

8. ENVIRONMENTAL MANAGEMENT PROGRAMME

8.1 Definition and objectives

The Environmental Management Programme (EMPr) was compiled in accordance with Appendix 4 of the Environmental Impact Assessment (EIA) Regulations, 2014 as well as the Western Cape Guideline for Environmental Management Plans (Lochner, 2005).

According to the Western Cape Guideline, an Environmental Management Programme (EMPr) can be defined as:

An environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

According to the EIA Regulations, 2014, an EMPr must include-

- (d) A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed or mitigated as identified through the environmental impact assessment process for all phases of the development including -*
- (i) planning and design;*
 - (ii) pre-construction and construction activities;*
 - (iii) operation or undertaking of the activity;*
 - (iv) rehabilitation of the environment; and*
 - (v) closure, where relevant.*

This section therefore provides an indication of the mitigation measures to be implemented by the site operator (and site workers) in order to reduce the potential impacts identified (see Section 7).

8.2 Contact details

An EMPr must include -

- (a) details of-*
- (i) the EAP who prepared the environmental management programme; and*
 - (ii) the expertise of that person to prepare an environmental management programme, including a curriculum vitae.*

The contact details and expertise of the environmental consultant are provided in Section 2 of this report.

The applicant will be responsible for the implementation of the EMPr. The contact details are provided in Section 2.

8.3 Description of the proposed project

An EMPr must provide -

(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.

(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.

A detailed description of the proposed development and aspects covered by the EMPr is provided in Section 2 of this report.

Section 5 provides a description of the biophysical environment of the site.

As indicated in Section 5.14, no sensitive environments (wetlands, streams, rivers) are present on site. Grobler (2015) indicated that no wetland or other watercourse type (as defined by the National Water Act, 1998 (Act 36 of 1998) overlaps with the development site (Figure 8.1). The proposed development site thus has a low-negligible risk of impacting on wetlands and other watercourses and therefore sensitive landscapes.

However, in view of the north-north-east trending watershed located in approximately the centre of the site, the resultant surface water runoff (as a result of construction or operational activities) could either impact (in terms of quantity and quality) on:

- a non-perennial tributary and associated channelled valley bottom wetland of the Klein Olifants River (located $\pm 100\text{m}$ west of the development site). It could also impact on a private property located between the development site and the said stream.
- a drainage area and associated unchannelled valley bottom wetland of the Klein Olifants River (located $\pm 200\text{m}$ east of the site) if proper storm water control measures are not implemented. The adjacent gravel road and adjacent private properties could also be impacted.

The nearby drainage line/tributary of the Klein Olifants River (located $\pm 100\text{m}$ west of the development site) is indicated as an Ecological Support Area and must thus be protected from any impact as a result of the proposed residential development.

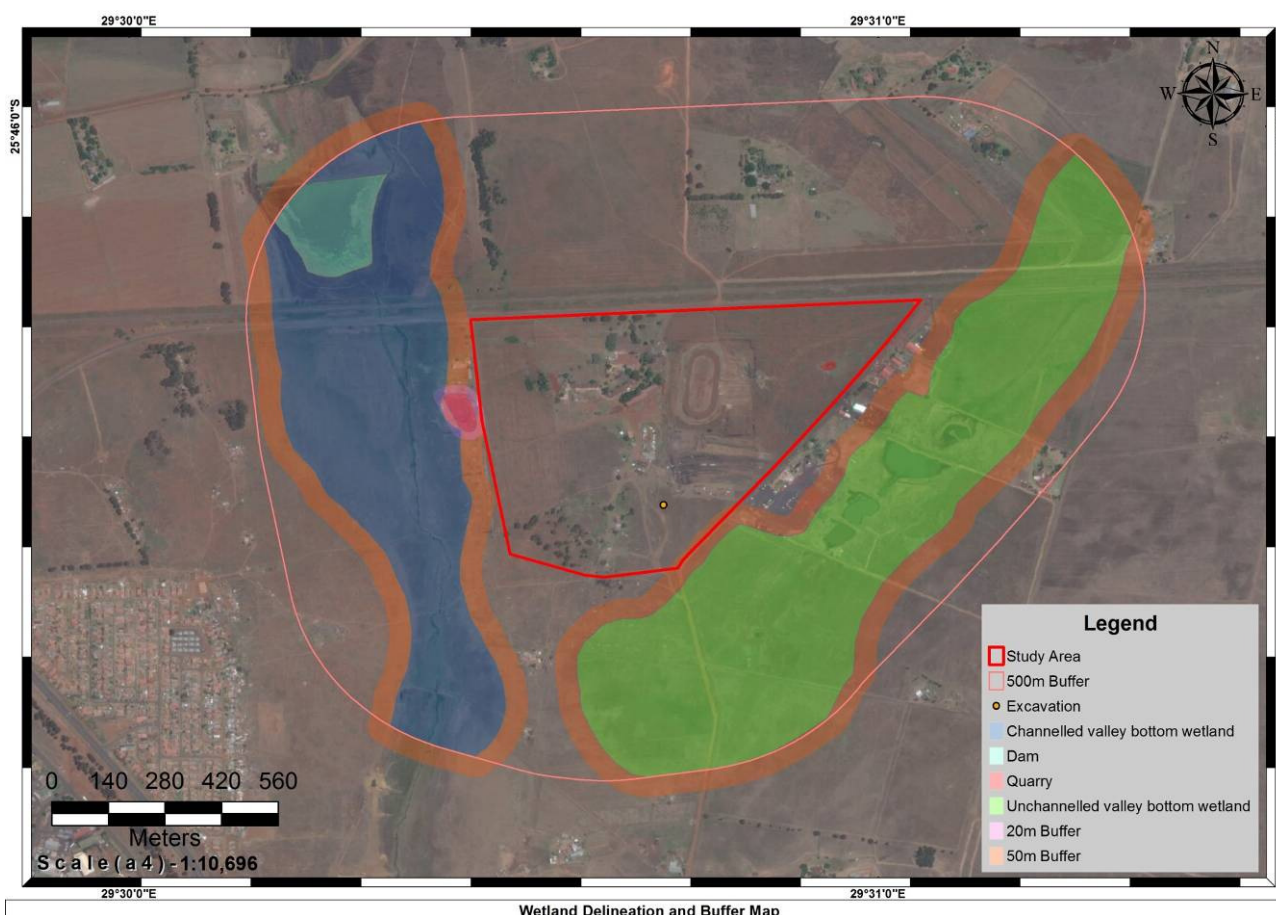


Figure 8.1: Sensitive environments located near the site

8.4 Phases of the development and timeframe

8.4.1 Planning and design phase and pre-construction activities

The planning and design phase involved office work and site surveys with regards to the development of the proposed Middelburg x44 residential area and the Basic Assessment Report. It also involves obtaining the necessary authorisations for the said development.

Apart from the existing activities on site, no actual construction work took place regarding the proposed Middelburg x44 residential area.

8.4.2 Construction phase

According to Afri- Infra (2015) the proposed development will be divided into the following three (3) phases as indicated in Table 2.9:

- Phase 1 (area = approximately 6 ha) will consist of the Towers Development (an old hotel and landmark in the area) as well as various complexes providing contractors' accommodation to seasonal and contract workers in the area. Additional buildings/structures could be built on the proposed Business stand and the three Residential 3 stands. Services (water, sewer, electricity) will be installed and the proposed internal road will be constructed.
- Phase 2 (area = approximately 17 ha) will consist of residential stands that will be serviced and sold to private owners. This would involve the construction of buildings on the Residential 1 stands as well as the 5 Residential 3 stands and the 1 Business stand. The existing church

stand will be rezoned to Institutional in order to ensure the continuation of the said activity. Three (3) Public Open Spaces will also be provided. Services (water, sewer, electricity) will be installed and the proposed internal road will be constructed.

- Phase 3 (area = approximately 17 ha) will consist of residential stands that will be serviced and sold to private owners. This would involve the construction of buildings on the Residential 1 stands, the construction of churches (2 Institutional stands), the community facility (1 Institutional stand) and the combined school (1 Institutional stand). Services (water, sewer, electricity) will be installed and the proposed internal road will be constructed. Two (2) Public Open Spaces will be provided.

Figure 7.1 provides a schematic representation of the above-mentioned phasing of the development.

In terms of the phasing of the development, the following should be noted in terms of the provision of services as indicated in Section 6.3:

- The use of the 2 onsite boreholes might continue once the overall development is connected to the municipal bulk water supply pipeline.
- The existing onsite septic/conservancy tanks will be decommissioned and connected to the proposed waterborne sewer network. The said septic tanks will however remain in use during the development of Phase 1.

For each of the above-mentioned phases, the construction phase would involve the pegging of the stands, installation of services and construction of the buildings and associated infrastructure. This would involve the following:

- ❖ Clearing of vegetation;
- ❖ Levelling of the site;
- ❖ Excavation of trenches;
- ❖ Installation and connection of services;
- ❖ Construction of access road and parking area;
- ❖ Laying of the required foundations;
- ❖ Building of the outer structure;
- ❖ Installation of the required internal fittings;
- ❖ Rehabilitation of the disturbed areas (i.e. landscaping).

Section 7.7 provides further details with regards to potential impacts identified. Mitigation and management measures are indicated in Section 8.5.

Construction timeframe:

12 – 24 months per phase depending on funding

8.4.3 Operational phase

The operational phase would involve the utilisation of the various buildings and facilities associated with the Middelburg x44 residential area.

Section 7.7 provides further details with regards to potential impacts identified. Mitigation and management measures are indicated in Section 8.5.

Operational timeframe:

Unknown.

8.4.4 Decommissioning and rehabilitation phase

This phase would involve the decommissioning of the buildings and infrastructure already constructed on site at that particular date, if ever required. This phase will not be discussed in detail. It is recommended that at the time of decommissioning, a specific Environmental Management Programme (EMPr) be compiled which specifically addresses this phase. This EMPr would have to address issues such as the removal of building rubble, ripping of the soil, the sowing of seed and the maintenance of the vegetation until it is established. Soil conservation measures would also have to be implemented.

8.5 Mitigation and management measures to be implemented

An EMPr must include -

(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -

- (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;*
- (ii) comply with any prescribed environmental management standards or practices;*
- (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and*
- (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.*

8.5.1 Construction site office

Impact management objective:

- 1) To ensure that an appropriate site is selected for the construction site office and that the site office is managed in an environmentally responsible manner with the least impact on the natural environment, site workers and persons residing on site.*

Mitigation and management measures:

- a. For each phase, a suitable site must be selected, demarcated and fenced for the construction site office (i.e. within the Phase 1, Phase 2 or Phase 3 area).
- b. No overnight accommodation may be provided as part of the construction site office.
- c. Chemical toilets must be provided for use by the site workers. These must be serviced on a regular basis. No long drop toilets may be allowed.
- d. Potable water must be made available to site workers.
- e. Proper waste management facilities must be provided as part of the construction site office (see Section 8.5.6).
- f. No waste may be burnt, buried or dumped on site or the surrounding area. The contractor will have to provide adequate containers for the collection of waste. The applicant will have to ensure that the contractor removes the domestic waste to a licensed waste disposal site.

8.5.1 Construction site office

- g. An area for the parking of construction vehicles and other vehicles should be clearly demarcated. When not in use, all vehicles should be parked within this area. The demarcated parking area should be located within or in close proximity to the construction site office.
- h. As far as practically possible, vehicles must not be serviced/repaired on site. However, should it not be possible to take the vehicle to a service centre in town, the contractor must ensure that the vehicles are serviced/repaired on a cement slab and that drip trays are utilized. Waste oil, filters, etc. must be properly disposed of (see Section 8.5.6).

8.5.2 General construction principles

Impact management objective:

- 1) *To ensure that the activities that occur during the construction phase have the least impact on the surrounding natural environment, site workers and persons residing on site.*

Mitigation and management measures:

- a. All construction activities must be limited to the said site. The said site should be properly demarcated and the footprint kept as small as possible.
- b. No members of the general public should be allowed at the construction site.
- c. An area must be selected (within the 6 ha site; Figure 3.5) and demarcated for the stockpiling of spoil (e.g. rocks, soil, etc.).
- d. The rights and conditions of Eskom (Appendix 7) with regards to their powerlines must be respected and adhered to at all times.
- e. No construction/spoiling/storing activities will be allowed near the Eskom powerlines without prior consent from Eskom.
- f. Contractors will be informed to keep to low speeds along the gravel roads to reduce the amount of dust.
- g. Dust suppression measures must be implemented during dry and windy periods to prevent air-borne deposition on the surrounding natural vegetation and nearby accommodation facility and houses.
- h. The applicant/contractor must appoint a Safety Officer and Environmental Control Officer (ECO) in order to ensure compliance with the legislation.
- i. Sufficient fire extinguishers must be provided as required by legislation.
- j. All machinery used during the construction phase must be properly muffled and maintained so as to reduce noise generation to a minimum.
- k. If any archaeological remains are exposed during the construction phase, the construction must be terminated immediately and the Provincial Heritage Resources Authority (SAHRA) must be notified in this regard. A qualified archaeologist must be requested to investigate the occurrence. The applicant must take note of the requirements in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999).
- l. If any graves are discovered during construction, the discovery must be reported to the SA Police Service and/or SAHRA or a qualified archaeologist must be called in to handle the matter.
- m. If any palaeontological material is exposed during digging, excavating, drilling or blasting SAHRA must be notified. All construction activities

8.5.2 General construction principles

must be stopped and a palaeontologist must be called to determine proper mitigation measures. If required, the protocol for finds provided in Appendix 14 must then be followed.

- n. All pollution incidents must be reported to the Department of Agriculture, Rural Development, Land and Environmental Affairs and the Department of Water and Sanitation within 24 hours of occurrence.

8.5.3 Rehabilitation of the environment after construction

Impact management objective:

- 1) To ensure that the areas disturbed due to construction activities are properly rehabilitated and maintained.
- 2) To control the growth of declared weeds and/or invader plants.

Mitigation and management measures:

- a. Before construction, topsoil must be removed and stockpiled in a demarcated area within the area of the particular phase (i.e. Phase 1, 2 or 3 area; Figure 7.1) for rehabilitation of the area surrounding the buildings. The topsoil layer generally has a high organic content and carries the seed bank. It is invaluable for post-development rehabilitation.
- b. Once construction has been completed, all temporary structures, excess materials, equipment and waste must be removed from site.
- c. All residual stockpiles must be removed to spoil or spread on site as directed by the ECO.
- d. The disturbed areas must be top soiled and re-vegetated (i.e. rehabilitated) as soon as possible in order to prevent soil erosion and the establishment of alien vegetation.
- e. Proper stormwater control measures and erosion control must be implemented to prevent erosion of the newly rehabilitated areas during heavy rainfall.
- f. If soil erosion is noted, appropriate remediation measures must be implemented.
- g. For rehabilitation purposes, a seed mix comprising of grass species indigenous to the area should be used. The planting of any alien plant species as part of landscaping should be prohibited.
- h. Kikuyu grass (*Pennisetum clandestinum*) is a proposed declared Invader that is highly invasive in wetland habitats. It is therefore recommended that this species is not used for rehabilitation of the area.
- i. The regulations in terms of Alien Invasive Species, the Conservation of Agricultural Resources Act, 1983 and the Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998) with regards to declared alien species must be noted and complied with.
- j. Regular site inspections will be conducted to identify any declared weeds and/or invader plants. If identified, the plants will be eradicated using appropriate methods.
- k. It is advisable to consult the latest edition of 'A guide to the use of herbicides' or contact the National Department of Agriculture, Forestry

8.5.3 Rehabilitation of the environment after construction

and Fisheries with regards to the latest information pertaining to the application of herbicides. If pesticides or herbicides are to be used, the product should be chosen responsibly. Storage, administering and disposal must be done according to the prescribed methods.

- i. A post-construction audit must be conducted to ensure that any shortcomings are identified and addressed.

8.5.4 General operational principles

Impact management objective:

- 2) *To ensure that the activities that occur during the operational phase have the least impact on the natural environment, site workers and persons residing on site.*

Mitigation and management measures:

- a. All operational activities must be limited to the said site.
- b. The fence around the site must be well maintained to prevent unauthorised access into the area.
- c. The rights and conditions of Eskom (Appendix 7) with regards to their powerlines must be respected and adhered to at all times.
- d. The following measures to minimize **water use** during the operational phase must be implemented:
 - o *Regular maintenance of the water infrastructure to minimize water wastage;*
 - o *High pressure washers to be used during cleaning to minimise water use;*
 - o *Water consumption to be monitored and recorded daily;*
 - o *A groundwater monitoring programme should be initiated to monitor the quality and yields of the onsite boreholes in order to manage the use of the groundwater resource as recommended in the groundwater study.*
- e. The waste management measures provided in Section 8.5.6 of this report should be implemented.

8.5.5 Soil management

Impact management objective:

- 1) *To ensure that the activities that occur during the construction phase have the least impact on the soils in terms of soil quality, structure and erosion potential.*

Mitigation and management measures:

- a. If possible, construction should take place during the dry season to prevent soil erosion.
- b. Before construction, topsoil must be removed and stockpiled in a

8.5.5 Soil management

demarcated area within the area of the particular phase (i.e. Phase 1, 2 or 3 area; Figure 7.1) for rehabilitation of the area surrounding the buildings. The topsoil layer generally has a high organic content and carries the seed bank. It is invaluable for post-development rehabilitation.

- c. Any stockpile, which is likely to remain for 12 months or more, must be vegetated.
- d. An area must be selected within the area of the particular phase (i.e. Phase 1, 2 or 3 area; Figure 7.1) and demarcated for the stockpiling of spoil (e.g. rocks, soil, etc.).
- e. All residual stockpiles must be removed to spoil or spread on site as directed by the ECO.
- f. Appropriate soil conservation measures to be provided in order to prevent soil erosion and loss of topsoil. Temporary soil berms (not exceeding 0.5m in height) should be placed at convenient intervals to minimize the speed and erosion potential of any storm water flowing across the gradient of the site. These berms should be removed in a phased manner prior to the landscaping of the site.
- g. Topsoil stockpiles must be located on a flat area (if possible) and must not be higher than 2 m.

Impact management objective:

- 2) *To reduce potential soil pollution as a result of construction and operational activities.*

Mitigation and management measures:

- a. The waste management measures as indicated in Section 8.5.6 must be implemented during both the construction and operational phases.
- b. Regular maintenance of the sewage infrastructure to reduce the potential for blockages and leaks and thus prevent potential soil pollution.
- c. It must be ensured that septic/conservancy tanks are empty prior to their removal.

Impact management objective:

- 3) *To ensure that the activities that occur during the operational phase do not lead to soil erosion.*

Mitigation and management measures:

- a. A storm water management plan must be drafted and implemented for the said site.
- b. Surface runoff volumes can be reduced and infiltration encouraged by maximising permeable surfaces.
- c. Storm water must be properly attenuated (e.g. attenuation ponds, grassed swales, etc) to minimize the anticipated increase in surface water runoff volume and flow velocity.
- d. The storm water management measures must be inspected on a regular basis in order to ensure that the structures are functional (not blocked) and not causing flooding. This will be of particular

8.5.5 Soil management	
<p>importance at the start of the rainy season and during the rainy season.</p> <p>e. Monitor for erosion and intervene and/or rehabilitate where necessary.</p>	
<p><u>Impact management objective:</u></p> <p>4) <i>To ensure that the geotechnical recommendations are taken into account during the construction phase in order to prevent impact on structures during the operational phase.</i></p>	
<p><u>Mitigation and management measures:</u></p> <p>a. The following mitigation measures recommended by Hansmeyer (2009) must be implemented in terms of the identified geotechnical zones:</p>	
ZONE 1 (Figure 5.9)	
AREA (ha)	5.07
NHBRC SITE CLASS	C, H, P, R
GEOTECHNICAL CONSTRAINTS	Occasional boulder excavation, Hardpan ferricrete in vicinity of TP5 (Figure 5.9) – localised intermediate excavation, Limited subsurface seepage.
CONSTRUCTION TYPE	Normal construction applies (e.g. slab-on-the-ground and strip footings). Good subsurface drainage is required.
ZONE 2A (Figure 5.9)	
AREA (ha)	13.08
NHBRC SITE CLASS	H1, P, R
GEOTECHNICAL CONSTRAINTS	Medium active clays overlaying shallow (>0.8 <1.5m). Intermediate excavatable shale and rock. Subsurface seepage.
CONSTRUCTION TYPE	Modified normal construction applies. Provide subsurface drainage. Alternatively, deep foundations on bedrock 0.8 – 1.8m below surface.
ZONE 2B (Figure 5.9)	
AREA (ha)	29.2
NHBRC SITE CLASS	C2, R and P
GEOTECHNICAL CONSTRAINTS	Consolidation and collapse settlement. Occasional boulder excavation. Limited subsurface seepage.
CONSTRUCTION TYPE	Modified normal construction applies. Provide subsurface drainage.
ZONE 3 (Figure 5.9)	
AREA (ha)	1.1
NHBRC SITE CLASS	P
GEOTECHNICAL CONSTRAINTS	Excavations subject to ponding during rainy season.
CONSTRUCTION TYPE	No development. Alternatively, rehabilitate and zone as public

8.5.5 Soil management

open space.

SEEPAGE AREA (Figure 5.9)

In addition to the above-mentioned, Hansmeyer (2009) indicated an area of 14.05 ha susceptible to seepage (Figure 5.9) that drains toward the south-eastern boundary. Sub-surface drainage and cut-off drains would be required within this area.

Detailed information regarding allowable bearing capacity, estimated compressibility, active clays, potential settlement, workability of site materials, can be obtained in the geotechnical report provided in Appendix 11.

8.5.6 Waste management

Impact management objective:

- 1) *To ensure the proper storage, management and disposal of waste during the construction and operational phases.*
- 2) *To reduce potential soil, surface water and groundwater pollution as a result of construction and operational activities.*

Mitigation and management measures:

General/building waste

- a. Proper waste management measures must be implemented at the site.
- b. No dumping of any kind of waste (domestic, general, building rubble, etc.) to take place on site.
- c. Waste skips to be provided for placement of general waste, building rubble, etc.
- d. Rubbish bins should be provided throughout the site for domestic waste. These bins should be emptied on a daily basis (i.e. at the end of a day's work). The waste should be sorted and placed in the appropriate bins or metal skips to be located at the construction site office.
- e. The applicant will have to ensure that the contractor removes the building rubble and any domestic waste to a licensed waste disposal site.
- f. Waste and building rubble not to be placed on the soil stockpiles resulting in the contamination of the soil.
- g. Building rubble must be disposed of at a site specifically earmarked for that purpose. No building rubble is to be disposed of in a haphazard way in the area surrounding the development site.
- h. Cement/concrete should be mixed in either demarcated areas or on metal sheeting or conveyor belts. If mixed in demarcated areas, these areas will have to be ripped and the cement/concrete removed on completion of construction activities.
- i. Site workers must be instructed to collect windblown rubbish which may collect in the surrounding area on the said site. This will assist with the overall visual appearance of the site.
- j. The applicant/contractor must ensure that all site workers receive appropriate training with regards to the overall waste management

8.5.6 Waste management

measures to be implemented for the said site.

- k. Site workers must be aware of the importance of the implementation of the waste management measures.

Hazardous waste management

- a. Proper storage facilities must be provided for the storage of oils, grease, fuels, etc. to be used during the construction phase.
- b. Collection containers (e.g. drip trays) must be placed under all dispensing mechanisms for hydrocarbons or hazardous liquid substances to ensure that potential contamination from leaks/spillage is reduced.
- c. No hazardous substance is to be disposed of on site.
- d. No bins containing organic solvents, paint tins or bins containing thinning agents may be cleaned on site, unless containers for liquid disposal are provided. The tins must be collected and rinsed at a central waste collection point, where it poses no threat to surface or ground water.
- e. All spills of chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) should be cleaned with the use of suitable absorbent materials such as drizit or oclanzorb. Appropriate soil remediation measures should be implemented where soil has been contaminated with oil.
- f. Contaminated soil generated as a result of fuel, oil, etc. spills will be disposed of in a specially marked drum located at the site office. An approved waste contracting firm (e.g. Enviroserv) will collect the drum and dispose of the contaminated soil at an appropriate waste disposal site.
- g. Contaminated soil/fuel that cannot be removed will be treated in situ with an appropriate remedial agent. In this instance, the services of an expert may be required.
- h. Waste oils collected on site should be stored in drums in a designated, bunded area and removed by an approved recycling contractor and disposed of at an appropriate licensed waste disposal facility.
- i. In all instances where a firm is contracted to collect waste (e.g. Enviroserv, Wastetech, Oilkol, etc.), the site operator will ensure that the correct documentation is completed and filed for future reference.
- j. Certificates of hazardous waste disposal (waybills) are to be kept for auditing purposes.
- k. Records of environmental related incidents should be maintained.
- l. The applicant must ensure that all workers receive relevant training with regards to the handling of hazardous substances and the potential health risks thereof.
- m. The contractor will be responsible for establishing an emergency procedure for dealing with spills.

8.5.7 Water management

Impact management objective:

- 1) *To reduce the potential impact of storm water drainage from the site on the surrounding area and nearby drainage areas in terms of flooding and soil erosion during the construction and operational phases.*

Mitigation and management measures:

- a. If possible, construction should take place during the dry season to prevent soil erosion.
- b. Sediment movement off site should be limited by ensuring the implementation of runoff control measures and the rapid revegetation of sites following construction related activities.
- c. Proper stormwater control measures (including erosion control and dirty water separation) must be implemented from the start of the construction activities.
- d. Surface runoff volumes can be reduced and infiltration encouraged by maximising permeable surfaces.
- e. Storm water must be properly attenuated (e.g. attenuation ponds, grassed swales, etc.) to minimize the anticipated increase in surface water runoff volume and flow velocity.
- f. The storm water management measures must be inspected on a regular basis in order to ensure that the structures are functional (not blocked) and not causing flooding. This will be of particular importance at the start of the rainy season and during the rainy season.
- g. Monitor for erosion and intervene and/or rehabilitate where necessary.

Impact management objective:

- 2) *To ensure that the construction and operational phases do not impact on the surface water run-off quality and quantity.*
- 3) *To ensure that the surface water run-off quality does not impact on the nearby drainage areas and associated wetlands located within 500m of the development site.*

Mitigation and management measures:

- a. The nearby drainage areas and associated wetlands (including buffer zones) should be clearly demarcated as NO-GO areas before any construction activities commence. No activities are to be allowed within the said areas. This includes dumping of any material during and after construction; driving of vehicles; trampling by construction workers, etc.
- b. All contractors will be informed of this NO-GO AREA through the environmental awareness programme and to be made aware of penalties (fines to be paid) to be imposed due to infringements.
- c. No water may be abstracted from the drainage areas for the construction activities. The existing boreholes must be used.
- d. If water from the drainage areas is to be used for dust suppression, a

8.5.7 Water management

water use licence in terms of the National Water Act, 1998 (Act 36 of 1998) must be obtained from the Department of Water and Sanitation.

- e. The **waste management measures** as indicated in Section 8.5.6 must be implemented during both the construction and operational phases.
- f. A stormwater management plan must be implemented to ensure that:
 - stormwater is diverted away from the site and not contaminated/polluted by any substance;
 - no accumulation of surface water takes place around the perimeter of the structures;
 - the site is properly drained.
- g. Regular maintenance of the sewage infrastructure to reduce the potential for blockages and leaks and thus prevent potential water pollution.
- h. If any soil or surface water contamination is noted, appropriate remediation measures must be implemented immediately. An environmental incident report must be completed indicating the date of the incident, description of incident and action taken. The Department of Agriculture, Rural Development, Land and Environmental Affairs and the Department of Water and Sanitation must be informed of the event within 24 hours. A copy of the environmental incident report must be kept on file at the site office.

Impact management objective:

- 4) *To ensure that groundwater abstraction during both the construction and operational phases do not impact on the groundwater quantity.*

Mitigation and management measures:

The recommendations made in the groundwater study (Gouws, 2014) must be implemented:

- Water meters to be installed on each borehole.
- The maximum amount of water that can be abstracted per day by Borehole RDBM1 is 69m³ (69000l/day).
- The maximum amount of water that can be abstracted per day by Borehole RDBM2 is 29m³ (29000l/day).
- Discharge during pumping must not exceed 0.80 L/s for Borehole RDBM1 and 0.34 L/s for Borehole RDBM2.
- Pumping must only be conducted at 8 hour intervals with 16 hour rest intervals to allow for borehole recovery.
- Groundwater quality must be tested on a quarterly basis in view of the fact that the water will be used for human consumption.

8.5.8 Vegetation and animal life management

Impact management objective:

- 1) *To reduce the potential impact on the surrounding vegetation and animal life during the construction phase.*

Mitigation and management measures:

- a. During construction, no unnecessary removal of vegetation should take place outside of the demarcated area.
- b. Only the area earmarked for construction to be cleared of vegetation. Mass clearing will not be allowed.
- c. Appropriate herbicides may be used on cleared areas, provided that they break down upon contact with the soil.
- d. Should any animals (e.g. reptiles or mammals) be found during the construction phase, a specialist should be contacted immediately to ensure the safe removal of the specimen(s).
- e. No poaching of animals to take place on site or in the surrounding area.

Impact management objective:

- 2) *To reduce the potential impact on the surrounding vegetation and animal life during the operational phase.*

Mitigation and management measures:

- a. The regulations in terms of the Alien Invasive Species, Conservation of Agricultural Resources Act, 1983, and the Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998) with regards to declared alien species must be noted and complied with.
- b. Exotic and alien vegetation should be removed or controlled on site.
- c. No poaching of animals to take place on site or in the surrounding area.

8.5.9 Interested and affected parties

Impact management objective:

- 1) *To ensure that site workers are not impacted upon in terms of the construction work being performed.*

Mitigation and management measures:

- a. The applicant/contractors must ensure that the necessary protective gear (PPE) is worn at all times and that signs are erected to warn workers to use hearing protection as well as any other hazards.
- b. The applicant/contractor must adhere (at all times) to the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), the Construction Regulations, 2003 and any other

8.5.9 Interested and affected parties

applicable legislation.

- c. For safety purposes, excavations must not be undertaken until such time as all required materials are available and services can be laid.
- d. Excavations should be closed as soon as is practically possible.
- e. If blasting is required, the requirements of the Explosives Act, 2003 (Act 15 of 2003) must be put in place in order to prevent any impact on site workers, etc.

Impact management objective:

- 2) *To ensure that the potential impacts on persons residing on the site are minimized during the construction and operational phase.*

Mitigation and management measures:

- a. All construction and operational management principles as indicated in this EMPr must be implemented.
- b. The waste management measures as indicated in Section 8.5.6 must be implemented.
- c. Sewage system (whether septic/conservancy tanks or waterborne sewage system) has sufficient capacity and does not result in sewage overflows and odours.

Impact management objective:

- 3) *To reduce potential impact on the general road users of the R104 provincial road as a result of the residential area.*
- 4) *To reduce the potential impact on the general road users of the Cowen Ntuli/N11 intersection.*
- 5) *To reduce potential road accidents as a result of pedestrians walking along the R104 provincial road.*

Mitigation and management measures:

- a. The R104 (154-4)/gravel access (site access) to be upgraded as recommended by Makala and Kotze (2009).
- b. The Cowen Ntuli/N11 (P49-1) intersection to be upgraded as recommended by Makala and Kotze (2009).
- c. As recommended by Makala and Kotze (2009), a sidewalk (1.5m wide) to be provided along the access road and the R104 provincial road (to the proposed Minibus –Taxi layby's).

8.6 Implementation and monitoring of the EMPr

An EMPr must include -

- (g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);*
- (h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);*
- (i) an indication of the persons who will be responsible for the implementation of the impact management actions;*
- (j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;*
- (k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);*
- (l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;*

The implementation of the Environmental Management Programme (EMPr) as part of the daily construction and operational activities is crucial and requires commitment from all levels of management and the on-site workers. The successful implementation of an EMPr has the following advantages:

- Meeting legal obligations;
- Contributes to environmental awareness;
- Can facilitate the prevention of environmental degradation;
- Can minimize impacts when they are unavoidable;
- Can ensure good environmental performance and improve community relations.

An approved contractor should be appointed to do the necessary construction on the said site. The contractor and site workers must be aware of their environmental responsibilities. Penalty clauses, in terms of the environment, must be built into the contracts and must be implemented. Monitoring of the environmental management programme must take place on a regular basis in order to ensure compliance.

The contractor must inform all site workers of their environmental responsibility during the construction phase. Measures to protect the environment and mitigation measures formulated in this EMPr must be implemented by the contractor and the site workers. The contractor must thus ensure that the site workers are aware of the Environmental Authorisation and this EMPr and understand the contents thereof.

In order to achieve the above-mentioned, the contractor and site workers should undergo basic environmental awareness training with regards to the contents of this EMPr. Environmental awareness training is critical for the contractor and site workers to understand how they can play a role in achieving the objectives specified in the EMPr. The contractor must ensure that the site workers undergo the necessary environmental awareness training (see Section 8.6.1) before commencing with activities on the site.

This section must be completed on acceptance of the appointment.

MANAGEMENT ACCOUNTABILITY		
Accountability	Title	Name

MANAGEMENT DECLARATION

I, the undersigned in my capacity as designated above hereby undertake to ensure that the conditions and recommendations in terms of the Environmental Authorisation and Environmental Management Plan (EMPr) are implemented and assume responsibility and accountability in this respect.

I further understand that officials from Steve Tshwete Local Municipality, Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) and Department of Water and Sanitation (DWS) may (at any time) conduct an inspection of the development in order to ensure compliance with the conditions and recommendations in the EMPr.

CONTRACTOR
..... Name and Designation
..... Signature:
..... Date:
EMPLOYER
..... Name and Designation:
..... Signature:
..... Date:

8.6.1 Environmental Awareness Plan (EAP)

An EMPr must include -

- (m) An environmental awareness plan describing the manner in which-*
- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and*
 - (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.*

It is recommended that the employees receive basic environmental awareness training. In order to ensure proper training, the applicant must develop and implement an Environmental Awareness Plan (EAP). This section provides an overview of what the proposed EAP will contain and how it will be implemented.

The following components would form an essential part of an Environmental Awareness Plan (EAP): -

- ✦ Development of an environmental policy;
- ✦ Identification of environmental impacts/risks and mitigation measures;
- ✦ Environmental training, awareness and competence;
- ✦ Environmental communication and reporting.

Development of an environmental policy

The applicant would have to compile an Environmental Policy (if they do not have one already), which is a one page statement setting out certain principles in terms of their environmental performance.

The environmental policy should indicate the following:

- The applicant's commitments in terms of the environment;
- Identify environmental impacts as a result of the activities taking place on site;
- Actions to be taken to minimize/mitigate the environmental impacts.
- Signature of management.

In order to ensure effective environmental management, it is important that the Environmental Policy is known and understood by all employees. It should thus be displayed at the offices, workshop and security access.

An Environmental Policy Template is provided to assist the applicant in the compilation of their Environmental Policy. A number of templates are also available on the internet.

Environmental Policy Template (taken from Richmond upon Thames, 2012)

[Insert company name here] believe that we have a responsibility to care for and protect the environment in which we operate. We are fully committed to improving environmental performance across all of our business activities, and will encourage our business partners and members of the wider community to join us in this effort.

[Insert company name here] recognises our key impacts to be in the areas of [for example]:

- *energy use*
- *raw material use*
- *waste generation*
- *emissions to air/water*
- *water use*
- *transport*
- *procurement*

We will strive to:

- *Adopt the highest environmental standards in all areas of operation, meeting and exceeding all relevant legislative requirements.*
- *Assess our organisational activities and identify areas where we can minimise impacts.*
- *Minimise waste through careful and efficient use of all materials and energy.*
- *Purchase sustainable products wherever feasible [e.g. recycled, FSC or low environmental impact products and energy from renewable sources].*
- *Train employees in good environmental practice and encourage employee involvement in environmental action.*
- *Reduce risks from environmental, health or safety hazards for employees and others in the vicinity of our operations.*
- *Adopt an environmentally sound transport strategy.*
- *Aim to include environmental and ethical considerations in investment decisions where appropriate.*
- *Assist in developing solutions to environmental problems.*
- *Continually assess the environmental impact of all our operations.*

[Insert company name here] have developed a series of action plans to supplement each of our environmental policy objectives. These can be found [in an appropriate place].

[Insert company name here] will periodically review performance and publish these results [in an appropriate manner].

Signed _____

Identification of environmental impacts / risks and mitigation measures

Environmental impacts/risks in terms of the development are indicated in Section 7 of this document while mitigation measures to be implemented are provided in Section 8.

Activities or work procedures that could have a significant impact on the environment have thus been identified and mitigation measures proposed in order to avoid pollution or the degradation of the environment.

This information must be communicated to the employees and thus forms the basis for developing an Environmental Awareness Plan (EAP) in order to ensure effective environmental management.

Environmental training, awareness and competence

Training is necessary in order to advance the competency of employees in implementing the Environmental Policy and the EMPr and to ensure effective overall environmental management.

The applicant must inform all his employees of their environmental responsibilities in terms of this Environmental Management Programme (EMPr). Measures to protect the environment and mitigation measures formulated in this EMPr must thus be implemented by the applicant and employees.

In addition, job specific training must be conducted that will be appropriate to the activity and the responsibility of the individual employees. Ad-hoc training will be undertaken as required.

Through training/awareness, the applicant will also make his employees aware of:

- ✚ the importance of conformance with the environmental policy and the requirements of the EMPr;
- ✚ the significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance;
- ✚ their roles and responsibilities in achieving conformance with the environmental policy and the requirements of the EMPr, including emergency preparedness and response requirements; and
- ✚ the potential consequences of departure from the specific operating procedures and/or mitigation measures specified in the EMPr.

Environmental training and development needs of employees will be identified on a regular basis through:

- Identification of significant environmental impacts;
- Analysis of non-conformance and incident reports;
- Audit reports.

Environmental communication and reporting

Environmental communication and reporting form an integral part of an Environmental Awareness Plan. It is important to maintain effective communication internally and to ensure that external communication (e.g. with government departments or adjacent landowners) is maintained.

In general, environmental communication and reporting will aim to:

- ✚ Ensure that employees understand the environmental policy and objectives;
- ✚ Ensure that information is communicated and readily accessible to the relevant parties;
- ✚ Improve feedback of operational and environmental performance to management;
- ✚ Ensure effective and constructive communication with relevant government departments and adjacent landowners (if applicable);
- ✚ Ensure that records are kept of environmental communication and interaction.

The following are some of the topics that should be discussed with new employees:

- ④ Time of commencement and completion of duties;
- ④ Cleaning of workplace and the importance thereof;
- ④ Safety clothing and its importance and correct use;
- ④ Procedure to follow in case of illness and injury;
- ④ Annual leave and when due;
- ④ Importance of instructions;
- ④ Late for work and leaving workplace without permission;
- ④ Emergency procedures;
- ④ Environmental awareness;
- ④ Training and its importance;
- ④ Alcohol and drug abuse;
- ④ Medical fitness;
- ④ Disciplinary procedures.

The following topics should form part of the environmental awareness discussions to be held with the employees:

- ④ NO-GO areas;
- ④ Water;
- ④ Fauna and flora;
- ④ Smoking and fires;
- ④ Dust;
- ④ Noise;
- ④ Waste management.

Various signs (including the Environmental Policy) should be displayed on site to remind site workers of the basic environmental principles and inform them of the 'DO'S' and 'DON'TS'.

The applicant must conduct regular inspections to check on site conditions and to provide training when necessary to ensure that the mitigation measures are being implemented and that the environment is carefully looked after.

8.6.2 Site documentation and record keeping

The following documentation must be available (at all times) at the site office:

- A copy of the Environmental Impact Assessment Report and Environmental Management Programme;
- A copy of the Environmental Authorisation;
- A copy of the Environmental Policy;
- A copy of site audit reports;
- A copy of any other permits/approvals and/or service agreements from other authorities.

The documents should be kept as hard copies as well as in electronic format.

Complaints Register

A complaints register must be kept at the site office. Any complaints received with regards to the development must be recorded in the complaints register. The following information must be recorded:

- Date complaint recorded;
- Nature of complaint;
- Details of complainant (name, address, telephone number, etc.);
- Manner in which complaint was dealt with;

- Date when complaint was reported to the Department of Agriculture, Rural Development, Land and Environmental Affairs and the Department of Water and Sanitation.

Emergency numbers

Emergency numbers (e.g. manager, police, fire department, ambulance, etc.) must be prominently displayed at the site office.

Contact details of adjacent landowners/users must also be kept on file (if applicable).

Other legislation

The following should also be displayed at the site office:

- Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended;
- Basic Conditions of Employment Act, 1997;
- Summary of the Employment Equity Act.

Supplementary documentation

The following supplementary documentation should be kept at the site office:

- Site instructions;
- Emergency preparedness and response procedures;
- Incident reports;
- Training records;
- Site inspection, monitoring and auditing reports.

During the course of the development, the applicant and employees must also comply with all other relevant legislation.

8.6.3 Auditing and corrective action

Environmental audits identify existing and potential environmental problems and determine what action is needed to comply with legal requirements and the Environmental Management Programme (EMPr). Subsequent audits then confirm that corrective actions have been taken and assess the effectiveness of such actions.

Construction phase:

The applicant must appoint an Environmental Control Officer (ECO) who will have the responsibility of monitoring and reporting on compliance with the conditions of the Environmental Authorisation as well as monitoring and reporting on the implementation of the EMPr.

The ECO must be appointed before the commencement of construction and must remain employed until all rehabilitation measures as well as site clean-up are completed.

The ECO will be responsible to:

- Monitor and audit the construction activities on a weekly basis;
- Keep a record of each site inspection and the findings thereof;
- Make a register of the environmental monitoring and auditing results available for inspection at the construction site office;
- Keep records relating to the compliance and non-compliance with the conditions of the Environmental Authorization;
- Make these records available to the Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) within

seven (7) working days of the date of the written request by the Department for such records.

A good approach to facilitate legal enforceability of the EMPr during the construction phase is to integrate the EMPr into the tender and contract document (i.e. between the project applicant and the contractors) as a set of environmental specifications. The contractor will thus be informed prior to being appointed of his environmental responsibilities.

Penalties in terms of the environment should be implemented upon non-compliance. This will ensure that the project applicant does not sit with an environmental liability at the end of the contract.

A post-construction audit should be conducted prior to the contractors leaving site.

There are several levels at which corrective action can be affected, namely verbal instructions, written instructions and contract notices.

Level 1: The problem is discussed with the contractor and a solution is worked out together. The discussion is minuted for record purposes and the solution implemented.

Level 2: When a more serious infringement is observed, the contractor is notified in writing and given a deadline by which the issue must be rectified. Costs to be borne by the contractor.

Level 3: The contractor will be ordered to suspend all or part of the work until such time as the problem is rectified or remedial measures put in place. Costs to be borne by the contractor and no extension of time will be granted.

Level 4: Breach of contract and/or termination of employment. The applicant may also institute legal proceedings against the contractor.

An example of a penalty schedule is provided below.

PENALTY SCHEDULE			
Level	Description	Penalty	Offences
1	Minor offence	R1000 first offence R2000 second offence And R1000/per day that offence continues beyond notification of offence	<ul style="list-style-type: none"> Littering; inadequate or inappropriate on-site waste management or sanitation Uncontrolled noise and dust nuisance Poaching on site Inadequate soil / water protection controls for fuel storage & dispensing areas, vehicle parking areas
2	Moderate offence	R5000 first offence R10 000 second offence And R5000 per day that the offence continues beyond notification of offence	<ul style="list-style-type: none"> Trespassing onto neighbours properties Removal of indigenous trees marked for conservation purposes without the permission of the ECO, or trees in demarcated sensitive environmental zones Disposal of any form of waste to a non-approved dump site Any illegal / non-permitted abstraction or use of water from a natural resource The withholding of pertinent information or provision of false information to the ECO or Project Manager
3	Significant offence	R30 000 first offence R50 000 second offence And R30 000 per day that the offence continues beyond notification of offence	<ul style="list-style-type: none"> Non-compliance with any risk or safety management requirements Significant spillage of hazardous materials Use of natural materials not sourced from a legally permitted source Construction or use of roads/access across rivers, streams or wetlands that has not been authorized by the Project Manager and ECO
4	Serious offence	Up to R500 000 or total cost of rehabilitating damaged environment	<ul style="list-style-type: none"> Any serious pollution event or accident Any serious encroachment into demarcated sensitive environmental zones, by accident or on purpose Any serious stormwater damage that could have been avoided through appropriate management interventions

In addition to the schedule of penalties, a portion of the Retention on all contracts could be apportioned to compliance with the EMPr.

Operational phase:

The Steve Tshwete Local Municipality will be responsible for auditing and corrective action during the operational phase of the development.

9. ENVIRONMENTAL IMPACT STATEMENT

9.1 Site location

As indicated in Section 6.1.2, the applicant purchased the said site specifically for development purposes and did not make another site available for investigation. No alternative sites were thus investigated.

The original Copper Towers establishment (hotel) is located on the proposed development site. Various buildings and infrastructure are present on site that is now utilized for accommodation of contractors on a short and longer term basis. Additional accommodation facilities have been built in recent years by the applicant.

According to Urban Dynamics Inc. (2009), the future direction of development would be to the northern, north eastern and eastern side of Middelburg. This area was also indicated in the Spatial Development Framework (2004) as the hinterland of the town, indicating the direction of growth.

In the Steve Tshwete Spatial Development Framework (2010), the proposed site is indicated as hotel (in terms of the original Copper Towers establishment). It is also indicated as Middelburg x44, indicating that residential development is proposed for the said site. As indicated in Section 4.5.5 and Section 6.1.1, the Steve Tshwete Local Municipality approved the development of the said property subject to certain conditions.

Although the site is currently located in a predominantly rural area, the proposed development can be viewed as a natural extension to the existing and proposed residential areas, Middelburg X22 (Hlalamnandi) and Middelburg X34 – 36. In addition, the main industrial area of Middelburg is located in close proximity of the site, which would give people the opportunity to reside closer to the workplace.

The properties located north, east, west and south of the site are all still zoned agricultural although they are utilized for a number of land uses (e.g. residential/light industrial/recreation/etc.).

The development of the said site would therefore not impact on the sense of place and immediate surroundings. It would legalise the existing accommodation activities taking place on the said site as well as provide much needed accommodation for contractors and residents of Middelburg. In addition, it would ensure that the said site is properly managed according to the Steve Tshwete Local Municipal bylaws.

9.2 Issues of concern

Through the Scoping and EIA phases, it was determined that the main issues of concern were with regards to the following potential impacts:

- On surrounding landowners/users in terms of:
 - Security (people and wildlife);
 - Type of development – design of residential area; building regulations/standards; fencing of development; etc.

- Size of population and services provided (e.g. school; community facility);
- Fencing of area;
- Services (water, sewage, electricity, traffic, transport);
- Possible sewage pollution;
- Storm water run off from site;
- Traffic – additional traffic on R104 provincial road;
- Traffic – public transport; pedestrians; walk and cycle ways;
- Wetlands;
- Heritage and palaeontological features;
- Spatial planning.

Table 4.1, Section 9.3 and Section 9.4 provide feedback with regards to the above-mentioned issues of concern.

No objections in terms of the development were received.

9.3 Potential environmental impacts identified

Natural vegetation

The site is located in the Rand Highveld Grassland, which has been classified as Endangered in Mucina et. al. (2006) and Vulnerable in the National List of Ecosystems that are threatened and in need of protection (GN 1002 of 2011). According to the Mpumalanga Biodiversity Sector Plan (MBSP, 2013), the majority of the site falls within the category – Moderately modified (old lands) and Heavily modified. A portion of the southern area is indicated as Other Natural Areas that links up with the nearby stream area. A small narrow strip along the northern boundary is indicated as CBA (Critical Biodiversity Area) Irreplaceable.

The vegetation on site comprises of natural grassland, which has been impacted upon by past agricultural activities, grazing, construction of the infrastructure as indicated in Section 5.6.4 of this report and human activities taking place on site. Large areas (e.g. entire Phase 1 area) have been totally cleared of vegetation. Only a small portion of natural grassland is present in the eastern and western portions of the site. The development of Phase 1 (6ha), Phase 2 (17 ha) and Phase 3 (17 ha) would thus impact on approximately 34 ha of disturbed Rand Highveld vegetation.

Many declared invaders and weeds were noted on site that would have to be removed according to the Conservation of Agricultural Resources Act (Act 43 of 1983) and Schedule 13 of the Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998).

Only one Red Data species potentially occurs in the area (quarter degree square 2529DC) namely, *Anacampseros subnuda subsp. lubbersii*. Suitable habitat (namely rocky places) for this plant species does however, not occur within the development site.

Phase 3 construction activities could impact on a number of bulbous plants (*Boophone disticha* – Poison Bulb) noted south of the excavation near the eastern boundary of the site. Although not on the endangered list, this plant species has to be protected according to Provincial Ordinances. This protected plant species could be relocated or harvested with the assistance of the Mpumalanga Tourism and Parks Agency as indicated in Section 8.

Animal life

It is not anticipated that the development will have a significant impact on animal life in view of the disturbed nature of the vegetation (on site and in the surrounding area), the constant human movement (on site and in the surrounding area) and the close proximity of domestic animals (such as dogs and cats). However, it is expected that smaller animal species (e.g. rodents), birds, reptiles and amphibian species would be found on site, especially in the areas where natural grassland is still present. The presence of endangered or rare species on site is highly unlikely.

Topography

As indicated in Section 5.4 of this report, the site is relatively flat and slopes in a westerly and easterly direction. The slope of the majority of the site is less than 2% (i.e. level to very gentle slope). No unstable rocky slopes or steep slopes with loose soil are present on site. The gradient of the said site is suitable for development purposes.

Land capability/agricultural potential

In terms of land capability, the proposed site is indicated as moderate potential arable land and the grazing potential as approximately 3 hectares per large stock unit. If cultivated, the area could produce 4-5 tons of maize per hectare. The said site is however, indicated as Transformed Rangeland and has a low to moderate agricultural potential due to the degree of disturbance/human impacts on site (e.g. buildings, roads, race-track, waste, etc.). The site has however not been used for agricultural purposes but for accommodation purposes for many years. The change of land use from 'Agricultural' to mainly 'Residential' will therefore not impact directly on agriculture.

Geology/soils (geotechnical aspects)

In terms of the geotechnical study, the site was found suitable for development purposes. Based on the geology and soils of the site, Hansmeyer (2009) divided the development site into 4 geotechnical zones characterized by specific geotechnical constraints for which mitigation measures must be implemented in order to reduce potential impact.

Hansmeyer (2009) indicated that no development should take place within geotechnical Zone 3 that covers an area of 1.1 ha and consists of old excavations. Hansmeyer (2009) indicated that the said areas should be properly rehabilitated and zoned as public open space.

In addition to the above-mentioned, Hansmeyer (2009) indicated that an area of 14.05 ha is susceptible to seepage that drains towards the south-eastern boundary. Sub-surface drains and cut-off drains are recommended in order to reduce potential impact on the built structures.

As indicated in Section 5.9 and 5.10, the above-mentioned seepage and the presence of ferricrete on site are not associated with wetlands as Grobler (2015) concluded that no wetland area or other watercourse type (as defined by the National Water Act, Act 36 of 1998) overlaps with the development site.

Surface water environments

Construction and operational activities associated with Phase 1, Phase 2 and Phase 3 will not impact directly on any surface water environments (e.g. rivers, streams, dams, etc.) located on site. In addition, construction and

operational activities will not impact on the 1:100 year floodline associated with a non-perennial tributary (located $\pm 100\text{m}$ to the west) and a drainage area (located $\pm 200\text{m}$ to the east) of the Klein Olifants River.

During the construction phase, the removal of vegetation, earthworks and stockpiling activities could result in changed runoff patterns, sediment transport and soil erosion. In addition, construction activities could lead to further soil and surface water run-off pollution if:

- sewage is allowed to continue overflowing;
- old septic tanks are removed still containing sewage;
- polluted soil from trucking area is not removed and disposed of properly;
- dumped waste is not collected and disposed of properly;
- the construction vehicles are not maintained/repared resulting in oil leaks and fuel spills;
- waste management measures are not implemented,
- proper ablution and sanitation facilities are not provided for the site workers to use on site.

During the operational phase, increased yields could be expected due to increased paved areas and buildings, which would facilitate increased run-off quantities due to quicker run-off and less infiltration into the soil. This could lead to soil erosion if proper storm water control measures are not implemented. In addition, the surface water runoff could be polluted if the sewage system does not have sufficient capacity, is not maintained on a regular basis and proper waste management measures (littering takes place) are not implemented on site.

In view of the north-north-east trending watershed located in approximately the centre of the site, the resultant surface water runoff (as a result of construction or operational activities) could either impact (in terms of quantity and quality) on:

- a non-perennial tributary and associated channelled valley bottom wetland of the Klein Olifants River (located $\pm 100\text{m}$ west of the development site). It could also impact on a private property located between the development site and the said stream.
- a drainage area and associated unchannelled valley bottom wetland of the Klein Olifants River (located $\pm 200\text{m}$ east of the site) if proper storm water control measures are not implemented. The adjacent gravel road and adjacent private properties could also be impacted.

The nearby drainage line/tributary of the Klein Olifants River (located $\pm 100\text{m}$ west of the development site) is indicated as an Ecological Support Area and must thus be protected from any impact as a result of the proposed residential development. Mitigation measures (e.g. storm water management plan) must thus be implemented.

Wetlands

Wetland Consulting Services (2009) indicated that a wetland was present in the south eastern portion of the site. According to the layout plan, the south eastern portion of the site was zoned 'Public Open Space' and would not be developed. However, the main access road was to extend through this wetland area. This area was subsequently used as a truck parking area.

As indicated in Section 5.9, Grobler (2015) did not verify the hillslope seepage wetland delineated by Wetland Consulting (2009) in the south-eastern portion of the study area. This area was found to be associated with shallow soil development that lacked the presence of diagnostic hydromorphic

features (such as mottling, gleying and localised iron depletion) and distinct hydrophyte plant species. *In other words, the hillslope seepage wetland area delineated by Wetland Consulting (2009) is not regarded as a wetland. It is a terrestrial area that lacks sufficient wetland indicators.*

Grobler (2015) concluded that no wetland area or other watercourse type (as defined by the National Water Act, 1998 (Act 36 of 1998) overlaps with the development site. The proposed development of the site thus has a low-negligible risk of impacting on wetlands and other watercourses.

As indicated in Section 6.2.3, a revised layout plan (Layout Plan no. 3; Figure 6.2) was compiled in view of the findings of the wetland study. This layout plan was subsequently rejected in view of the findings of the land surveyor (as indicated in Section 6.2.3) and a revised layout plan (Layout Plan no. 4; Figure 6.3) compiled as indicated in Section 6.2.4.

Construction and operation activities will not directly impact on the following identified wetlands located within 500m of the development site:

- the channelled valley bottom wetland (PES = Class C; EIS = Class B/c) associated with a non-perennial tributary of the Klein Olifants River (located $\pm 100\text{m}$ to the west) – this drainage line/tributary is indicated as an Ecological Support Area (ESA) in terms of the wetlands associated with it.
- the unchannelled valley bottom wetland (PES = Class C; EIS = Class B/C) associated with a drainage area of the Klein Olifants River (located $\pm 200\text{m}$ to the east).

However, the proposed residential development could impact on the buffer zones associated with these wetlands as indicated below.

Grobler (2015) identified and delineated an abandoned quarry in the north-western portion of the property that borders onto the above-mentioned channelled valley bottom wetland. According to Grobler (2015), the said quarry may be hydrologically connected to the channelled valley bottom wetland in view of its close proximity thereto. Impacts, such as storm water runoff into the quarry may therefore also impact negatively on the lower lying wetland. In view of this, Grobler (2015) recommended that a buffer of 20 metres must be applied to the old quarry. Based on these recommendations, the layout plan was revised and the said area zoned Public Open Space (Layout Plan no. 4; Figure 6.3).

Where the wetland buffer zone of the unchannelled valley bottom wetland extends (located to the eastern side) within the development site, the layout plan was also revised and the said stand zoned as Public Open Space (Layout Plan no. 4; Figure 6.3).

Heritage and palaeontological features

As indicated in Section 5.13.1, Van Vollenhoven (2015) identified three sites which have a Low cultural significance and a field rating of General Protection Grade C (IVC). According to van Vollenhoven (2015), the three sites may be demolished. No further action is required.

No graves were noted on the said site (Van Vollenhoven, 2015). In the scoping report mention was made of a small informal graveyard (with possibly three (3) un-marked graves) located on the southern boundary of the site on Portion 56 (i.e. not on the proposed development site). Hansmeyer (2009) also indicated the presence of graves on the said site.

According to Fourie (2015), the impact of the development on fossil heritage is Moderate and Low and therefore mitigation or conservation measures are not necessary for this development. Fourie (2015) indicated no objection to the proposed development of the said site.

9.4 Services

Interested and affected parties expressed concern regarding the potential impact of the proposed residential development on existing services (water, sewage, electricity, traffic) provided by the Steve Tshwete Local Municipality.

As indicated in Section 2.5, the required services will be provided by the Steve Tshwete Local Municipality. The link services (roads and electricity), internal reticulation (water, sewer, electricity, streets and street lighting) and storm water control measures of the development will be done by the developer to the satisfaction of the Steve Tshwete Local Municipality. After installation, the services will be handed over to and maintained by the Steve Tshwete Local Municipality.

As indicated in Section 6.3, alternatives in terms of service provision were investigated for the overall development. Service provision by the Steve Tshwete Local Municipality was found to be the best long term solution in this regard.

Water

As indicated in Section 2.5.2 and Section 6.3.1.1, the onsite boreholes cannot provide the required volume of water and will therefore not be able to supply the overall development with water. The boreholes are currently unable to supply the onsite accommodation facility resulting in water being trucked in. Water supply using boreholes was therefore rejected for the overall development.

It was however indicated that the 2 onsite boreholes may continue to be used once the overall development is connected to the above-mentioned municipal bulk water supply pipeline. The continued use of these boreholes (during both the construction and operational phases) would have to be in line with the recommendations of the groundwater study in order to reduce the potential impact on the groundwater environment. In addition, a water use licence in terms of the National Water Act, 1998 (Act 36 of 1998) would be required.

As indicated in Section 6.3.1.3, connecting to this municipal water pipeline is the preferred long term option in terms of the overall development. According to Afri-Infra (2015), a potable water connection is available on the newly installed Rockdale bulk supply pipeline located towards the south eastern side of the site. This pipeline is supplied from the 20 MI Rockdale Reservoir Complex located next to the N4 national road, which in turn is supplied by the Vaalbank Water Treatment Works.

Afri-Infra (2015) indicated that an 800m long, 160mm diameter uPVC bulk connection pipeline from the Rockdale bulk supply line to the proposed development is proposed.

According to Afri-Infra (2015), the design of the new Rockdale bulk supply line allowed for the supply of water to the proposed development. However, the following must still be confirmed:

- If sufficient pressure is available in the bulk supply pipeline to enable smooth operation of an internal water network;
- If the bulk supply pipeline has a valve chamber and connection point available for connection of the internal network onto the bulk supply.

Sewage

Sewage from the various buildings on site is disposed off by means of septic tanks (and French drains in the past) which has resulted in sewage spills due to the lack of capacity. As indicated in Section 2.5.3, the applicant recently upgraded the system in order to prevent spillage and pollution of the surrounding natural environment. The management of sewage will be very important in order to ensure that the natural environment is not polluted especially in view of the nearby drainage line/tributary of the Klein Olifants River and the utilization of onsite boreholes as water source. Interested and affected parties indicated concern regarding sewage and the impact thereof.

Afri-Infra (2015) indicated that a full waterborne sewer system is proposed for the development that will connect to an existing municipal outfall sewer approximately 350m west of the site by means of a 250mm diameter connector outfall sewer. According to Afri-Infra (2015), it is assumed that the existing municipal outfall sewer has sufficient capacity to accommodate the additional flow (i.e. based on the current drainage area).

It is proposed that the existing onsite septic/conservancy tanks be decommissioned and connected to the proposed waterborne sewer network. The said septic tanks will however remain in use during the development of Phase 1. The management of these tanks will be of utmost importance in order to prevent any further pollution.

In view of the local watershed present on site, a pump station (with a delivery capacity of approximately 10 l/s at a duty point of 15.3m, and a rising main of 550m long, 110mm diameter) will be constructed at the low point of the eastern drainage area in order to pump the sewage across the watershed into the western drainage area's reticulation. According to Afri-Infra (2015), this will only be required during Phase 3 of the development.

Storm water control measures

Interested and affected parties expressed concern in terms of potential impact of surface water runoff from site on the nearby tributaries of the Klein Olifants River and a downstream dam.

As indicated in Section 2.5.6, Afri-Infra (2015) indicated that the western portion of the proposed storm water drainage system will drain towards a well defined drainage area located in close proximity to the western boundary of the site. The eastern portion of the proposed storm water drainage system will drain towards the R104 provincial road and the Klein Olifants River.

According to Afri-Infra (2015), the storm water infrastructure will be designed for the 1:5 and 1:25 year return periods to cater for the minor and major system respectively. Infrastructure will consist of a piped conduit system, associated kerb and grid inlets and outlet structures. Drainage outlets will be properly safeguarded to prevent erosion and unnecessary damage to the drainage area and associated wetland area.

In order to reduce the potential impact of the storm water runoff (both quantity and quality) on the nearby drainage areas and associated wetlands,

a well designed storm water management plan will be required to attenuate flood peak events within the property and thereby prevent erosion and sediment impacts on the adjacent systems. Grobler (2015) recommended that a site specific storm water management plan be developed that takes into account the demarcated wetlands and buffers located within 500m of the development site. In addition, this storm water management plan must ensure that:

- discharged storm water is released in a controlled manner with a diffuse flow pattern across a buffered vegetation strip and is accompanied by energy dissipating interventions to prevent erosion impacts (Kotze *et al.*, 2002);
- sufficient space and attenuation structures (for managing runoff) are available (This should be determined by a suitably qualified engineer with urban stormwater attenuation and wetland impact mitigation experience).

Grobler (2015) indicated that buffer zones are not walk away solutions and need to be maintained during the operational phase of the development in order to be effective. This includes the maintenance of a well vegetated grass cover that is free of aliens and erosion features. Any aliens and/or erosion features observed within the buffer zone must be addressed in order to ensure buffer functioning. The storm water management plan needs to give special consideration to buffer zones in order to prevent erosion impacts and the creation of channellised flows at discharge points, which would largely negate the benefits of any buffers present.

Roads and traffic

Interested and affected parties expressed concern regarding the potential impact of the additional traffic generated by the residential development on the R104 provincial road. Concern was also expressed in terms of the potential impact of an increase in pedestrians along the R104 provincial road as a result of the residential development.

As indicated in Section 5.16.2, traffic generated as a result of the proposed residential development will impact on the R104 provincial road. In view of this potential impact, Makala and Kotze (2009) recommended that the existing access to the proposed development site be formalised with short turning lanes and that the intersection comprise of 4 legs which is acceptable in terms of traffic engineering principles and geometric design standards. The recommended upgrading of this site access must thus be implemented as part of the overall development of the residential area.

In addition, Makala and Kotze (2009) recommended the upgrading of the Cowen Ntuli/N11 (P49-1) intersection in terms of the widening of the western approach (Cowen Ntuli Street) to accommodate double right-turn lanes and a shared through- right lane.

As indicated in Section 5.16.2, Makala and Kotze (2009) indicated no upgrading of the Cowen Ntuli Street/Watt Street or the N11 (P49-1)/Tswelopele Street intersections are required.

As indicated in Section 5.16.3, Makala and Kotze (2009) indicated that an existing Public Transport facility (in the form of Bus & Taxi Lay-bys) is situated about 2km from the proposed site access along the R104 provincial road. It is however considered too far away for passengers to walk to and from the proposed development. Makala and Kotze (2009) therefore

proposed that two public transport facilities (Bus & Taxi Lay-bys) be provided on the downstream sides of the R104/access intersection.

In addition, Makala and Kotze (2009) recommended that a sidewalk at least 1.5m wide be provided along Cowen Ntuli Street (R104 provincial road) to the development site. This would ease and formalise the movement of pedestrians to and from the proposed new and nearby Bus and Taxi Lay-bys.

The above-mentioned recommendations made by Makala and Kotze (2009) must be implemented by the developer.

9.5 Overall conclusion

As indicated, the development of the said site would not impact on the sense of place and immediate surroundings and is in line with the Steve Tshwete Spatial Development Framework (2010). The development is intended as a mostly residential development that will cater for clustered Residential Type 3 accommodation by means of contractor's accommodation as well as Residential Type 1 accommodation for the medium income market (i.e. similar to the nearby Hlalamnandi).

It would legalise the existing accommodation activities taking place on the said site as well as provide much needed accommodation for contractors and residents of Middelburg. The development would be provided with services (water, sewage, etc.) in accordance with the standards of the Steve Tshwete Local Municipality. In addition, it would ensure that the said site is properly managed according to the Steve Tshwete Local Municipal bylaws (e.g. building regulations, etc.).

Based on the findings of this environmental impact assessment, the development of the proposed residential area can proceed subject to the implementation of the mitigation measures included in the Environmental Management Plan (EMP) provided in Section 8 of this report. Of particular importance is the development of a storm water management plan based on the recommendations of Grobler (2015) and ensuring that services provided (especially sewage) have sufficient capacity (i.e. does not result in the pollution of the surrounding environment).

9.6 Listed activities to be authorised

Applicable listed activities

In view of the findings of this Environmental Impact Assessment, the following listed activities can be approved:

GN R544 – LISTING NOTICE 1 (REQUIRES A BASIC ASSESSMENT)	
Listed Activity	Description
Listed activity 9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water – (i) with an internal diameter of 0.36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, Excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or b. where such construction will occur within urban areas but further than

GN R544 – LISTING NOTICE 1 (REQUIRES A BASIC ASSESSMENT)	
Listed Activity	Description
	32 metres from a watercourse, measured from the edge of the watercourse.

GN R545 – LISTING NOTICE 2 (REQUIRES A FULL EIA)	
Listed Activity	Description
Listed activity 15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more except where such physical alteration takes place for: (i) linear development activities; or (ii) agriculture or afforestation where activity 16 in this Schedule will apply (listed activity 15 of Listing Notice 2). Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more except where such physical alteration takes place for: (i) linear development activities; or (ii) agriculture or afforestation where activity 16 in this Schedule will apply (listed activity 15 of Listing Notice 2).

Listing Notice No. 3 becomes applicable if the site is located within a specific geographical area (e.g. endangered ecosystems or critical biodiversity areas). The Mpumalanga Biodiversity Conservation Plan (2006) must be used to determine the applicability of Listing Notice No. 3, and not the Mpumalanga Biodiversity Sector Plan (2013) as indicated in the application form and Section 1 of this report.

According to the Mpumalanga Biodiversity Conservation Plan (C-Plan; Figure 5.14a), the said site falls within a 'Critical Biodiversity Area' (CBA). Listed activity 13 is thus applicable.

GN R546 – LISTING NOTICE 3 (REQUIRES A BASIC ASSESSMENT)	
Listed Activity	Description
Listed activity 13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for: (1) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental: Waste Act, 2008, in which case the activity is regarded to be excluded from this list. (2) the undertaking of a linear activity falling below the thresholds mentioned in Listing Notice 1 in terms of GN No. 544 of 2010.

Listed activities no longer applicable

Listed activities 11 and 18 (dealing with construction activities within a watercourse) were included in the application form. However, according to Grobler (2015), no wetlands or watercourses are located on site or would be directly impacted upon. **Listed activities 11 and 18 are thus not applicable to the project.**

Listed activity 55a (dealing with the treatment of effluent) was also included in the application form as a sewage package plant was to be constructed as part of the development. However, as indicated in Section 6.3.2, the

proposed development will now connect to the municipal sewer. **Listed activity 55a is thus no longer applicable.**

Listing Notice No. 3 becomes applicable if the site is located within a specific geographical area (e.g. endangered ecosystems or critical biodiversity areas). The Mpumalanga Biodiversity Conservation Plan (2006) must be used to determine the applicability of Listing Notice No. 3, and not the Mpumalanga Biodiversity Sector Plan (2013) as indicated in the application form and Section 1 of this report.

According to the Mpumalanga Biodiversity Conservation Plan (C-Plan; Figure 5.14a), the said site falls within a 'Critical Biodiversity Area' (CBA). **Listed activity 12 (i.e. the clearance of an area of 300 square meter or more) is thus not applicable as indicated in the application form since no bioregional plan exists for the Mpumalanga Province.**