

Appendix H: EMPR

Attached



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PROPOSED MEMORIAL DEVELOPMENT ON PORTION 45 OF THE FARM
BEYNESPOORT 335-JR, GAUTENG PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

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GENERAL TERMS AND ABBREVIATIONS:

Audit	Regular inspection and verification of implementation of the EMPr
Bund	A sealed enclosure under or around a storage facility to contain any spillage
Batch plant	Concrete or plaster mixing facility and associated equipment and materials
Contractor	Principal persons or company undertaking the construction of the development
Development site	Boundary and extent of development works and infrastructure
Engineer	Person who represents the client and is responsible for enforcing the technical and contractual requirements of the project
ECO	Environmental Control Officer: - Person tasked with monitoring implementation of the EMPr during construction
Emergency situation	An incident, which potentially has the ability to significantly impact on the environment, and which could cause irreparable damage to sensitive environmental features. Typical situations amongst others are: <ul style="list-style-type: none"> • Large spills of petroleum products and lubricants on site, • Potential damage, erosion and slumping of unstable slopes, • Indiscriminate dumping of construction waste on site, and accessing exclusion zones
RE/PM	Resident Engineer/Project Manager: Person representing the Engineer on site
BAR	Basic Assessment Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Program
GDARD	Gauteng Department of Agriculture and Rural Development
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)

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1. INTRODUCTION

This Environmental Management Programme (EMPr) describes impact mitigation measures to be implemented during the construction and operation phases of the proposed establishment or development of a public cemetery/memorial park on Portion 45 of the farm Beynespoort 335-JR, Gauteng Province. A new access road will be constructed from the R573 over the Remainder of Portion 24 of the farm Beynespoort 335-JR to Portion 45 (portion of Portion 24) of the farm Beynespoort 335-JR. This access road will be about 300m in length with a width of 9m.

The careful implementation and management of activities on site, during the entire process of project construction and operation, is vitally important. Focus should be placed on the activities to occur on the site of the proposed development; however, consideration of the adjacent environment (socially and ecologically) is equally important. The mitigation measures represented in this EMPr should not be seen as static measures, but rather as methodologies that can be updated and improved during implementation, as and when site conditions become clearer. However, this EMPr sufficiently serves to provide the most practicable methods to promote sound environmental management during the construction and operational phases of the development.

The measures and principles are provided to assist placing impacts identified in another perspective - more towards the firm potential of mitigating the impacts during the development and implementation of the project. But this, as already mentioned, also implies that during the course of the project certain adaptations can be made or will be eminent during the construction implementation period. These adaptations will be the result of the EMPr monitoring exercise that is planned to take place during the construction period. The EMPr subsequently is an on-site working and dynamic document.

This section of the report provides recommendations on matters relating to the impact of the development on the physical environment, the biological environment and the social environment (of the site and study area) by describing mitigation measures that are to be implemented.

2. PROJECT DESCRIPTION

The site is located on the southern boundary of Seringveld Conservancy; within the City of Tshwane Metropolitan Municipality. The locality of the proposed development is on the Portion 45 of the farm Beynespoort 335-JR: Latitude (Fig 1): -25.649710°; Longitude: 28.452471° (entrance to the site). The total size of the property is 22.0746ha and situated within the 2528CB (Silverton) quarter degree grid cell (q.d.g.c.). The turn-off to the proposed development can be reach from the R573, 680m before the Kameelfontein Rd turn-off, in the direction of KwaMhlanga. The access to the site is another 695m on this gravel road on your left-hand side. A new access road will be constructed from the R573 over the Remainder of Portion 24 of the farm Beynespoort 335-JR to Portion 45 (portion of Portion 24) of the farm Beynespoort 335-JR. This access road will be about 300m in length with a width of 9m. The proposed uses include the following:

- Chapel, admin office, kitchen, reception hall, ablutions guard house;
- Graves and spaces between graves, access and pathways;
- Adult graves;
- Child graves;
- Memorial wall;
- Memorial benches; and
- Memorial trees.

3. DESCRIPTION OF THE ENVIRONMENTAL ASPECTS OF THE ACTIVITY

Environmental Aspects	Proposed Development
<p>Geology</p>	<p>According to the published 1:250 000 Geological map 2528 Pretoria, the area is underlain by a variety of geology from different ages and formations.</p> <p>The area is underlain by sandstone and quartzite of the Selonsrivier formation which is part of the Rooiberg Group. The central, north east area is underlain by nebo granite of the Lebowa Granite Suite which is part of the Bushveld Complex. The south area is underlain by sandstone, quartzite and conglomerate from the Wilgerivier formation which is part of</p>

	<p>the Waterberg Group; the quartzite, shale, subgraywacke of the Rayton formation which is part of the Pretoria Group; the tillite and shale of the Dwyka formation which is part of the Karoo Sequence. Diabase intrusions dominate this area. The north area is underlain by shale, sandstone, conglomerate and coal of the Ecca formation of the Karoo Sequence.</p> <p>The area is characterised with numerous faults and structure zones. Lineaments in the form of dolerite/diabase dykes are evident. The Karoo Sequence being the youngest and the Pretoria Group the oldest.</p> <p><u>Impacts:</u> Blasting/Drilling of geology to accommodate foundations of the development.</p>
<p>Topography</p>	<p>Sensitive features include the small wetland, drainage line / stream and a small dam on the site.</p> <p>The 'terrain type' of the area is classified as plains with open hills or ridges. The terrain contains some distinct topographical sections, namely:</p> <ul style="list-style-type: none"> • A small quarry, north-western part of the site; • An old agricultural field found in the south-eastern part of the site; • The rest of the site consist of natural veld; • The outside the site in the northern part of the property there is a stream, quarry and farm house. <p>The site falls within the Crocodile (West) and Marico Quaternary catchment area (A23B catchment).</p> <p><u>Impacts:</u> Blasting/Drilling of geology to accommodate foundations may alter the topography slightly.</p>

<p>Soil, Land Capability and Land Use</p>	<p><i>Land Type (1:250 000 scale) Coverage</i></p> <p>As far as existing soil information is concerned, the whole area is covered by land type maps at a scale of 1:250 000, with the portion of the area south of 25° 30'S and west of 28° 30'E being covered by more semi-detailed (1:50 000 scale) soil information.</p> <p>There is a great difference between land types in terms of both the soils occurring as well as the associated agricultural potential. There is also a significant difference in the dominance of the agricultural potential classes within each land type.</p> <p>The only land type where there is a predominance of high potential soils is Ae20, occurring in the north of Dinokeng. The land types where moderate potential soils are in the majority include Ba5, Ba6, Ba12, Ba13, Bb6, Bb7, Bb9, Bb12, Bb16, Bb17, Bb18, Dc1 and Fa4. However, the percentage varies from 36% to 70%, and the proportion of high and low potential soils also varies accordingly. The lowest potential soils (which would include rock outcrops) are dominant in land types Bd3, Bd4, Fa5, Fa6, Ib7, Ib8, Ib9, Ib10 and Ib12, again with percentages that vary from 64% to 95%.</p> <p>The advantage of the land type coverage is that it indicates where areas with significant percentages of agricultural soils occur, but the disadvantage of this scale of survey is shown by land type Bb9, where each of the high, moderate and low potential soils are almost equally dominant within the land type, but the precise location/ distribution of each cannot be shown due to the scale of the survey.</p> <p>The land potential, and specifically the agricultural potential of a site, is determined by the combination of climate, soil conditions and slope prevailing in that region or site, resulting</p>
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	<p>in the classification of areas with similar agricultural land potential. These land potential classes range from “High Potential” to “Low Potential”. The Agricultural Geo-Referenced Information System (AGIS) has mapped the agricultural potential of SA. Using this mapping shapefiles, it can be seen that the site as well as areas towards the east and south; the agricultural potential is classified as Non-arable; moderate potential grazing land as well as moderate potential arable land.</p> <p>The site is currently zoned as “Agricultural”. This allows the property to be used for agricultural buildings and agricultural land.</p> <p>The site is currently not used. The surrounding zoning and land uses are agricultural as well.</p> <p><u>Impacts:</u> Soil compaction. Possible soil erosion due to removed vegetation. Surface disturbance and topsoil removal.</p>
<p>Flora</p>	<p>The study area lies in the Marikana Thornveld (SVcb6), which is found in the North West & Gauteng Provinces. This type of grassland occurs mainly on plains from the Rustenburg area in the west, through Marikana and Brits to the Pretoria area in the east. The landscape consists of open Acacia karroo woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs are denser along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire (Mucina and Rutherford, 2006).</p> <p>A Threatened species and Species of Conservation Concern list for the Grids 2528CB (Silverton) was obtained from the Plants of South Africa (POSA) database on the South African National Biodiversity Institute (SANBI) website. Threatened species are those that are <i>facing high risk of extinction, indicated by the</i></p>

	<p><i>categories Critically Endangered, Endangered and Vulnerable.</i> Species of Conservation Concern include the Threatened Species, but additionally contain the categories Near Threatened, Data Deficient, Critically Rare, Rare and Declining. This is in accordance with the new Red List for South African Plants (Raimondo <i>et al.</i> 2009). However, the POSA list is based on herbarium specimens housed in the National Herbarium of SANBI; therefore many plant species that do occur in the area are not listed.</p> <p>The following possible red data plant species (by the categories Critically Endangered, Endangered and Vulnerable) <u>could</u> occur in the areas surrounding the study area:</p> <ul style="list-style-type: none"> ▪ <i>Bowiea volubilis</i> Harv. ex Hook.f. subsp. <i>volubilis</i> according to the POSA database for grid 2528CB; <p><u>Impacts:</u> Stripping of surface vegetation during construction.</p>
<p>Fauna</p>	<p>The study area is stretched over a relatively small area. No Red Data Book Species were encountered.</p> <p>Possible smaller mammals that would commonly occur in the wider surrounding area are:</p> <ul style="list-style-type: none"> • Multimammate Mice (<i>Mastomys coucha</i>); • Namaqua Rock Mouse (<i>Aethomys namaquensis</i>); • Single-Striped Lemniscomys (<i>Lemniscomys rosalia</i>); • Rock Hyrax (<i>Procavia capensis</i>) <p>No Red Data Book species were recorded.</p> <p>According to available literature, approximately 379 bird species occur in the Silverton quarter degree grid cell (2528CB). No Red Data species were recorded.</p> <p>According to Barnes (2000) and South African Bird Atlas Project</p>

2, the following bird species are threatened in the wider area:

List of possible red date avifauna on or near the site:

SCIENTIFIC NAME	COMMON NAME
<i>Ciconia nigra</i>	Black Stork
<i>Mycteria ibis</i>	Yellow-billed Stork
<i>Phoenicopterus minor</i>	Lesser Flamingo
<i>Sagittarius serpentarius</i>	Secretarybird
<i>Gyps africanus</i>	White-backed Vulture
<i>Gyps coprotheres</i>	Cape Vulture
<i>Polemaetus bellicosus</i>	Martial Eagle
<i>Falco biarmicus</i>	Lanner Falcon
<i>Falco peregrinus</i>	Peregrine Falcon
<i>Falco naumanni</i>	Lesser Kestrel
<i>Anthropoides paradiseus</i>	Blue Crane
<i>Rostratula benghalensis</i>	Greater Painted-snipe
<i>Hydroprogne caspia</i>	Caspian Tern
<i>Tyto capensis</i>	African Grass-Owl
<i>Alcedo semitorquata</i>	Half-collared Kingfisher

No Red Data species was recorded. And no amphibians or reptiles were encountered on site. This might be due to the lack of suitable or specialised searching techniques that is required, as well as the history of anthropogenic activities on site.

List of herpetofauna possibly on site or rather in the wider area:

SCIENTIFIC NAME	COMMON NAME
<i>Schismaderma carens</i>	Red Toad
<i>Sclerophrys gutturalis</i>	Guttural Toad
<i>Amietia queketti</i>	Quekett's River Frog
<i>Boaedon capensis</i>	Brown House Snake
<i>Acanthocercus atricollis</i>	Southern Tree Agama
<i>Trachylepis varia</i>	Variable Skink

Impacts:

- Removal of surface vegetation thereby depleting food sources.
- Human presence resulting in emigration of animals.
- The disturbances of the nearby vegetation cover and natural habitat will have a limited impact on the wildlife. However, it should be viewed against the background of the disturbances by human movement and

	activities through the area.
Surface Water	<p>There are surface waterbodies onsite. The terrain contains some distinct topographical sections, namely:</p> <ul style="list-style-type: none"> • None. There is however a non—perennial stream on the northern boundary of the property; <p>The flow of water over the area might be altered by the development through hard surfaces and the channelling of stormwater.</p> <p><u>Impacts:</u> Poorly implemented storm water system will result in increased surface run-off volume and speed, which could lead to the creation of erosion gullies. Storm water must be allowed to spread out gradually over a large surface area to protect the soil surface against erosion. Inadequate designed storm water outlets can lead to flooding of the development area & road surface, adding unnecessary volume to other waterbodies downstream which is dangerous. Impacts on the wetland could be caused by the construction and operational phase.</p>
Ground Water	<p>Use of ground water resources is definitely anticipated.</p> <p><u>Impacts:</u> Moderate potential environmental impact predicted. Temporary toilets (chemical) left unmanaged can leak raw sewage and effluent into the soil, surface and even ground water sources, during the construction phase. Possible contamination of ground / surface water, from faulty or un-serviced sewage conservancy tanks and leak prevention methods from coffins, further afield that could lead to habitat destruction and health issues for animals and humans.</p>
Air Quality	Dust will be generated by vehicular movements on site, the construction & operational phase.

	<p><u>Impacts:</u> Low potential environmental impact. During the construction phase; dust could cause problems for nearby human settlements. During the construction phase the air quality will be the same as it currently is.</p>
Noise	<p>Noise generation by operating air compressors, excavators and other heavy machinery. Noise is also generated by the construction workers.</p> <p><u>Impacts:</u> Low potential environmental impact. Noise from the farm traffic will be an inconvenience to a certain extent for some existing properties nearby.</p>
Visual	<p>Visual and aesthetic elements are important. This proposed development will alter the visual landscape from agriculture / natural veld to a more structured area.</p> <p><u>Impacts:</u> Low negative significant impact. The study area is already transformed by the equestrian facilities. Waste, such as building rubble and empty cement bags can be a negative visual impact if not collected and disposed of correctly.</p>
Sensitive Landscapes	<p>Sensitive landscapes identified will include the drainage line / stream further north of the site.</p> <p><u>Impacts:</u> Moderate negative significant impact. Human presence resulting in possible emigration of animals. The movement of water to drainage lines further afield could be altered by construction activities.</p>
Sites of Archaeological and Cultural Interest	<p>During the site investigations, focus was also placed on the presence of any stone built structure, ruins, grave sites, complete built structures and the presence of artefacts. Based on preliminary observations no such features occur within the</p>

	<p>proposed area of development. It is therefore not identified as an issue at this stage.</p> <p>A Heritage Impact Assessment (HIA), as part of the Environmental Impact Assessment stage of the application process, was conducted in accordance with the National Heritage Resources Act (Act 25 of 1999).</p> <p>A summary of the HIA investigations follows:</p> <ul style="list-style-type: none"> • There are no visible restrictions or negative impacts in terms of heritage associated with the site. • In terms of heritage this project can proceed. • The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account. <p><u>Impacts:</u> No significant impact.</p>
<p>Socio-economic</p>	<p>This development will have a positive impact on the regional socio-economic structure through its support of the development industry, better local services support, job creation and the skills development of its employees and local community.</p> <p>This fully integrated development offers the shareholders the opportunity to assist in local upliftment through the following:</p> <ul style="list-style-type: none"> • Involvement of local contractors, • Job opportunities, • Skills training and development, • Social upliftment <p><u>Impacts:</u> Positive impact on the regional socio-economic structure through its support to the community, like: Job opportunities during the construction phase. Local economic boost.</p>

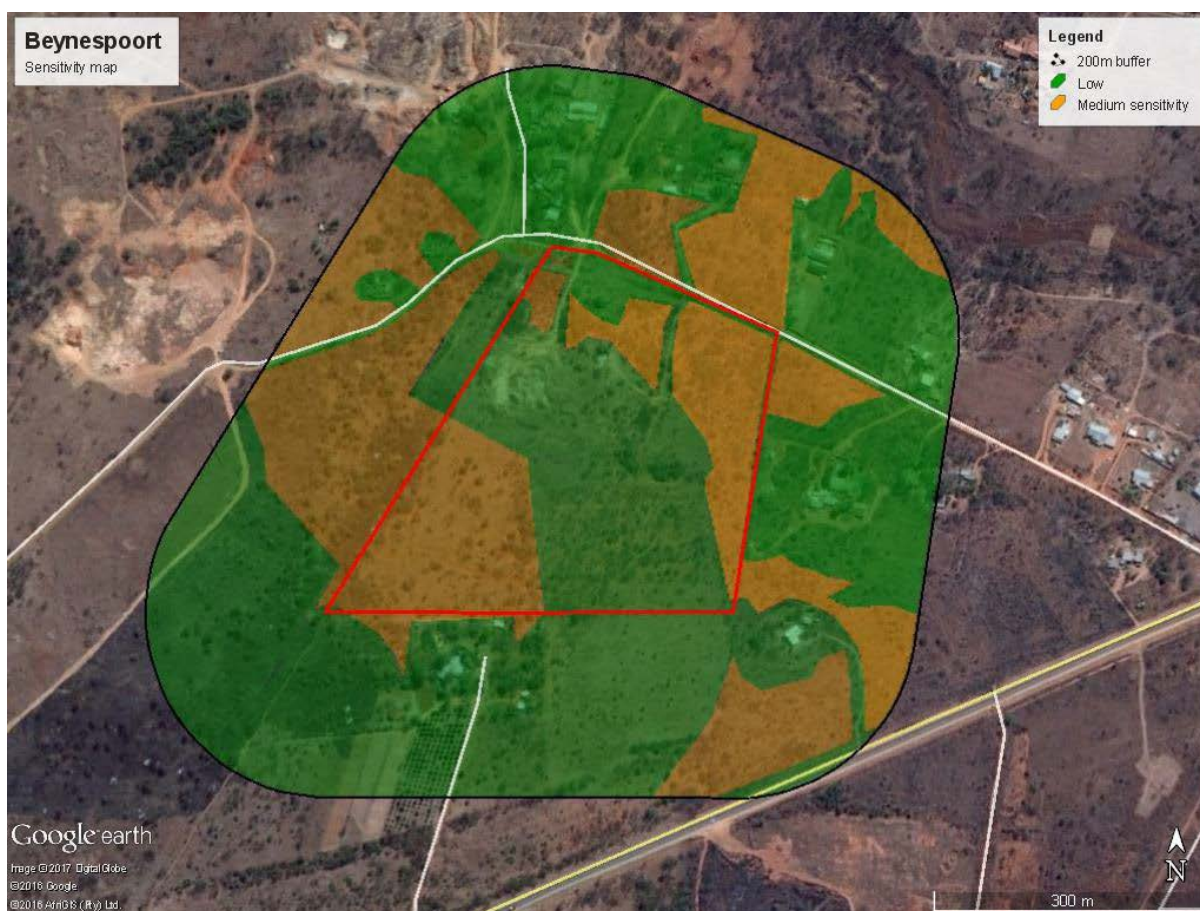
Interested and Affected Parties	<ol style="list-style-type: none"> 1. Noise, dust and domestic waste from the development; 2. Maintenance of gravel road leading to the cemetery; 3. Traffic congestion; 4. Security; 5. Reduction of property value; and 6. Possible impact of dead bodies/pollution on drinking water/underground water.
Cumulative	<p>The cumulative impact of the development on the social environment is positive. More job possibilities and economic boost for the local area.</p> <p>Seen at a wider scale the additional developments are not physically connected, but the removal of vegetation cover, such that the soil surface is exposed, may lead to increased soil erosion in the area and loss of habitat.</p>

4. SENSITIVITY MAP

Also refer to Appendix A of the BAR.

The sensitivity map was drawn up for the site to determine areas of more sensitivity. The map corresponds with the methods of determining the sensitivity of the site as described in Section 2.6, Table 3 of the vegetation report:

Vegetation sensitivity map:



5. DESCRIPTION OF THE IMPACT MANAGEMENT OBJECTIVES FOR ALL PHASES OF THE DEVELOPMENT

5.1 Recommendations applicable to the planning and design stage:

Time frame: 1 Month

There are a number of potential impacts that can be mitigated through careful design of technical/physical project components. The following design components are relevant in this regard:

- Address the potential contamination of surface run-off and soil through storm water drainage;
- Ensuring effective effluent management - to prevent potential contamination of soil and groundwater resources, as a result of insufficient or incorrect waste management systems by point source pollution;

- Visual and aesthetic impacts of the proposed development on the surrounding environment - landscaping will be an important component in this regard, as will the type and intensity of lighting used; and
- Waste management on site, including handling, storage and collection of solid waste and disposal of treated effluent.

5.1.1 Contamination of surface water/soil through storm water run-off from hard or paved surfaces

It is recommended that the storm water management system, leading from the paved surfaces be designed in such a manner that no direct link or piping be established into the natural drainage course.

Other precautions to be implemented in order to prevent storm water pollution are:

- Cover any wastes that are likely to wash away or contaminate storm water;
- Build a bund around waste storage area to stop overflow into storm water;
- Storm water outflows will not enter directly into a drainage line;
- Energy dissipaters (gabions/grass bales etc.) must be installed at all potential large flow volume areas, especially during the construction phase where large areas will be open soil;
- Natural storm water must not be piped other than in areas where it runs perpendicularly cross a roadway;

Storm water design (as per civil engineers) for all hard surfaces will ensure the proper management and precautionary measures are taken into account.

5.1.2 Visual and aesthetic impacts of the building structure

The proposed development is built relatively close to recreational and farming entities further away, which could be unattractive and undesirable in to such an environment. The proposed development, however, is situated in an agricultural/natural veld setting. However, the character of the site and its location makes the proposed development acceptable and compatible with the aesthetics of the study area. Nevertheless, careful attention will be placed on various design elements associated with the proposed development, including attention to aspects that will enhance the aesthetic quality of this development, such as landscaping.

Poor maintenance of the facility as a whole will affect the visual and aesthetic quality of the area. Therefore, general building maintenance on a regular basis will form a crucial component of the operational phase of the proposed development. Therefore, to pay special attention to “blending” the development to the environment is relevant exercise. In terms of the level and nature of night illumination, carefully placed and downward shining lights are recommended to reduce this impact sufficiently. No high flood-lights should be installed on the site.

5.1.3 Waste management on site

Poorly designed waste collection/storage facilities have a significantly negative impact in terms of surface pollution, possible water pollution and negative impacts on the visual quality of an area. Therefore, practical design and efficiency is essential in this regard. The location of the refuse areas/waste collection area must be carefully planned and located so as not to cause a visual nuisance, as wind-blown refuse is often a problem. It is suggested that large black bins, which are secured in place, are distributed frequently at strategic locations across the site to discourage littering. The dustbins should be secured to prevent them from being knocked over or carried away. The lids should also be suspended permanently above the dustbins, to ensure that the waste disposed of is efficiently contained. The waste from these bins should be collected on a weekly basis and stored in a refuse collection yard (which should be contained within a walled fence), until such a time that a certified/registered contractor collects the waste - on a weekly basis - to be disposed of at a registered waste disposal site or when the farmer see fit to do it himself.

<p>Implementation responsibility: The site engineer / applicant will be responsible for the implementation of the above measures as an on-going process during construction phase.</p>

5.2 Impact mitigation during the construction phase:

Timeframe: 4 Months

The following recommendations are proposed to assist as basic environmental management steps and to be implemented during the construction phase of the project:

The construction stage of the proposed development will cause minor impacts on the biophysical and social environment. Although these impacts are short-term and low significance in nature, it still is essential to address them as sufficiently as possible.

This stage represents the period immediately after site hand over. The contractor must be made aware of the contents of the EMPr, even if there are sections in the tender documentation which referred to environmental impact management measures to be budgeted for and implemented.

The following “rules” must be implemented to make the document relevant and handy on site:

- ❖ The EMPr shall not be removed from the site office
- ❖ The EMPr shall be updated when necessary
- ❖ The EMPr shall be readily available to the Resident Engineer/Project Manager, and the site manager
- ❖ The ECO shall monitor the state/condition of the document and how it is kept on site. He will provide new printed copied when the EMPr is updated or adapted.
- ❖ The EMPr shall be available on site to any Interested and affected party but shall not be removed or copied to such a party or person.

The Environmental Policy that can be put forward for the proposed development should be read as follow and should be pinned up at the Construction office.

The objective and aim of the final product of this development is the creation of an environmentally sound development that will be seen and function as an environmental asset in biophysical and socio-economic terms. The objective will be achieved through careful implementation of all measures pertaining to the protection of the environment during construction and operational stages of the project.

This policy will be conveyed to the appointed main contractor and his team by the Resident Engineer during the construction phase.

The following elements must be considered and addressed when the construction stage of the development commences:

- The locality of the construction camp and site offices (if used). Limited accommodation will be provided for construction workers. Staff will be limited to security personnel after normal working hours.
- The locality of stock pile areas must be confirmed and discussed with the appointed contractor before construction activities commence.
- Specified areas of access and movement by construction vehicles during the construction period are essential.

5.2.1 Management of impacts on vegetation cover and faunal habitats

Clearing/removal of the existing vegetation (which consists predominantly of natural vegetation) for the construction of the buildings will be necessary, however, due to the indigenous and some non-indigenous vegetation and size of the site, the significance of this impact is rated as moderate.

The propagation of exotic species and weeds will need to be controlled during the construction phase, as there are many activities on site that could lead to the establishment of weeds - including compaction of the soil by heavy machinery, construction waste, stockpile areas etc. Weed species should be removed on a four-week basis. Much of the site will be paved (either as parking areas or access roads) and a large portion will be landscaped. It is recommended that only indigenous species be used in the landscaping process, and that trees are incorporated into the landscaping design, if possible.

Weed species should be removed on a four-week basis. The site will not be paved and a large portion will be landscaped / maintained. It is recommended that only indigenous species be used in the landscaping process (if implemented), and that trees are incorporated into the landscaping design on the boundary of the development.

Innovative landscaping or re-vegetation of the site towards the end of the construction stage will contribute significantly to the visual and aesthetic attractiveness of the site and will also solve the problems associated with the removal of vegetation cover, including soil erosion, dust generation and the flourishing of weeds and/or other unwanted exotic species in the long term.

Disturbance to any stream/drainage line/wetland during construction should be avoided. A plan for the immediate rehabilitation of damage caused to wetlands/streams should be compiled by a specialist registered in accordance with the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science. This rehabilitation plan should form part of the EMPr and a record book should be maintained on site to monitor and report on the implementation of the plan. Engineering measures are recommended to lower the risk of spillages into any wetlands located within 200 m of the site.

No specific mitigation measures are deemed necessary with regards to mitigating the impact of the proposed development on the faunal component, because the proposed area is small. No mammal species were detected on the site. Avifaunal species were plenty.

Where possible, work should be restricted to one area at a time, as this will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.

The ECO must be alerted to the fact that the snaring or hunting of wild animals often takes place in the vicinity of construction sites. This must be punished if there is proof that such a practice is conducted by members of the construction team. The contractor must ensure that no fauna is disturbed, trapped, hunted or killed during the construction phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance. It is suggested that where work is to be done close to the wetland, these areas be fenced off during construction, to prevent heavy machines and trucks from trampling the plants, compacting the soil and dumping in the system. During the construction phase, noise must be kept to a minimum to reduce the impact of the development on the fauna residing on the site. Alien and invasive plants must be removed.

<p>Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.</p>

5.2.2 Soil stability and storm water management

If construction is to take place during the summer months, the terrain will be susceptible to sheet and gully erosion as a result of the steep angle of the terrain. However, in the event that additional access routes are required (at this stage such a requirement is highly

unlikely), the physical layout of the access routes should follow the contours of the site wherever possible.

Aspects that typically impact on soil conditions are blasting activities, excavations for the founding of foundations, establishment of stockpile areas, removal and/or clearance of vegetation, movement of construction vehicles, and maintenance of construction vehicles, construction camp establishment and sanitation provision to workers during the construction period. Therefore, the following recommendations pertaining to soil conservation practices are made:

- Topsoil should be stockpiled separately from subsoil. The height of the stockpiles may not exceed 2.5 m and the stockpiles should not be stored for more than a one year period.
- Topsoil must be stripped from all areas, where construction activities are going to take place, to be re-used in landscaping the site.
- If any blasting activities occur on site, the blasted rocks and heavy rock material must be transported to an external venue. These rocks are not allowed to rest on site. If the rocks are left on site, the soil will be greatly compacted, which will promote the growth of weeds.
- Any excess overburden material that is generated may not be dumped in a random manner. Dumping sites should be predefined, agreed upon and adhered to.
- Any embankments created adjacent to the roads or any drainage lines must be stabilised during construction and re-habilitated afterwards.
- Generally, surface water must be prevented from damming or creating gully erosion. This can be achieved by placing sandbags along the boundaries of steep working areas where higher intensity surface run-off may occur.
- All rills and erosion channels developing during the construction period or during the operational and maintenance period should be backfilled and consolidated immediately.
- The movement and maintenance of construction vehicles may only take place in pre-determined and delineated areas. Only planned and formal routes for hauling of material should be used.
- Soil contamination during construction vehicle maintenance or as a result of fuel storage on site is easily prevented, but in the event of such an

accident, the spill should immediately be cleaned up by absorbing the worst of the fluid with saw dust and then disposing of the saw dust and the first bit of the soil layer.

- Fuel storage areas should be bounded effectively and all applicable safety standards must be adhered to.

In terms of the stability of excavations, it is strongly recommended that all excavations exceeding 1.5 m should have proper sidewall protection to ensure the safety of workers. Seepage may result in the destabilising of the soils above the seepage and special precautions may be required. The contractor is responsible for the implementation of suitably designed support systems. Constructed embankments exceeding 1.5 m, or as deemed necessary by the design engineer, can be stabilised/protected by means of retaining walls. Embankments should be adequately compacted and protected from erosion.

The proposed development site is flat; however, abnormal transportation of sediment during construction activities is possible. The following management measures must be implemented during construction. Abnormal soil erosion plays an important role in the siltation of watercourses and the loss of valuable topsoil. The following suitable storm water management and mitigation measures may therefore be necessary:

- Storm water run-off must be guided through appropriate drainage structures where needed. The engineering design will address the proper run-off of storm water and run-off must be handled in such a way that flooding of the access roads will not occur.
- Erosion control during construction is the responsibility of the contractor. The contractor will monitor the formation of erosion channels and repair as required to limit erosion damage to the works and the natural environment.
- The buildup of loose soil must be managed and limited, where possible, to reduce dust emissions. This can be achieved through the regular cleaning of road surfaces by sweeping these areas when necessary.
- Upon completion of construction at the site, all disturbed areas, not paved or landscaped, must be ripped and ploughed to enhance the establishment of natural grasses.

In addition to the above, the following restrictions will be enforced:-

- No borrow pit or quarry will be opened on site (unlikely). All imported material will be obtained from commercial borrow pits or quarries.
- The footprint of the various structures will be staked out prior to commencement of construction activities.
- No moving or removal of stones, plants or any other natural specimens will be allowed outside the staked construction area.

The construction of engineering services including any water, sewerage and underground electricity lines will require trenching and backfilling as per the engineering design. Where possible, all excavations of trenches shall be done by hand to limit the impact of excavators on site.

The following will be applicable where excavation done by hand is conducted:-

- Excavated material from the trenches along the driveways and walkways will be placed on the road surface or within the future road surface area and will not be allowed to be stockpiled in a nearby veld or adjacent vegetation.
- Trenches will only be as deep as required and be backfilled as soon as possible.
- The contractor will check all open trenches every morning for trapped animals.
- All open trenches will be demarcated clearly with danger tape, or as otherwise instructed by the Engineer.

The top 150 mm of backfilling will not be compacted and will comprise topsoil stripped from the area prior to opening of the trench.

<p>Implementation responsibility: The main contractor and project engineer will be responsible for the implementation of the above measures as an on-going process during construction phase.</p>
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5.2.3 Visual and aesthetic quality

Currently the study area comprises mostly natural vegetation. The visual quality of the area may be negatively affected, considering that the proposed development is an above-

ground level development. However, to reduce the visibility of the structures, the following techniques should be implemented:

- Lamp posts and directional lighting is advised. Security lights should face away from neighbouring properties.
- Replacement of topsoil where necessary.
- Construction vehicles are not permitted to turn/drive into areas that are not designated for this purpose.
- No additional access routes may be established in the vicinity of any area where construction action is taking place.

Implementation responsibility: The site engineer will be responsible for the implementation of the above measures as an on-going process during construction phase. Hydro-seeding can be done by a contractor in this field.

5.2.4 Stockpiles and general storage of building material and equipment

Special care must be exercised when selecting the location of temporary material storage areas.

- Any excess soil or overburden material must be stockpiled to reduce visibility.
- Excess material that is not used during construction activities should be removed from the site to be used by other users in the construction industry.
- It is essential to place enough sand bags along the toe line of any loose material stockpiled and for the storage of building material.
- In the event of soil and overburden being removed from its locality, it should be stockpiled in a suitable place where, if possible, surfaces are already disturbed and where the natural vegetation will not be covered by this material to a significant extent.
- Overburden or stock-piled material must only be stockpiled temporarily. No soil may be left exposed after construction activities have ceased.
- In the event of soil and overburden being removed from its locality, it must be suitably stockpiled away from any drainage ways.
- Overburden soil can alternatively be re-used in landscaping depending on the need.
- No material must in any event be dumped in any place in the surrounding region. Written proof of disposal at a waste disposal site must be given to the

applicant and site manager on every load of construction waste removed from the site.

- No vehicle and equipment parking areas may be established within 20m of any natural drainage ways.

All stockpile areas should be ripped and ploughed at the end of the construction period to loosen soil surfaces for the natural propagation of vegetation and/or to allow for landscaping of the area. The same applies to other temporarily disturbed areas on site, which are vulnerable to the propagation of unwanted species (weeds). It is important that the contractor implements weed control through physical and/or approved chemical eradication methods. Only registered herbicides should be used to curb this problem.

The temporary storage of construction material and especially fuel must be carefully monitored by the site engineer to prevent the risk of accidental spillage or disposal of any such material that will contaminate soil surfaces, surface and subsurface water. All liquid material must, where applicable, be stored on solid concrete surfaces and must be surrounded by bunds. Bunding is also applicable to fuel and mechanical oil storage areas. Bunding walls should not be less than 30 cm high. Bunding walls must be able to contain 110% of the "unit's" capacity stored within it. Storage containers must be inspected regularly to prevent leaks that could contaminate the site.

<p>Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.</p>

5.2.5 Community or public safety

The study area is situated in a rural area. Large construction vehicles, including trucks and other heavy machinery, will impact on road safety circumstances on the roads they use and it is the duty of the contractor to ensure that safety measures are implemented and adhered to.

The safety of the community throughout the construction period is of utmost importance. As road safety awareness is imperative, the following important actions must be noted that will assist in the management of safety during the construction phase where necessary:

- Adequate and correct caution signage and road marking during construction in accordance with the requirements of the South African Road Traffic Signs Manual and the CSRA / CUTA Road Signs Note 13. (Workers with red flags, visible workers and vehicles etc.)
- No soiling of road surfaces, causing accidents.
- A maximum of fifteen workers (if any) may be housed on-site, mainly to guard material and machinery. This will assist in managing and maintaining safety and security at appropriate levels.
- Names and identification numbers of each worker housed on-site must be provided by the contractor.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.6 Waste disposal and management

It is crucial to implement strict and effective waste control and waste management procedures during the construction phase. No littering by any personnel is permissible. The site manager/contractor should conduct regular site clean-ups to keep the site litter free - as litter is not only aesthetically displeasing, but it is also harmful to the environment. All domestic solid waste produced must be disposed of in waste bins situated on site. The bins should be emptied into a covered skip (for storage) on a regular basis, until its collection and removal to a municipal waste disposal site (preferably on a weekly or bi-weekly basis).

No liquid waste material should be disposed of on or near the site during construction, or in any non-designated areas. A firm arrangement must be made to place chemical toilets on the construction site (within the construction camp to be erected). A sufficient number of chemical toilets need to be provided; in the range of 1 per every 8 workers. These toilets must be well maintained and inspected on a daily basis to ensure that they are clean and functioning properly. The toilets must be within walking distance from the work areas. No person is allowed to use any area, other than the chemical toilets provided, as a toilet. No washing of people and/or goods should take place on cleared surfaces, as this water should not be allowed to drain into any of the adjacent storm water canal.

In the event of accidental spillage of liquid substances, like paints and resins, it is important to implement the correct emergency procedures and cleaning-up operations. Pollution of surfaces should be limited at all costs.

The generation of construction waste occurs at every site under development and construction. Due to the costs involved in the disposal of this material at municipal or other licensed waste sites, the contractor or sub-contractor may be tempted to illegally dump waste at concealed locations to save on costs. Therefore, strict control is required from the main contractor on site to control this issue. Proof of disposal of waste material at a registered waste disposal site must be shown after off-loading of each waste load, which should then be logged or registered for control purposes. Control measures in terms of the National Building Regulations and standard requirements laid down by the local authority, with regards to spillage and waste disposal, must strictly be adhered to.

General waste disposal management involves the collection of construction waste at a central collection facility, which should be pre-arranged and implemented. This should include making points available for solid as well as liquid waste - including mechanical fluids disposed of during vehicle maintenance.

The site should be designed in such a manner that hazardous wastes are not located in close proximity to the permitted fire making area. These areas shall be predetermined and located in areas that are already disturbed. This area should be on a concrete base to avoid any possible seepage into the soil. All hazardous waste must be stored in sealed and suitably marked containers for removal to a hazardous waste landfill site by the contractor on a bi-weekly basis. Hazardous waste could include used oils and fluorescent light tubes, as examples. The contractor should refer to the relevant Department of Water Affairs (DWA) guidelines for the classification of hazardous waste.

Implementation responsibility: The resident engineer and contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.
Removal of waste from the terrain will be the responsibility of a certified waste contractor.

5.2.7 Dust suppression

During the initial construction phase it is anticipated that the generation of dust may occur. The management of dust generation during construction is of particular importance. Therefore dust suppression, as a normal daily practice, is essential. This can be achieved by:

- Watering and compacting of exposed surfaces where dust is generated. This must be conducted and strictly monitored. Such surfaces also include construction areas and unpaved access roads as part of the construction site.
- On rainy days this should obviously not be implemented to avoid access mud generation and water accumulation.
- In dry hot weather conditions water spraying must be applied twice a day on surfaces.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.8 Noise

Another important aspect is the control of noise pollution. This is achieved by implementing the following measures:

- Ensuring that machinery and trucks are well-oiled and maintained; this will make less noise than poorly serviced construction equipment.
- Silencers can be fitted to exhausts of heavy vehicles to limit the noise they produce.
- Lastly, construction hours should be confined to daylight hours of a normal working day, specifically from 7 am to 5 pm in the summer and 7.30 am to 5 pm in the winter.
- No activities should take place on Saturdays after 14:00 and no actions must take place on Sundays.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.9 Vehicle Maintenance and Fuel Storage

- Lubricants and mechanical oils or mechanical fluids must be collected in separate containers or drums to be collected by waste contractors for disposal at hazardous waste sites.
- Used oils that can be refined must be made available to companies for collection.
- These containers must not be placed in close proximity to any drainage ways.
- In the event of construction vehicle breakdowns or during routine maintenance checks, care must be taken to avoid oil, grease or any mechanical fluid spills within the study area. Vehicles may not be serviced in or adjacent to the road reserve of the study area, thus servicing must be limited to the designated areas or workshops.
- No temporary fuel storage tanks or containers may be erected near drainage courses and refueling must be done by means of a fuel bowser.
- Fuel storage areas must be bunded effectively and all applicable safety standards have to be adhered to. The bunded area around the fuel storage areas should be able to contain 110% of the volume of the fuel container inside it.
- All fuel storage areas must be fenced and secured.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.10 Archaeology and Cultural Sites

- Should archaeological objects of any nature (including fossils, graves or remains of structures) be found, the developer will stop all construction activity, and notify REC Services (PTY) Ltd. immediately. The Provincial Heritage Resources Agency (PHRA), will be consulted for further investigation and clarification.
- All finds of human remains must be reported to the nearest police station.
- Human remains or any burial ground or part thereof that are deemed to be of cultural significance may not be destroyed, damaged, altered, exhumed or removed from their original positions without a permit from the PHRA.
- Work in areas where artefacts are found must cease immediately.

- Under no circumstances must the Contractor, his/her employees, his/her sub-contractors or his/her sub-contractors' employees remove, destroy or interfere with archaeological artefacts. Any person who causes intentional damage to archaeological or historical sites and/or artefacts could be penalised or legally prosecuted in terms of the National Heritage Resources Act, 25 of 1999.
- A fence at least 2 m outside the extremities of the site must be erected to protect archaeological sites.
- All known and identified archaeological and historical sites must be left untouched.
- Work in the area can only be resumed once the site has been completely investigated. The Project Manager will inform the Contractor when work can resume.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.11 Construction camp establishment

- Workers that are allowed to live on-site should be kept to minimal numbers. Those workers present at night should be on site only to look after construction equipment and to take register of the workers present on site to eliminate crime in the area.
- Any temporary structures will be soundly built and will not pose a danger to personnel.
- The contractor must supply cooking facilities (preferably gas) if labourers are to be housed at the site.
- No fires will be permitted outside the construction camp and adequate firefighting equipment, which complies with fire and safety regulations, must be available at the construction camp site at all times (at least one all-purpose 12,5 kg extinguisher)
- Chemical toilets to be supplied at the construction camp for labourers accommodated on site. They may also use existing facilities on site.
- Welding, gas cutting or cutting of metal will only be permitted inside the construction camp.

- The contractor will supply 210 litre drums at the construction camp, as well as at the construction site, for the storage of domestic waste.
- Recyclable waste including glass, paper and plastic shall be separated at the construction camp, stored and recycled (where economically feasible).
- Waste must be removed on a weekly basis to a registered waste disposal facility, or through the utilisation of existing municipal waste removal systems.
- As far as possible, local labour should be employed during the construction period.

Implementation responsibility: The main contractor will be responsible for the implementation of the above measures as an on-going process during construction phase.

5.2.12 General rehabilitation of the construction site

It is important that rehabilitation will commence as soon as feasible on each of the construction areas to run concurrent with the construction phase and not to be left until completion of the works. This will increase the chances of successful rehabilitation.

All areas disturbed by development activities will be rehabilitated on completion of the construction phase. The following general procedure will be followed:-

- Removal of all construction facilities and materials from site, cleaning up of any remaining oil or other spills and removal of all construction waste from site;
- Shaping of the disturbed areas to blend with the surrounding landscape;
- Placing of topsoil on all disturbed areas (minimum depth 150 mm);
- Organic fertilizers must be added to the topsoil prior to seeding (if required).
- Re-vegetation of all areas where topsoil is placed using a mixture of indigenous grasses and bushes;
- Maintenance of these areas until an acceptable cover has been established. Acceptable cover shall mean 75% ground cover with no gaps exceeding 500 mm. Maintenance may include watering, mowing and weeding as well as preventing the development of erosion channels or, backfilling where they have occurred.

5.2.13 Stockpile Areas

Once stockpiles have been removed the ground surface is to be inspected for compaction. Should it be required, the surface is then to be ripped and the prescribed re-vegetation process followed.

5.2.14 Rehabilitation of Construction Camps

Rehabilitation will be necessary in the following areas:

- Concrete and compacted earth platforms;
- Removal of fuel storage tanks;
- Removal of chemical toilets; and
- Access roads running into and through the camps.

Concrete platforms will need to be broken up and rubble removed. The prescribed re-vegetation process must then be followed.

5.2.15 Re-vegetation Process

The basic re-vegetation steps which will be implemented where and if required are detailed below:

Step 1: Prepare the area to be re-vegetated for top-soiling - this may require soil ripping, scarifying and/or digging of steps or terraces. The scarification should take place to a minimum depth of 150 mm. If ridges are formed, they should be approximately 100 mm high and 400 mm wide.

Step 2: Stockpiled topsoil must be placed on areas to be re-vegetated to a minimum depth of 100 mm, spread when dry by means of hand raking or mechanical means to a uniform thickness.

Step 3: If required when sodding or hydro seeding, appropriate organic fertilisers must be applied and worked into the soil to a minimum depth of 150 mm.

Step 4: Fresh, good quality seed - which is certified by the supplier and free from contamination by seeds of other species - can be used for the re-vegetation process, although seed harvested from site is preferable. The rehabilitation grass seed mix will be

seeded at a minimum density of 30 kg/ha, utilising a mixture of suitable species. The mixture must also always include at least one legume species.

Step 5: Mulch should be applied to protect the seeded area from erosion. The mulch should be composed of straw or other cellulose-rich material and free of undesirable seeds. The mulch must not be excessively fresh and green or in an advanced state of decomposition as it could smother growth. It must be applied to a depth and density that will prevent erosion by wind and water, but not completely block out the access of sunlight to the soil or prevent penetration by young plants.

Step 6: Re-vegetated areas are to be enclosed within an erected safety barrier to prevent excessive trampling and any other factors that might cause erosion or compaction. No road building equipment, trucks or other heavy equipment will be permitted onto re-vegetated areas.

Step 7: Re-vegetated areas must be irrigated on a regular basis, or as required.

Step 8: An appropriate maintenance and monitoring program must be implemented. This program will include monitoring of the success of seed germination, growth of the plants, removal of invasive weeds, replanting of areas where re-vegetation has not been successful once the cause of the inhibiting factor has been identified and remedied, and repair of any funnels or erosion channels.

5.3 Operational phase:

Timeframe: 30 years plus

Responsibility: The applicant will be responsible for the implementation of the measures as an on-going process during operational phase.

Mitigation of impacts during the operational phase is of great importance, as there are long-term issues that are of relevance.

5.3.1 Waste Management of domestic solid waste

- General waste generated during the operation of the development must be collected in waste bins that are emptied on a regular basis into a central waste collection

facility.

- General waste is to be collected on a regular basis to be emptied at the nearest municipal solid waste disposal site. The products that will typically be generated are general refuse such as empty food cans, leftover foods, paper, plastic and bottles.
- Recycling is always desirable and if the separation of waste can be encouraged and implemented, this would be highly beneficial.

5.3.2 Waste management of the conservancy tanks and borehole testing.

Bi-Annual hydraulic testing of boreholes will help detect and prevent the possible spread of contamination beyond the border of the memorial. This will also address the monitoring of sustainable yields of the on-site boreholes. According to the geohydrologist: Pathogens, organic leachate from decomposing bodies, and organic embalming fluids (e.g. formaldehyde) will very likely attenuate/breakdown naturally in the unsaturated zone (clay soil) prior to reaching the groundwater table. The depth of groundwater is in the order of 20m below surface, which represents enough residence time for natural attenuation in the unsaturated zone. The stormwater management plan addresses the surface water flow across the proposed site in order to prevent any erosion from taking place and possible contamination 'downstream'.

The conservancy tanks requirements and maintenance:

- a) Such tank shall be provided with a fresh air inlet and an intercepting trap,
- b) Such tank shall be constructed with 215mm brick or 150mm reinforced concrete walls on a foundation slab of mass concrete not less than 150mm thick. The tank shall be at ground level and shall be provided with one or more airtight manhole covers to allow access to the tank for cleaning it.
- c) The floor of the tank shall be graded to a point, which is vertically below one of the manholes referred to in paragraph (b) and a sump not less than 300mm or more than 450mm² in plan and not less than 150mm or more than 225mm deep shall be constructed at such point.
- d) The tank shall have a capacity of not less than -
 - 5 400 litres, or
 - the maximum amount of sewage likely to be discharged into it over a period of 2 days, whichever of these figures is the greater; provided that the capacity of the tank shall be an exact multiple of 5 400 litres.

3. The owner of the property served by such tank shall provide and maintain at his own expense a suitable road or other means of access to enable the vehicle used by the licensed contractor to empty such tank to reach and empty such tank, and any person contravening the provisions of this sub-regulation shall be guilty of an offence.

4. Such owner shall pay the licensed contractor for the clearance of such tank in accordance with such tariff as may from time to time be prescribed by the Council.

5. The licensed contractor shall not be liable for any loss or damage the owner or occupier of the premises concerned may sustain or for any nuisance he may suffer due to the inability of the licensed contractor to provide a clearance of a conservancy tank.

6. No person other than the licensed contractor shall clear a conservancy tank except by arrangement with and under the supervision of the City Engineer.

7. No industrial, trade or manufacturing waste, refuse or effluent shall be discharged into any conservancy tank except by special arrangement with the City Engineer.

8. Where a new conservancy tank has been installed and put into use the owner or occupier of the premises concerned shall give the City Engineer at least two clear days' notice of his requiring such tank to be cleared for the first time. The initial request is to be in writing to the City Engineer.

This system will be cleaned as and when needed. A licensed contractor (honey suckers) will clean the system and taken the solids to the nearest waste treatment works.

5.3.3 Water usage

- The water used that is supplied from onsite bore holes should be carefully managed to ensure that water extraction does not exceed the maximum amount allowable as indicated on the water licence application.
- The water to the ablutions should be under regular inspections to ensure sufficient water supply and to prevent any loss of water.

5.3.5 Noise impact management

The location of the proposed development is adjacent to various farming practises or just houses. The significance of the noise impact associated with the proposed development during the operational phase is moderately negative. Noise will be generated by the movement of vehicles such as memorial park visitors and the odd maintenance vehicle. The following noise impact mitigation measures can be implemented:

- ⇒ The security gate entrance should be well-oiled at all times to prevent excessive noise.
- ⇒ Speed limits should be enforced within the development (speed bumps are one way of ensuring this), not only in terms of reducing noise levels, but also to ensure the safety of workers and visitors.
- ⇒ Deliveries and pick-ups with large trucks should be limited to as when needed only.
- ⇒ No load music.

5.3.7 Compliance to standards

Compliance to all relevant regulatory standards and codes of practice is essential. An assurance that the development will comply with the relevant regulatory standards and codes of practice will be enforced by the Environmental Authorization to be issued by the GDARD, providing that authorisation for the proposed development is granted and also in terms of NHBRC guidelines, to which all building and services will comply.

Implementation responsibility: The applicant will be responsible for the implementation of the above measures as an on-going process during operational phase.

5.3.8 General provisions

Disposal of hazardous waste (if any) should be separately handled from domestic waste. This will help to prevent water and soil pollution. Hazardous waste includes substances such as paint, chemicals, razorblades, needles etc.

Implementation responsibility: The applicant will be responsible for the implementation of the above measures as an on-going process during operational phase.

5.3.9 Erosion Control

All road fill, ridge cuttings and drainage structures have to be checked and maintained on regular intervals to ensure that no erosion takes place along these surfaces. Sedimentation needs to be prevented from entering stream and wetland areas.

Implementation responsibility: The applicant will be responsible for the implementation of the above measures as an on-going process during operational phase.

5.4 Closure phase

Timeframe: 5 months

Responsibility: The applicant will be responsible for the implementation of the measures as an on-going process during closure phase.

- The physical and chemical stability of the remaining structures on site should be appropriately secured.
- The site should be securely fenced off and all remaining structures securely locked up.
- The physical integrity of the remaining structures on site should under no circumstances be allowed to deteriorate to an extent that makes the site visually unpleasant.

6. PROPOSED MECHANISMS FOR MONITORING

It is recommended by the Environmental Practitioner that an Environmental Control Officer (ECO) be appointed by the applicant. The ECO will be the person involved with the development of the project and also be responsible for the monitoring of the implementation of the EMPr. It may be different parties during the different phases of the project.

- This person may be appointed by the appointed engineer or indirectly by the applicant/client. It must, however, be a person with adequate technical and environmental knowledge to understand and implement this management programme.
- The ECO may not be someone appointed by the contractor.

- The ECO must report to the applicant on a regular basis or frequency.
- The ECO has the authority to stop works during construction 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 (see definitions) where consultation with the engineer or developer is not immediately possible. In all such work stoppage situations the ECO is to inform the engineer and developer of the reasons for the stoppage as soon as possible.
- Upon failure by the contractor or his employees to show adequate consideration to the environmental aspects of this contract, the ECO 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.

Monitoring will be done on monthly, weekly or quarterly basis and a report will be submitted to the relevant authority for checking compliance with the EMPr. This report will give a point scale of implementation measures. This may be the construction site manager, contractor, safety officer, and engineer.

CONSTRUCTION PHASE

MONITORING TYPE	FREQUENCY			
	DAILY	WEEKLY	MONTHLY	QUARTERLY
WEED ERADICATION			X	
EROSION CONTROL			X	
WASTE MANAGEMENT		X		
DUST CONTROL	X			
NOISE MONITORING	X			
SAFETY	X			
BOREHOLE				X
HAZARDOUS SUBSTANCE			X	

Compliance with the EMPr was rated according to the system detailed below:

SCORE	COMPLIANCE RATING	DEFINITION
4	Full Compliance	All requirements and conditions have been addressed.
3	Substantial Compliance	Between 75 and 100% met
2	Broad Compliance	Between 25 and 75% met
1	Partial Compliance	Less than 25% met
0	Non Compliance	None of the requirements and conditions has been addressed.

Outlined below are a number of steps, relating to increasing severity of environmental problems, which will be implemented. The principle is to keep as many issues within the first few steps as possible.

Step 1: The ECO discusses the problem with the contractor or guilty party, and they work out a solution together. The ECO records the discussion and the solution implemented. This detection together with the solution will be included in the monthly monitoring report.

Step 2: The ECO observes a more serious infringement, and notifies the guilty party in writing, with a deadline by which the problem must be rectified. All costs will be borne by the contractor. This incident will be included in the monthly monitoring report.

Step 3: The ECO shall order the contractor to suspend part, or all, the works. The suspension will be enforced until such time as the offending party (ies), procedure or equipment is corrected and/or remedial measures put in place if required. No extension of time will be granted for such delays and all cost will be borne by the contractor. The Department of Environmental Affairs shall be involved and penalties will be allocated. In this time the department can decide to submit a pre compliance notice and has authority to withdraw the Record of Decision.

7. ENVIRONMENTAL AWARENESS PLAN

7.1 Training programmes:

1. Occupational Health and Safety (OHS) - Done internally by Health of Officer.
2. Personal Protection Equipment (PPE) - Done internally by Safety Officer.
3. Environmental training
 - a. program 1 - Introduction to Environment, Ecosystems and Habitats. Including symbiotic interactions.
 - b. program 2 - Environmental Degradation, Soil, Air, Noise, Water and Ground water Pollution. Erosion.

Programmes 1 and 2, the OHS and PPE training is something that is done either annually or bi-annually depending on the need identified by management of the development. The environmental training and awareness will be implemented a.s.a.p. before the construction phase begins. Management will also arrange for training bi-annually for 2 to 4 hour sessions at a time. Training will either be done internally or externally. Internal training will be done by the Environmental Management Department and externally training providers will be sourced as approved by the owner of the site.

7.2 Monitoring of awareness

Bi-monthly Health and Safety meetings are held where relevant issues regarding health, safety and environment are discussed and feedback is given. Environmental awareness should be incorporated into the compulsory 'Tool box talks' that include health and safety issues. These should be done on a monthly basis.

8. RECOMMENDATION FROM SPECIALISTS & STAKEHOLDERS

8.1 Heritage Impact Assessment:

As taken from the HIA report:

"3.2 SPECIFIC CATEGORIES INVESTIGATED AS PER SECTION 3 (1) AND (2) OF THE NATIONAL HERITAGE LEGISLATION (ACT 25 OF 1999)

3.2.1 Does the site/s provide the context for a wider number of places, buildings, structures and equipment of cultural significance?

The study area does not provide context for a wider number of places, buildings, structures and equipment of cultural significance. The reason being the low density of heritage items in the study area.

3.2.2 Does the site/s contain places to which oral traditions are attached or which are associated with living heritage?

Places to which oral traditions are attached or associated with living heritage are usually found in conjunction with traditional settlements and villages which still practice age old traditions. None of these are evident near or on the proposed site.

3.2.3 Does the site/s contain historical settlements?

No historical settlements are located on or near the proposed site.

3.2.4 Does the site/s contain landscapes and natural features of cultural significance?

Due to infrastructure development and farming activities the original character of the landscape has been altered significantly in the study area. There the site does not contain natural features of cultural significance.

3.2.5 Does the site/s contain geological sites of cultural importance?

Geological sites of cultural importance include meteorite sites (Tswaing Crater and Vredefort Dome), fossil sites (Karoo and Krugersdorp area), important mountain ranges or ridges (Magaliesburg, Drakensberg etc.). The proposed site is not located in an area known for sites of this importance.

3.2.6 Does the site/s contain a wide range of archaeological sites?

The proposed site does not contain any surface archaeological deposits; a possible reason is previous infrastructure development activities in the greater study area. The possibility of sub-surface findings always exists and should be taken into consideration in the Environmental Management Programme. If sub-surface archaeological material is discovered work must stop and a heritage practitioner preferably an archaeologist contacted to assess the find and make recommendations.

3.2.7 Does the site/s contain any marked graves and burial grounds?

The site does not contain any marked graves or burial grounds. The possibility of graves not visible to the human eye always exists and this should be taken into consideration in

the Environmental Management Plan. It is important to note that all graves and cemeteries are of high significance and are protected by various laws. Legislation with regard to graves includes the National Heritage Resources Act (Act 25 of 1999) whenever graves are 60 years and older. Other legislation with regard to graves includes those when graves are exhumed and relocated, namely the Ordinance on Exhumations (no 12 of 1980) and the Human Tissues Act (Act 65 of 1983 as amended). If sub-surface graves are discovered work should stop and a professional preferably an archaeologist contacted to assess the age of the grave/graves and to advise on the way forward.

3.2.8 Does the site/s contain aspects that relate to the history of slavery?

This is not an area associated with the history of slavery like the Western Cape Province.

3.2.9 Can the place be considered as a place that is important to the community or in the pattern of South African history?

In primary and secondary sources the proposed site is not described as important to the community or in the pattern of South African history.

3.2.10 Does the site/s embody the quality of a place possessing uncommon or rare endangered aspects of South Africa's natural and cultural heritage?

The proposed site does not possess uncommon, rare or endangered aspects of South Africa's natural and cultural heritage. These sites are usually regarded as Grade 1 or World Heritage Sites.

3.2.11 Does the site/s demonstrate the principal characteristics of South Africa's natural or cultural places?

The proposed site does not demonstrate the principal characteristics of South Africa's natural or cultural places. These characteristics are usually associated with aesthetic significance.

3.2.12 Does the site/s exhibit particular aesthetic characteristics valued by the community or cultural groups?

This part of the greater study area does not exhibit particular aesthetic characteristics valued by the community or cultural groups. The reason being the low density of heritage buildings and structures located in the greater study area.

3.2.13 Does the site/s contain elements, which are important in demonstrating a high degree of creative technical achievement?

The site does not contain elements which are important in demonstrating a high degree of creative technical achievement. Reason being none of the above are evident on site.

3.2.14 Does the site/s have strong and special associations with particular communities and cultural groups for social, cultural and spiritual reasons?

The proposed site does not have a strong or special association with particular communities and cultural groups for social, cultural and spiritual reasons. No comment in this regard was received during the public participation period.

3.2.15 Does the site/s have a strong and special association with the life or work of a person, group or organisation?

No indication of the above could be found in primary and secondary research sources.

4. RECOMMENDATIONS

- There are no visible restrictions or negative impacts in terms of heritage associated with the site.
- In terms of heritage this project can proceed.
- The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account in the Environmental Management Programme. See 3.2.6 and 3.2.7."

8.2 Flora Survey:

The following recommendations are made with regards to the proposed development:

The following mitigation measures are proposed by the specialist:

- Only clearance of vegetation within the site can be allowed within the low sensitivity area as per the sensitivity map provided for vegetation.
- No clearance of indigenous vegetation in the 200m buffer zone will be allowed within the high and medium sensitive areas.
- The unnecessary clearance of indigenous vegetation should be avoided as far as possible.
- Maintenance should not extend beyond the proposed study site.

- Storage of fuel and servicing of construction vehicles should be done off site, on a cement slab.
- Declared alien species should be prevented from occurring on site, as disturbance in natural habitat and compaction of soil usually leads to the establishment of alien plant species.
- No clearance of any areas containing vegetation around the site not directly affected by the proposed development.
- No clearance of vegetation within the high and medium sensitivity areas as these areas is more likely to contain red and orange listed plants.
- No future extension outside the study site will be allowed.
- Development of an Alien Invasive Management plan after the Construction phase has been completed.
- Implementation of the Alien and Invasive plant management plan.

CONCLUSION:

After the site visits was conducted on the site, it was clear that a large part of the site has been degraded due to recreational and other camping facilities by Camp David. Around 98% of the site has been irreversibly transformed and vegetation on site is predominantly alien and invasive plants. Indigenous vegetation associated with the endangered Witwatersberg Skeerpoort Mountain Bushveld is present inside of the 200m buffer zone and is clearly defined in a straight line on the northern part of the site, due to an installed pipeline and associated servitude. All development activities has to stay on the southern side of this servitude to avoid the indigenous natural vegetation of the Class 1 ridge and endangered ecosystem.

Information obtained from POSA and GDARD indicated that at least 21 orange and red data species have been recorded within the quarter degree cell of the site. For the site visits conducted, no red data species were encountered on the study route and servitude. A medium to low sensitivity was awarded for the study site based on the methodology described in Section 2.5 of this report. This is due to 98% of the site to have been historically transformed.

Vegetation around the river area was deemed of high sensitivity and patches of historically transformed secondary vegetation was deemed as medium sensitivity.

A total of 22 plants were identified on and around the site that is listed in the Alien and Invasive Species. These plants need to be controlled in accordance with an Alien Invasive Plant management plan.

8.3 Geo-Hydrological Investigation:

The following mitigation measures are made with regards to the proposed development:

- Continuous monitoring, at least twice per year, will be required to ensure early detection of cemetery-sourced contaminants in groundwater and surface water. At least one upstream and one downstream monitoring borehole will need to be implemented for these purposes. Bailing or purging should precede sampling to ensure that stagnant water is not being sampled. If borehole BNP01 or BNP02 are to be used for these purposes, proper construction will be required to minimise contamination from other sources.
- Hydraulic testing of one or more of the monitoring boreholes will supply require hydraulic parameters related to storage and transmissivity. These parameters are crucial in addressing movement of groundwater and in understanding the aquifer.
- Highly permeable site soils in the quartzite regions (Zone I) will likely promote the vertical percolation of water from land surface. Waterlogged conditions can be expected in the diabase regions (Zone II). Due to variable compaction of grave backfill, graves may form preferential pathways for moving water. This could possibly flood graves and mobilise contaminants downwards or off-site. Stormwater practices and limited irrigation for landscaping are recommended to minimise direct infiltration into graves.
- Proximate sources of potential pollution may possibly also impact on groundwater quality. The influences of these should be noted during further monitoring programmes.
- Landscaping practices should not result in waterlogging from over-irrigation, nor should it induce excessive surface runoff and erosion.
- Excavations may become unstable when left open for prolonged periods. Graves should be excavated and backfilled within the shortest possible period of time.
- Burial densities should comply with specifications contained in the relevant bylaws of the municipality.

8.4 Stormwater Management Plan:

The general drainage pattern of the Proposed Development is from south to north.

Proposed Internal Storm Water Reticulation

It is proposed to install a 450mm Ø storm water pipe reticulation for the Proposed Development.

Internal storm water of the Proposed Development will consist mainly of sheet flow discharging into the internal storm water pipe reticulation.

Storm water run-off generated by the Proposed Development will be accepted via kerb and grid inlets situated at strategic positions within the Proposed Development.

The storm water run-off will drain to the northern corner of the Proposed Development where it will connect to the proposed external storm water reticulation as described below.

Refer to Annexure B (in the SWMP attached in Appendix G), Drawing No. 2441/500/01/00 for details.

Proposed External Storm Water Reticulation

Proposed Option 1

It is proposed to construct a new 900mm Ø storm water pipe from the northern corner of the Proposed Development, along the western boundary of the Remainder of Portion 45 of the Farm Beyneskloof 335-JR. This new 900mm Ø storm water pipe will discharge above the 1:1 00-year flood line of the Roodeplaats Spruit.

The proposed storm water outlet structure will be equipped with energy dissipaters to minimize the effect of erosion due to the concentrated storm water flow.

The internal reticulation of the Proposed Development will connect directly to this new 900mm Ø storm water pipe. A 3m wide storm water servitude will have to be registered along the western boundary of the Remainder of Portion 45 of the Farm Beyneskloof 335-JR.

The external storm water system will be designed for a 1:20 year flood return period and a runoff coefficient of 49% (C= 0.49) will be allowed for the Proposed Development.

Refer to Annexure B (in the SWMP attached in Appendix G), Drawing No. 2441/500/01/00 and 2441/500/02/00 for details.

Proposed Option 2

The new 900mm Ø storm water pipe will be constructed from the northern corner of the Proposed Development, along the western boundary of the Remainder of Portion 45 of the Farm Beyneskloof 335-JR. This new 900mm Ø storm water pipe will discharge above the 1:100-year flood line of the Roodeplaat Spruit.

The proposed storm water outlet structure will be equipped with energy dissipaters to minimize the effect of erosion due to the concentrated storm water flow.

It is proposed to construct a 300m³ irrigation pond in the northern corner of the Proposed Development. The proposed irrigation pond will consist of only one discharge structure designed to accommodate the 1:100-year flood.

The internal storm water reticulation of the Proposed Development will discharge into the proposed irrigation pond. Once the irrigation pond has reached full capacity it will discharge into a proposed 900mm Ø storm water pipe.

The proposed inlet structure of the 900mm Ø storm water pipe will be designed to accommodate the 1:20 year flood. Storm water run-off from floods exceeding the 1:20 year flood line will not be accepted into the proposed external storm water infrastructure and will be discharged, through an energy dissipating structure, onto the natural ground downstream of the proposed irrigation pond.

A 3m wide storm water servitude will have to be registered along the western boundary of the Remainder of Portion 45 of the Farm Beyneskloof 335-JR. The external storm water system will be designed for a 1:20 year flood return period and a runoff coefficient of 49% (C= 0.49) will be allowed for the Proposed Development.

A Water Use Licence Application (WULA) will be required for the Proposed Development for water will be stored on site.

Refer to Annexure B (in the SWMP attached in Appendix G), Drawing No. 2441/500/03/00
and 2441/500/04/00 for details.

9. A TABULAR VERSION OF ENVIRONMENTAL ASPECTS, IMPACTS, MITIGATION AND PERSONS RESPONSIBLE

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT POTENTIALLY TO BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE POTENTIAL IMPACT/ISSUE	MITIGATION MEASURES AND PERSON/S RESPONSIBLE
Establishment of the development, parking areas and other associated infrastructure (c) (o)	Topography.	Not applicable to a specific locality.	The development and associated infrastructure will be established on a flat terrain and low significant impact on the topography is anticipated. This area seriously lacks tourist caravan facilities. Erosion will be prevalent on steeper slopes	<p>If surface erosion DOES become prevalent during the construction phase, it should be curbed through control measures such as placing sand bags at the lowest point of water run-off areas to halt the sediment transport and erosion that will otherwise occur.</p> <p>Aspects that typically impact on soil conditions are blasting activities, excavations for the founding of foundations, establishment of stockpile areas, removal and/or clearance of vegetation, movement of construction vehicles, and maintenance of construction</p>

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT POTENTIALLY TO BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE POTENTIAL IMPACT/ISSUE	MITIGATION MEASURES AND PERSON/S RESPONSIBLE
				<p>vehicles, construction camp establishment and sanitation provision to workers during the construction period. Therefore, the following recommendations pertaining to soil conservation practices are made:</p> <ul style="list-style-type: none"> • Topsoil should be stockpiled separately from subsoil. The height of the stockpiles may not exceed 2.5 m and the stockpiles should not be stored for more than a one year period. • Topsoil must be stripped from all areas, where construction activities are going to take place, to be re-used in landscaping the site.

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT POTENTIALLY TO BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE POTENTIAL IMPACT/ISSUE	MITIGATION MEASURES AND PERSON/S RESPONSIBLE
				<ul style="list-style-type: none"> • If any blasting activities occur on site, the blasted rocks and heavy rock material must be transported to an external venue. These rocks are not allowed to rest on site. If the rocks are left on site, the soil will be greatly compacted, which will promote the growth of weeds. • Any excess overburden material that is generated may not be dumped in a random manner. Dumping sites should be predefined, agreed upon and adhered to. • Any embankments created adjacent to the roads or any

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				<p>drainage lines must be stabilised during construction and re-habilitated afterwards.</p> <ul style="list-style-type: none"> • Generally, surface water must be prevented from damming or creating gully erosion. This can be achieved by placing sandbags along the boundaries of steep working areas where higher intensity surface run-off may occur. • All runnels and erosion channels developing during the construction period or during the operational and maintenance period should be backfilled and consolidated immediately. • The movement and maintenance

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				<p>of construction vehicles may only take place in pre-determined and delineated areas. Only planned and formal routes for hauling of material should be used.</p> <ul style="list-style-type: none"> • Soil contamination during construction vehicle maintenance or as a result of fuel storage on site is easily prevented, but in the event of such an accident, the spill should immediately be cleaned up by absorbing the worst of the fluid with saw dust and then disposing of the saw dust and the first bit of the soil layer. • Fuel storage areas should be

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				<p>bounded effectively and all applicable safety standards must be adhered to.</p> <ul style="list-style-type: none"> • In terms of the stability of excavations, it is strongly recommended that all excavations exceeding 1.5 m should have proper sidewall protection to ensure the safety of workers. • Seepage may result in the destabilising of the soils above the seepage and special precautions may be required. <p>Responsible Person: Applicant / Developer</p>
Preparation of the site, including the	The existing grass layer, shrubs and trees	The development and other	The removal of vegetation cover, such that the soil surface is	It is advisable that only vegetation be removed where and when it is

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clearance of vegetation (c)	are to be removed for the establishment of buildings and infrastructure.	associated infrastructure footprint, and parking areas.	exposed, may lead to increased soil erosion in certain areas. Where the removal of surface vegetation is of a temporary nature only, the establishment of weed species is a threat. The topsoil layer is required to rehabilitate the vegetation in these areas; where surface vegetation has been temporarily removed it must be replaced again.	<p>necessary. After removal of vegetation, landscaping needs to be incorporated by re-establishing natural grassland/vegetation where appropriate. No red data plant species were recorded during the site visits conducted.</p> <p>Responsible Person: Applicant / Developer</p>
Excavations for the establishment of foundations (c)	Vegetation and soil layers.	The development and other associated infrastructure footprint, and parking areas.	The existing vegetation will be permanently removed to accommodate the development and other associated infrastructure footprint, and parking area foundations, which will be approximately the size of the built footprint.	It is advisable that only vegetation be removed where and when it is necessary. After removal of vegetation, landscaping needs to be incorporated by re-establishing natural grassland/vegetation where appropriate. No red data plant species were recorded during the

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				site visits conducted. Responsible Person: Applicant / Developer
Establishment of stock pile areas (c)	Soil and vegetation cover.	Locations still to be determined; the impacts on soil and vegetation will occur wherever stockpiles are established.	Stockpiles will need to be established for the storage of aggregate, bricks and cement. Stock piles cause compaction of soil surfaces, which promotes the establishment of unwanted weed species. The establishment of weeds greatly reduces the quality of the natural vegetation on site. Correct and efficient storm water drainage systems must be installed. Poorly designed storm water outlets will result in increased surface run-off volume and speed, which could	Building material stockpiles must not be stockpiles within any of the riparian areas. Any alien vegetation that established itself because of disturbance need to be eradicated. Erosion control measure must be implanted where necessary. Responsible Person: Applicant / Developer / Contractor

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			lead to the creation of erosion gullies. All road surfaces generate storm water, which should be controlled by preventing the storm water from crossing the road. Storm water must be allowed to spread out gradually over a large surface area to protect the soil surface against erosion.	
Generation of construction waste (c)	Soil, vegetation, aesthetic quality of the site and surface water run-off.	The site and its directly adjacent areas.	Waste, such as building rubble and empty cement bags can be a negative visual impact if not collected and disposed of correctly. Polluted surface water run-off may pollute the water resources (both the underground resources and other drainage areas in the vicinity). Construction waste that is not	Building rubble has to be collected at a centralized area and preferably in skip waste bins. No illegal dumping may be allowed in the construction phase and this will have to be checked and monitored by the appointed Environmental Control Officer.

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			removed from site will also be an eye sore in the area and will promote the growth of unwanted weed species.	Responsible Person: Applicant / Developer / Contractor
Movement of construction vehicles on all local road networks (c)	Air quality due to dust generation. Traffic safety aspects. Soil and vegetation cover.	Wherever construction vehicles travel. Potential impacts may be eminent over a wide area if not carefully managed and restricted.	The movement of heavy vehicles (transporting building material) on tar roads and especially busy main roads, can impact on traffic safety, due to accidental soiling of the road surface and/or speeds driven by construction vehicles. Access points to the site are dirt; therefore, dust generation may be a problem to adjacent land owners and motorists in general. Movement will cause limited or localised disturbances and temporary soil compaction, which promotes the establishment of weed	Alien plant species need to be controlled and it must be ensured that weeds are removed. Dust depression measures such as watering the bare surfaces need to be implemented. Responsible Person: Applicant / Developer / Contractor

ENVIRONMENTAL ASPECT AND PROJECT STAGE	ENVIRONMENTAL COMPONENT POTENTIALLY TO BE AFFECTED	LOCALITY / APPLICABLE ZONE OF THE IMPACT	NATURE AND DESCRIPTION OF THE POTENTIAL IMPACT/ISSUE	MITIGATION MEASURES AND PERSON/S RESPONSIBLE
			species.	
Maintenance of construction vehicles (c)	Possible soil contamination, which in turn will affect surface water run-off. Vegetation.	Location of the construction camp, if established temporarily on the development site is still to be determined.	In the event of on-site repairs and servicing, soil surfaces, vegetation, and run-off may be locally contaminated. Soil contamination during construction vehicle maintenance is easily prevented. But in the event of such an occurrence, the impact will be of a temporary nature only, as spills can and should immediately be cleaned up. The quality of surface water may temporarily be negatively affected.	The construction camp has to be identified and communicated to the ECO as soon as its position is available. Any fuel depot areas have to be bunded and where fuel hoses will operate, absorbing gravel needs to be provided. This area can also be lined with a small piece of plastic below the gravel. As soon as any spillages occur, the gravel has to be collected and disposed of as hazardous waste. Responsible Person: Applicant / Developer / Contractor
Noise generation by operating air	Ambient noise levels.	Areas on and surrounding site at	Noise generation caused by the operation of construction machinery	Noise mitigation measures are required in order to keep the noise

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compressors, excavators and other heavy machinery (c) (o)		which construction activities take place.	causes social disturbances. These disturbances are of a temporary nature only (during the construction phase). Noise from funeral processions.	generated by construction activities as low as possible - given the site's relatively close proximity to some farmsteads areas. This can be achieved by ensuring that only well-oiled, well maintained machinery is used, as such machinery will produce less noise than poorly serviced machinery. For example, poor maintenance of exhaust systems will produce unnecessary noise pollution. Furthermore, working hours for construction should be limited to between 07h00 and 17h00 on week days, as construction outside of these time frames will be a nuisance to adjacent dwellers.

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				<p>No loud music.</p> <p>Responsible Person: Applicant / Developer / Contractor</p>
Construction camp establishment (c)	Aesthetic impacts, social aspects, subsurface and groundwater quality, generation of domestic waste, vegetation removal, soil surface compaction and faunal impacts.	Locations of the construction camps still to be determined - will be within the least sensitive areas.	The establishment of construction camps will have a localised impact on the soil and vegetation cover of the site, as well as on the quality of surface water - as a result of construction camp litter, vehicle servicing, fuel storage and other such activities.	<p>Proper management of any temporary toilets need to be undertaken on a strict schedule.</p> <p>The construction camp must be more than 100 metres away from any water bodies.</p> <ul style="list-style-type: none"> Workers that are allowed to live on-site should be kept to minimal numbers. Those workers present at night should be on site only to look after construction equipment and to take register of the workers present on site to

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				<p>eliminate crime in the area.</p> <ul style="list-style-type: none"> • Any temporary structures will be soundly built and will not pose a danger to personnel. • The contractor must supply cooking facilities (preferably gas) if labourers are to be housed at the site. • No fires will be permitted outside the construction camp and adequate firefighting equipment, which complies with fore and safety regulations, must be available at the construction camp site at all times (at least one all-purpose 12,5 kg extinguisher) • Chemical toilets to be supplied at

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				<p>the construction camp for labourers accommodated on site. They may also use existing facilities on site.</p> <ul style="list-style-type: none"> • Welding, gas cutting or cutting of metal will only be permitted inside the construction camp. • The contractor will supply 210 litre drums at the construction camp, as well as at the construction site, for the storage of domestic waste. • Recyclable waste including glass, paper and plastic shall be separated at the construction camp, stored and recycled (where economically feasible). • Waste must be removed on a

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				<p>weekly basis to a registered waste disposal facility, or through the utilisation of existing municipal waste removal systems.</p> <ul style="list-style-type: none"> As far as possible, local labour should be employed during the construction period. <p>Responsible Person: Applicant / Developer / Contractor</p>
Temporary fuel storage on site (c)	Possible soil and water contamination.	This will occur in the construction camp(s) established and their localities are still to be determined.	There shouldn't be any impacts as a result of this activity. However, in the event of a fuel spill the soil and water may become contaminated, which should be dealt with rapidly.	<ul style="list-style-type: none"> No temporary fuel storage tanks or containers may be erected near drainage courses and refuelling must be done by means of a fuel bowser. Fuel storage areas must be banded effectively and all applicable safety standards have

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				<p>to be adhered to. The bunded area around the fuel storage areas should be able to contain 110% of the volume of the fuel container in side it.</p> <ul style="list-style-type: none"> All fuel storage areas must be fenced and secured. <p>Responsible Person: Applicant / Developer / Contractor</p>
Provision of water for construction on site (c)	Use of ground water resources, but is it anticipated that NO natural surface water sources would be used. A WULA is being conducted in this regard. WULA will	Water table within the study area.	Groundwater will be impacted upon for construction purposes. The use of water as an important resource must be assessed carefully and a statement should be made on the impact once it has been established what the source of the water for construction purposes will be. The	Water will be sourced from boreholes. Possible significance assessment on ground water resources would be of moderate significance. Water use management set out in the WULA must be followed closely.

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	concentrate on this proposed development due to: <ul style="list-style-type: none"> • Section 21(a): taking water from a water resource; • Section 21(c): impeding or diverting the flow of water in a watercourse; • Section 21(i): altering the bed, banks course or characteristics of a watercourse 		WULA is also necessary as mentioned.	Responsible Person: Applicant / Developer / Contractor
Provision of water for consumption (by	Site quality (in terms of littering).	The site.	There is boreholes on site, therefore it is anticipated that borehole water	Water use management set out in the WULA must be followed closely.

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workers) on site during the working day (c)			will be provided to workers on site.	Responsible Person: Applicant / Developer / Contractor
Sanitation provision to workers during the working day (c)	Possible contamination of subsurface soil and surface water quality.	Still to be determined, but if provided, will be within the construction camp to be established.	Insufficient chemical toilets will have a health impact. Subsurface soil contamination and contamination of surface / subsurface water quality could occur if the ablution facilities provided are not according to standard. A temporary impact is possible; however, it can easily be prevented.	Sufficient chemical toilets should be provided for workers, in the range of 1 per every 8 workers, within walking distance of all construction activities. These toilets must be well maintained and inspected on a daily basis to ensure that they are clean and functioning properly. No washing of people and/or goods should take place on cleared surfaces, as this water should not be allowed to drain into any adjacent storm water canals or drainage lines.

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				Responsible Person: Applicant / Developer / Contractor
Waste disposal and handling of solid waste and sewage associated with the development and waste disposal by funeral goers (o)	The aesthetic quality of the site, social impacts (health of workers and adjacent communities within the study area), possible surface water run-off and groundwater resource contamination, as well as air pollution.	The site and directly surrounding areas.	Poor design and layout of waste collection / storage facility sites will have a negative impact in terms of surface pollution and aesthetic quality. Practical design and efficiency is essential in this regard. Untidy collection facilities and wind-blown refuse is often a problem associated with these developments. Incorrect management of solid waste and the waste water treatment plant can cause air pollution (in the form of foul odours), health problems (pests and other diseases) and water pollution.	Therefore, practical design and efficiency is essential in this regard. The location of the refuse areas/waste collection area must be carefully planned and located so as not to cause a visual nuisance, as wind-blown refuse is often a problem. It is suggested that large black bins, which are secured in place, are distributed frequently at strategic locations across the site to discourage littering. The dustbins should be secured to prevent them from being knocked over or carried away. The lids should also be suspended permanently above the

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				<p>dustbins, to ensure that the waste disposed of is efficiently contained. The waste from these bins should be collected on a weekly basis and stored in a refuse collection yard (which should be contained within a walled fence), until such a time that a certified/registered contractor collects the waste - on a weekly basis - to be disposed of at a registered waste disposal site or when the applicant see fit to do it himself.</p> <p>See section 5.3.2 for conservancy tank.</p> <p>Bi-Annual hydraulic testing of</p>

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				<p>boreholes will help detect and prevent the possible spread of contamination beyond the border of the memorial. This will also address the monitoring of sustainable yields of the on-site boreholes. According to the geohydrologist: Pathogens, organic leachate from decomposing bodies, and organic embalming fluids (e.g. formaldehyde) will very likely attenuate/breakdown naturally in the unsaturated zone (clay soil) prior to reaching the groundwater table. The depth of groundwater is in the order of 20m below surface, which represents enough residence time for natural attenuation in the unsaturated</p>

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				<p>zone. The stormwater management plan addresses the surface water flow across the proposed site in order to prevent any erosion from taking place and possible contamination 'downstream'.</p> <p>Responsible Person: Applicant / Developer / Contractor</p>
<p>Cleaning and maintenance of surfaces (o)</p>	<p>Surface water run-off (into the storm water system) and water quality within the study area.</p>	<p>Storm water systems and natural drainage areas.</p>	<p>Chemicals used in the routine cleaning of surfaces (and possible oil and fuel spill clean-ups) can result in polluted surface water run-off, which enters the storm water systems, thereby affecting the quality of the storm water that may eventually end up contaminating the natural drainage system.</p>	<p>Any chemicals or effluent must always be collected in closed containers / sumps when cleaning surfaces. No chemicals or effluent must enter storm water drainage systems or natural veld.</p> <p>Responsible Person: Applicant / Developer / Contractor</p>

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Impact on prevailing ambient noise levels (o)	Adjacent landowners.	The area directly adjacent to the development.	Noise will be generated by the movement of vehicles associated with the development activities and tourists staying over.	<ul style="list-style-type: none"> • Ensuring that machinery and trucks are well-oiled and maintained; this will make less noise than poorly serviced construction equipment. • Silencers can be fitted to exhausts of heavy vehicles to limit the noise they produce. • Lastly, construction hours should be confined to daylight hours of a normal working day, specifically from 7 am to 5 pm in the summer and 7.30 am to 5 pm in the winter. • No activities should take place on Saturdays after 14:00 and no actions must take place on Sundays.

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				<ul style="list-style-type: none"> No loud. <p>Responsible Person: Applicant / Developer</p>
Impact on storm water quality during the operation of the development and in the event of accidental spillage (o)	Storm water run-off, natural drainage courses and areas in the vicinity of the study area.	Storm water canals and the area surrounding the site of the proposed development.	Should surface water run-off be contaminated it may run through the storm water systems into the natural drainage course. This will occur under circumstances where no anti-pollution measures are designed and installed. The design of the storm water system, to drain the premises, must be such that it prevents the risk of storm water pollution or abnormal soil erosion at its outlets.	<p>Maintenance of storm water outlets is required to ensure that they don't get blocked (i.e. no longer fulfil their function) or result in erosion. The custodian of the development has to perform regular checks and maintenance.</p> <p>Responsible Person: Applicant / Developer</p>
Impact of the proposed	Land use options and agricultural potential	Within the study area; which is	The sites agricultural potential, rated as non-arable; low to	None. Small development on low potential agricultural land.

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development on future land use (o)	of the site.	agricultural land.	moderate potential grazing land. Therefore, this is not a significant impact.	
General building maintenance (o)	Visual and aesthetic quality, also surface water quality and vegetation cover.	The study area at large.	The design and nature of the development will determine the impact of the proposed development on the visual quality of the study area. Maintenance of the development as a whole will prevent a further negative impact on the visual quality of the study area. The disposal of rubble (both during construction and maintenance) causes impacts on the natural environment (including faunal ecology, surface water and vegetation) if disposed of illegally.	Maintenance of all structures is critical in upholding or improving on the visual impact on the area. Weed / exotic vegetation control must be implemented regularly to protect the natural environment. Responsible Person: Applicant / Developer

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			Compaction of soil surfaces and the propagation of weeds are typical impacts.	

10. COMPLYING, REMEDYING, AND CONTROLLING ENVIRONMENTAL POLLUTION INCIDENTS AND CAUSES

If there is an environmental incident, like oil or diesel spills, or any other form of pollution during the construction phase then the applicant/contractor/engineer should consult with the appointed Environmental Control Officer (ECO) for the project. The ECO should then respond immediately on the incident at hand with the appropriate mitigation measure as practically as possible.

An environmental awareness plan should be communicated to the workers and contractors via a training session before the construction phase starts. All risks should be put forward in terms of pollution and environmental degradation. The environmental awareness plan can be compiled by the ECO or environmental practitioner for the training session before the construction phase.