (whether fenced or unfenced), expect when authorised to do so by the environmental officer.	

Impact	Project phase	Mitigation measures	Performance specifications
Relocation of homesteads or community due to project			
	Planning, Implementation	a) Owners of Land to be expropriated must receive compensation in terms of Expropriation Act, Act 63 of 1975; b) An extensive public participation must be undertaken allowing a decision making process that is based on rights and risks culminating in negotiation to benefit sharing, resettlement and compensation; c) Project must be planned in consultation with the local community leaders. d) Resettlement action plan and development programmes for the displaced must be planned in advance. This must be done in accordance with the S&ES standards Resettlement Action Plan; e) If required, provision of temporary accommodation must be planned in advance. f) Ongoing liaison with community leaders/ representatives must be maintained in order to tract any problems with the relocations. p) Affected people must be empowered to participate effectively in the process.	Site establishment
Direct or indirect loss of essential resources			
	Implementation, Operation	a) The amount of essential resources lost must be minimised through alternative project design b) Damaged to crops or other food resources must be compensated for.	Site establishment
Disturbance of graves			
	Planning, Implementation	a) Any graves situated in the construction site or area of inundation in case of dams must be dealt with according to the Exhumation Laws of the Provincial Government and with the bye-laws of the Local Municipality Authority. b) If a graveyard is discovered, the Environmental Officer (EO) must be contacted immediately. The relatives of the deceased must be contacted immediately. The local chief, SAHRA and local Authority must also be informed of the situation. c) The relatives must be informed should a grave need to be moved. The exhumation of bodies must be executed in the local traditional manner and affected families allowed sufficient time to perform any traditional rituals. q) All finds of human remains must be reported to the nearest police station to ascertain if there was any crime involved.	Site establishment

Impact	Project phase	Mitigation measures	Performance specifications
Disruption of services			
	Implementation	a) Where service disruption is inevitable, the contractor must advise the Project Manager at least 7 days in advance, allowing enough time to inform affected parties. b) A complaints register must be maintained on site and must include contact details for complaints by the public in accordance with details provided by the Engineer. c) Updated information boards must be maintained on site and must include contact details for complaints by the public in accordance with details provided by Engineer.	Site establishment
Employment prospects			
	Planning, Implementation, Operation	a) The project must be planned in consultation with local authorities and aligned with local plans such as IDPs. b) Labour intensive method must be used where feasible, cost effective and not time constraining. c) Local labour must be employed as far as possible. d) Training of the unskilled labour must be undertaken. e) Local suppliers must be used, as far as possible.	Site establishment

5. IMPLEMENTATION STRATEGIES

A list of activities that require implementation in order to ensure that the EMP has effect is provided below.

- EMP must be adopted by provincial Department of Economic Development, Environment and Tourism.
- The Waterberg District Municipality must adopt the EMP for use in spatial planning and environmental management for sustainable development.
- The EMP must be included into future revisions of the IDP.
- An environmental management framework, that sets more precise management, monitoring and reporting systems, must be formulated for the study area. These EMFs must incorporate the principles of the EMP.
- Programmes to commence for collection, measurement, assessment and development of key environmental performance indicators.
- District Municipality and Local Municipalities to facilitate consultation with the relevant authorities and organisations for the purpose of implementing the recommendations in the EMP.
- Develop a work plan detailing key activities, anticipated completion dates and responsibilities.
- Organise a project team to guide the process of EMP implementation.
- Monitor the implementation and the performance of the EMP.

6. ROLES AND RESPONSIBILITIES

To ensure efficient and effective implementation of the Environmental Management Plan, roles and responsibilities should be clearly assigned to all roleplayers, including:

- Municipal officials
- Environmental Health Practitioners
- Environmental Officers
- Environmental Consultants
- Relevant Environmental Authorities
- Consulting Engineers
- Contractors
- Politicians, and
- the public.

6.1 Implementing Agent

The implementing agent, which is a person or organisation that will implement the project, is responsible for the implementation of the EMP. The liability of non-compliance however rests with the District Municipality.

The Municipal Environmental Officers, or their representatives, should be given specific projects to manage as environmental advisors for the duration of the project.

6.2 Project Manager

The project manager must ensure that the scope of work of the project includes environmental supervision. The implementing agent is answerable to the project manager for all environmental issues associated with the project and the Environmental Advisor must give direct feedback to the project manager regarding all environmental issues.

6.3 Environmental Consultant

An independent Environmental consultant(s) may be appointed for certain projects and would be responsible for the following:

- Ensuring compliance with the EIA regulations for listed activities, conditions of the Record of Decision and requirements of the EMP.
- Reporting all environmental incidences to the environmental advisors.
- Completing the Environmental Compliance Checklist for listed activities.
- Giving site instructions to the contractor, when it is stated in the record of decision that the contractor should be monitored, and
- Liaison with the environmental advisor.

6.4 Consulting Engineer

For many projects, consulting engineers may be appointed. Consulting engineers are involved with the planning and design phase of the project and must ensure that the requirements of the EMP are enforced during these phases. The engineer should also ensure constant consultation with the Independent Environmental Consultant and Environmental Advisor.

6.5 Operations and Maintenance Manager

The Operations and Maintenance Manager, or his/her representative, is responsible for the on-site implementation of the EMP during the operational phase of the project and is answerable to the Environmental Advisor regarding non-compliance.

6.6 Contractor

The contractor or his/her representative is responsible for ensuring compliance with the EMP.

6.7 Environmental Officer/Advisor

The Environmental Officer will liaise with the municipality, Engineer, Environmental Consultant, Contractor, Commissioners, De-commissioners, Operations and Maintenance Managers on all environmental concerns.

The Environmental Advisor is responsible for monitoring the performance of the contractors, issuing of site instructions and assisting in the resolution of conflicts.

The Environmental Officer will compile a monitoring and auditing plan to ensure that the environmental management measures are implemented and are effective.

6.8 Politicians

The success of sustainable development and implementation of the EMP depends on the support, commitment and mobilisation by the politicians.

ANNEXURE 1

Preliminary Integrated Environmental Management Plan and Baseline State of Environment Report for the Waterberg District Municipality

prepared by

EnviroXcellence Services

ANNEXURE 2

State of the Waterberg District Cultural Heritage Resources

ANNEXURE 3

Public Participation Process