

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

1. INTRODUCTION

The purpose of this Environmental Management Programme (EMPr) is to ensure 'good environmental practice' by taking a holistic approach to the management of environmental impacts during the construction and operation of the proposed construction of facilities and infrastructure for the storage and handling of 92 000 ℓ of a dangerous good (filling station), consisting of 4 x 23 000 ℓ tanks and the establishment of a shopping center located on Erf 3726, Erf 3727 and Erf 3728 Danville, Mahikeng Local Municipality, North West Province. The proposed development will result in the clearance of 27 590 m² of indigenous vegetation located within a critical biodiversity area. This EMPr therefore sets out the methods by which proper environmental controls are to be implemented by the applicant and his nominated contractor. However, where necessary, these methods have been expanded upon and additional issues addressed in order to ensure that all environmental aspects are appropriately considered and monitored.

It is important to note that this EMPr is focused primarily on the construction and operational phases of the project. Design specifications from an environmental point of view were taken into consideration, the Environmental Assessment Practitioner (EAP) have provided input with regard to possible mitigation measures for reducing environmental impacts.

This EMPr is also intended to ensure that the principles of sound Environmental Management and the general "Duty of Care" specified in the National Environmental Management Act are promoted on site during all phases of the development

This EMPr has been designed to suit the particular activities and needs of the proposed construction of facilities and infrastructure for the storage and handling of 92 000 ℓ of a dangerous good (filling station), consisting of 4 x 23 000 ℓ tanks and the establishment of a shopping center located on Erf 3726, Erf 3727 and Erf 3728 Danville, Mahikeng Local Municipality, North West Province. The proposed development will result in the clearance of 27 590 m² of indigenous vegetation located within a critical biodiversity area, and incorporates specific project mitigation measures. This EMPr therefore identifies the following:

- Construction and operation activities that will impact on the environment;
- Specifications with which the contractor shall comply in order to protect the environment from the identified impacts; and
- Actions that shall be taken in the event of non-compliance.

It is important to note that the EMPr is a dynamic document subject to similar influences and changes as are brought by variations to the provisions of the project specification. Any substantial changes shall be submitted to the contractor, resident engineer and relevant environmental authorities in writing for approval.

A professional team consisting of the following experts have been assembled in order to ensure the success of the proposed development:

- Geo-Technical Engineer
- Civil Engineer
- A Town and Regional Planner
- A SAHRA Specialist.
- A Fauna and Flora Habitat specialist
- Specialist were appointed to conduct feasibility studies.
- Registered Environmental Assessment Practitioner (EAP)

They were responsible for the following actions:

- A Geo-Technical Engineer has conducted a Geo-Technical investigation for the proposed development do determine the impact of the Geology of the area on the development.
- A Civil Engineer has designed the Bulk Services for the proposed development to ensure sustainable service delivery.
- A SAHRA Specialist has been appointed to determine the possible impact of the development on Archaeological and Cultural features.
- A Fauna and Flora Habitat specialist has been appointed to determine the impact of the proposed development on the Fauna and Flora of the area.
- A Feasibility Study was conducted to provide a considered estimation of the projected fuel and shop sales based on the trade area demographics and the current traffic count with the scope of work being to undertake a market assessment and demand study for the proposed filling station.
- A Retail Study was conducted to determine the demographic market size and feasibility of the proposed retail centre
- An Environmental Screening Process was conducted by the EAP to ensure that all the relevant Environmental Legislation is taken into consideration.
- Desktop studies were conducted and alternatives assessedThe EAP must assess all possible environmental issues that may affect the proposed project and ensure that all interested and affected parties are notified in order to assist him in identifying possible impacts. He must also give mitigation measures where applicable.
- It will be essential to plan for the appointment of an Environmental Control Officer (ECO) who will be responsible to ensure that all aspects regarding the environmental issues are implemented and monitored. The ECO will also be responsible for maintaining a database of all records pertaining to the environment for the study area.
- The surveyor ensured that the cadastral information is accurate, up to date and properly mapped. The contours of the area are accurately plotted.

2. Contents of the Environmental Management Programme

The contents of an EMPr, shown below, are contained in Appendix 4 of the NEMA EIA Regulations 982 of 2014 as amended and published in Appendix 4 of Government Notice No. R 326 of 2017.

1. (1) An EMPr must comply with section 24N of the Act and include-
 - (a) details of
 - (i) the EAP who prepared the EMPr; and
 - (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;
 - (b) a detailed description of the aspects of the activity that are covered by the 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 any areas that should be avoided, including buffers;
 - (d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-
 - (i) planning and design;
 - (ii) pre-construction activities;
 - (iii) construction activities;
 - (iv) rehabilitation of the environment after construction and where applicable post closure; and
 - (v) where relevant, operation activities;
 - (f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes and outcomes contemplated in paragraphs (d) 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;
 - (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;
 - (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; and

(n) any specific information that may be required by the competent authority.

3. Details of Environmental Assessment Practitioner

Environmental Assessment Practitioner (EAP): ¹	Mr. JP de Villiers of AB Enviro Consult CC		
Contact person:	Mr. JP de Villiers		
Postal address:	7 Louis Leipoldt Street		
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E-mail:	jp@abenviro.co.za		

4. Expertise of the Environmental Assessment Practitioner

AB Enviro Consult (CC) is a registered consultancy, owned and operated as an independent unit by the registered owner and consultant: **Prof. A.B. de Villiers**

- **Mr J.P. De Villiers** joined the consultancy during 2004
- **Mrs J.E. du Plooy** is a consultant since 2001

Over a period of 25 years (1996-2021) this consultancy has successfully applied for, and obtained positive ROD's and EA's for more than 380 projects. Environmental Control Officer's duties are also performed on various projects.

The company was involved (from 1992-1994) in evaluation of 114 applications for the subdivision of land, 23 applications for resort developments, and 54 applications for business rights for the Department of Agriculture, Conservation and the Environment - North West Province.

The consultancy is qualified to undertake professional studies in waste management and is still involved in the development of waste disposal- (solid and liquid effluent), and emission studies. These studies

are conducted both academically and practically. This work relates to mine waste, domestic waste and effluent as well as to the monitoring of waste disposal. Environmental audits in this respect are undertaken on a regular basis.

PERSONAL PARTICULARS AND CAREER HISTORY OF PROF DE VILLIERS

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 Address : 7 LOUIS LEIPOLDT STREET
 POTCHEFSTROOM
 2531

Lecturer & Professor – Potchefstroom University 1969- 2004

ACADEMIC AND PROFESSIONAL QUALIFICATIONS

Post–Matric Qualifications

YEAR	Qualification	Institution	Field of Study
1968	B.Sc.	PU FOR CHE	Geography, Geology
1970	HONNS. B.Sc.	PU FOR CHE	Soil Science
1974	M.Sc.	PU FOR CHE	Geography
1981	Ph.D.	UOFS	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

YEAR	Qualification/ Registration	Institution	Field of Study
1986	Professional Natural Scientist	S.A. Council for Natural Scientists	Environmental Science
1994	Quality Auditor	ESKOM	Auditing
1998	Personnel & Verifying Auditor	SAATCA	Environmental Auditing
2006	Environmental Assessment Practitioner	Interim Certification Board EAPSA	Environmental Science

MEMBERSHIP AND PARTICIPATION IN SOCIETIES, COUNCILS, ETC.

Name of professional societies	YEAR	Capacity
S.A. Geographical Society.	1967-1996	Board Member
Society for Geography	1968-2004	Member
SAGS Western Transvaal	1985-1989 1987-1989 1996	Chairman
Africa Geographical Association	1993-1995	Vice-President.
Society for the Vaal River Catchment	1980-1999	Member
S.A. Society for Photogrammetry, Remote Sensing and Cartography	1984-1996	Member
Dendrological Society	1986-2005	Member
Birdlife South Africa	2003-present	Member
British Geomorphological Research Group	1985-1997	Member
Int Com on Water Resource Systems	1985-1997	Member
Int Com on Continental Erosion	1986-1990	Member
Int Com on Remote Sensing and Data Transmission	1986-1991	Member

Society for S.A. Geographers	1995-2005	Member
SA Photogrammetrical and Geo. Info.	1995-2003	Member
S.A. Association of Geomorphologists	1994-1999	Board Member and member
SADC Mine Dump Study Group	1996-2005	Member

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MR J.P. DE VILLIERS

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1993	BA	PU FOR CHE	Geography, Economics
1994	HED	PU FOR CHE	Geography Economics
2006	B.Sc.(Honns) Cum Laude	North-West University	Environmental Management
2007	M.Sc.	North-West University	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

<u>YEAR</u>	<u>Qualification/ Registration</u>	<u>Institution</u>	<u>Field of Study</u>
2008	Basic Principles of Ecological Rehabilitation and Mine Closure	Centre for Environmental Management (North West University)	Ecological Rehabilitation
2019	Registered as Environmental assessment Practitioner	EAPASA Registration number: 2019/808	

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MRS J.E. DU PLOOY

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1999	BA	PU FOR CHE	Geography, Tourism
2000	BA (Honns) Cum Laude	PU FOR CHE	Geography
2003	Master's degree in Environmental Management	PU FOR CHE	Environmental Management
2001	Aquabase Intro	AQUABASE	Hydrology
2001	Geomedia Professional	INTERTECH	GIS
2001	Map Info	SPATIAL TECHNOLOGY	GIS
2020	Registered as Environmental Assessment Practitioner	EAPASA : 2019/1573	

5. DESCRIPTION OF THE ACTIVITY

The applicant intends to develop a filling station, consisting of 4 x 23 000 ℓ tanks and the establishment of a shopping center, located on Erf 3726, Erf 3727 and Erf 3728 Danville, Mahikeng Local Municipality, North West Province. The proposed establishment of the filling station will also involve the eradication of 27 590 m² of indigenous vegetation located within a critical biodiversity area. Figure 2 is a copy of the proposed layout plan.

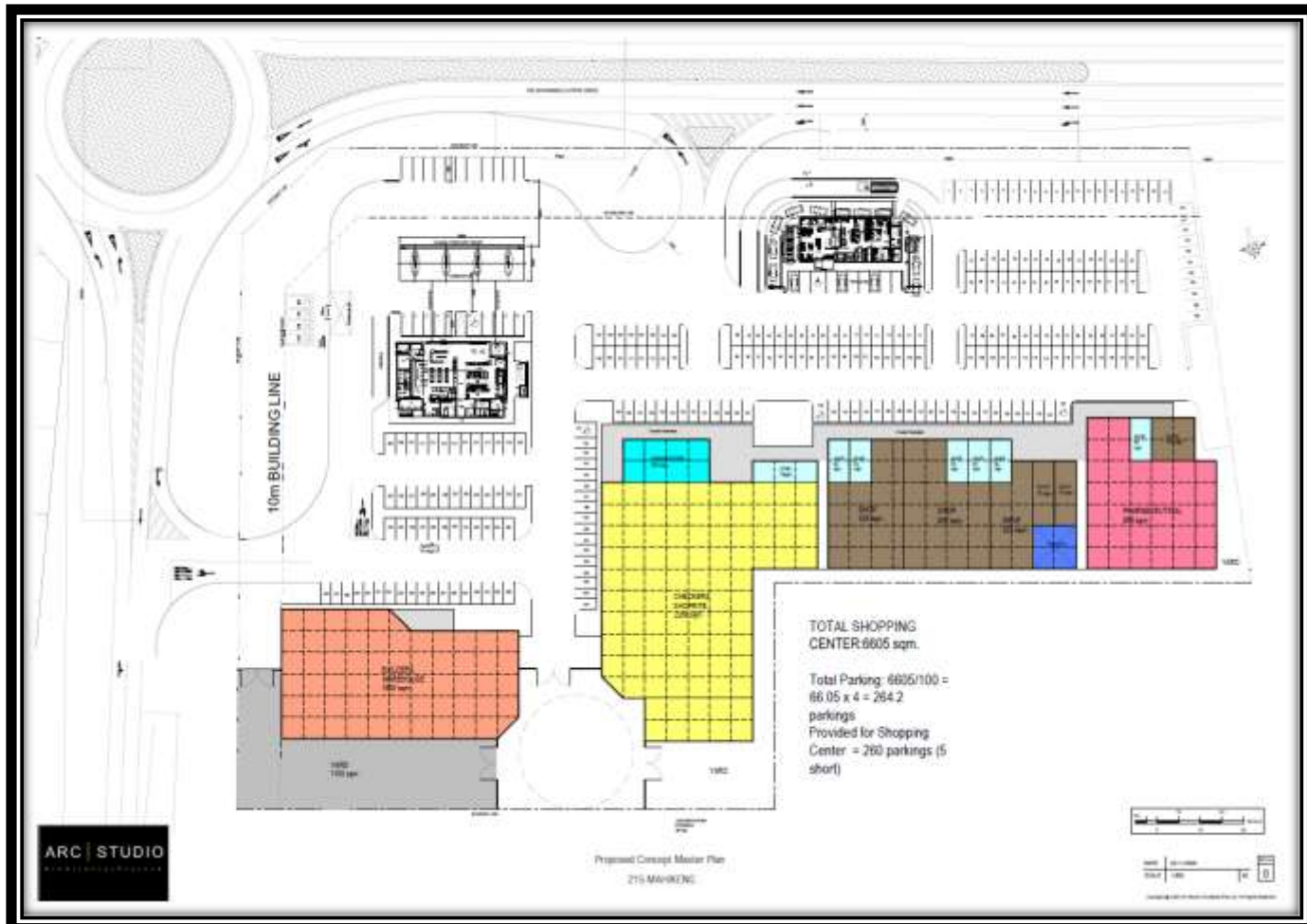


FIGURE 2: PROPOSED LAYOUT PLAN

Footprint of each proposed building:

Tenant	Extent
Engen Filling Station	1 200m ²
KFC	250m ²
Shoprite	3 000m ²
Clicks	800m ²
Cashbuild	1350 + 1000 yard
Other Line Shops	1 500m ²

The proposed shopping centre will be located on the south-eastern corner of the intersection of the R503 Lichtenburg Road and Bophelong Hospital Road. The intersection has recently been

reconstructed to incorporate a new roundabout as part of the upgrading of the R503 road. The intersection has been identified as a “Gateway Project” in the Mahikeng Local Municipality IDP 2020-21.

Bulk Services

Water

The Ngaka Modiri Molema District Municipality is the Water Services Authority (WSA) whereas the Mahikeng Local Municipality is the Water Services Provider (WSP).

In addition to the Modimola Dam located to the west of Mahikeng, bulk water for Mahikeng is abstracted from the Grootfontein wellfields and the Molopo Eye for treatment. The estimated reliable delivery of the water sources amounts to 23 Mℓ/day. The Modimola Dam is the primary water source for the Mmabatho Water Treatment Works operated under contract by Sedibeng Water.

The Mmabatho WTW has a design capacity of 20 Mℓ/day although it currently only treats approximately 16 Mℓ/day. The plant services the Lokaleng Reservoir Site located to the northwest of Mahikeng.

The Proposed Development will have an estimated average daily water demand of 30 kℓ/day. The Erven does not have an existing municipal water connection. Due to the extent of the Proposed Development and future internal water management strategy, it is proposed that a new metered Ø 110mm connection be made to the existing bulk pipeline located in Danville to the west of the Proposed Development.

A new fire booster connection will be incorporated into the design of the metered connection to allow the Fire Brigade to boost the internal network in the case of fire. A sufficient number of strategically located fire hydrants will be supplied as part of the internal water network design.

Sewer

All sewage generated in the Greater Mmabatho is treated at two Waste Water Treatment Works located to the east and west of the Modimola Dam respectively. The Mmabatho Waste Water Treatment Works is located to the west of Mahikeng on the eastern side of the Modimola Dam. The plant has an estimated treatment capacity of 24 Mℓ/day. Due to limited functionality of flow meters, the exact current inflow could not be provided by the Local Authority however, it is estimated that the current inflow is between 16 and 17 Mℓ/day. Considering the estimated sewer runoff that will be generated by the Proposed Development, the plant has sufficient capacity to treat current and future generated sewer.

All sewage generated on the Proposed Development will follow the natural topography of the site to flow under gravity conditions towards the north-western corner of the site.

The topography of the Proposed Development can be described as relatively flat although sufficient slope is available to install internal sewer pipelines at minimum gradients.

A sewer manhole is located on the corner of the existing township to the west of the Proposed Development where connection to the existing bulk sewer line can be made.

The theoretical sewer runoff of the Proposed Development is approximately 0.9 ℓ/s. Taking into account the peak flow generation periods as well as current size of the existing outfall sewer, the Proposed Development will have a negligible effect on the existing sewer network due to minimal additional flow volumes compared to the existing network.

generated on the southern side of the R503 flows in a western direction to also cross the R503 at the same location next to the roundabout in a northern direction. Open unlined storm water channels in the road reserve convey storm water to the said crossing and it is assumed that the storm water crossing was sufficiently designed upon upgrading of the intersection and roundabout to accommodate existing flow volumes.

All paved areas and roads will be designed to accommodate storm water as surface water towards existing outlets. In addition, sufficiently designed storm water culverts will be installed crossing both proposed new access locations (as mentioned above) to allow unobstructed flow conditions.

All new storm water infrastructure will be designed to avoid additional flow volumes in existing channels while preventing ponding and flooding of any existing or new buildings.

Solid Waste

Municipal Solid Waste (MSW) removal is a function of the Waste & Environmental Management Division of the Mahikeng Local Municipality. Mahikeng currently generates an estimated MSW volume of 150 tons per day. The Proposed Development will not have any significant impact on the current generated MSW compared to the total volume of solid waste generated in the Municipal area. The MSW removal services of the Municipality will be extended to service the Proposed Development.

1 in 100 year Flood Line

The proposed development is not affected by the 1-in-100 year flood line.

Operation and Maintenance of Services

All external municipal services namely water, sewer, roads and storm water, electricity infrastructure as well as refuse removal functions shall remain the function of the Local Authority which is responsible for the operation and maintenance thereof.

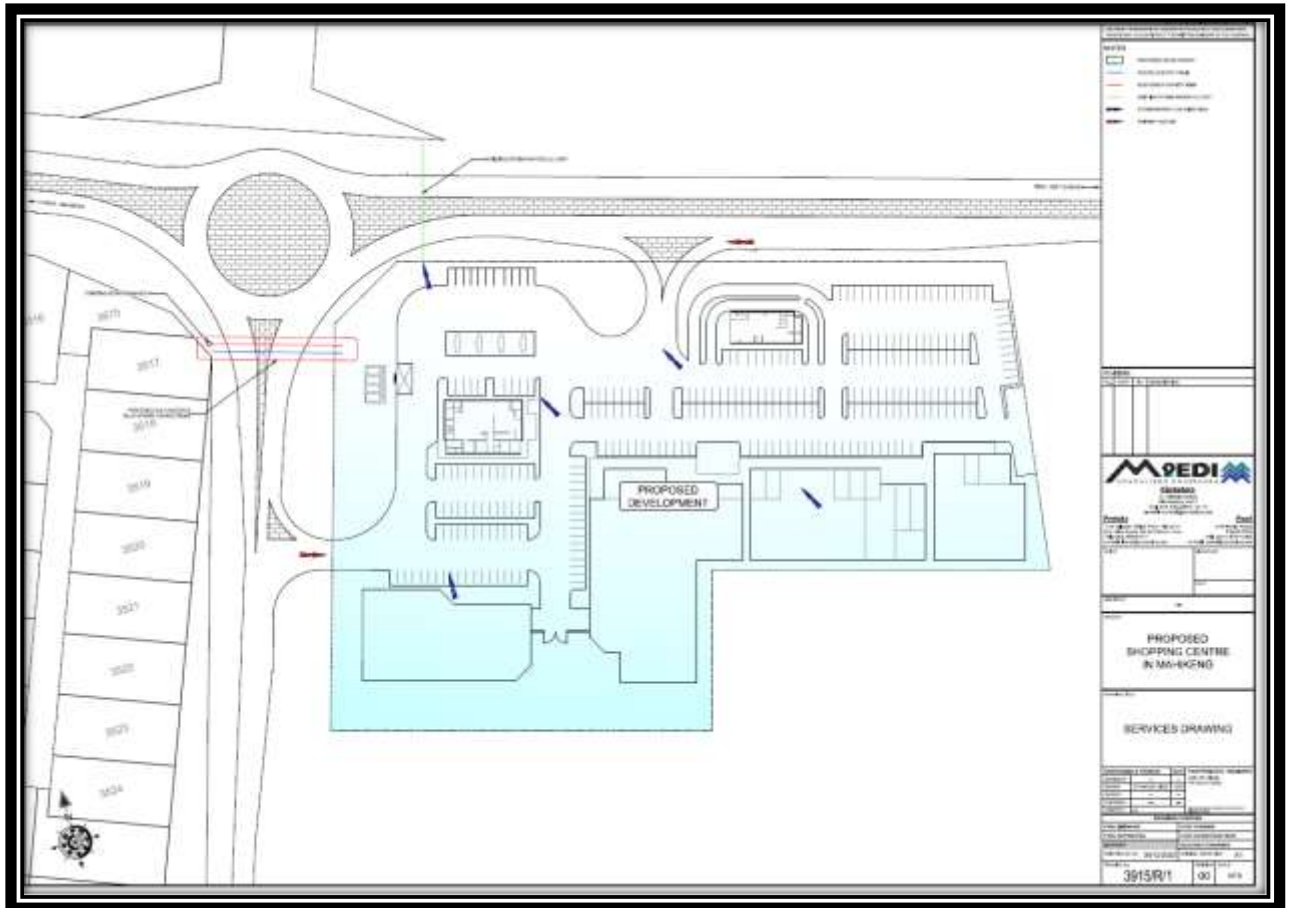


Figure 3: Civil Engineering Services Drawing

Infrastructure for the storage of fuel

The tanks will be installed in sealed underground bunkers. Containment elements are proposed concrete slab minimum 74mm concrete bedding/blinding concrete grade 15/19. Cement is proposed stabilised backfill in 150 mm layers, top slab 150mm thick to engineer's details. See Figure 4 below.

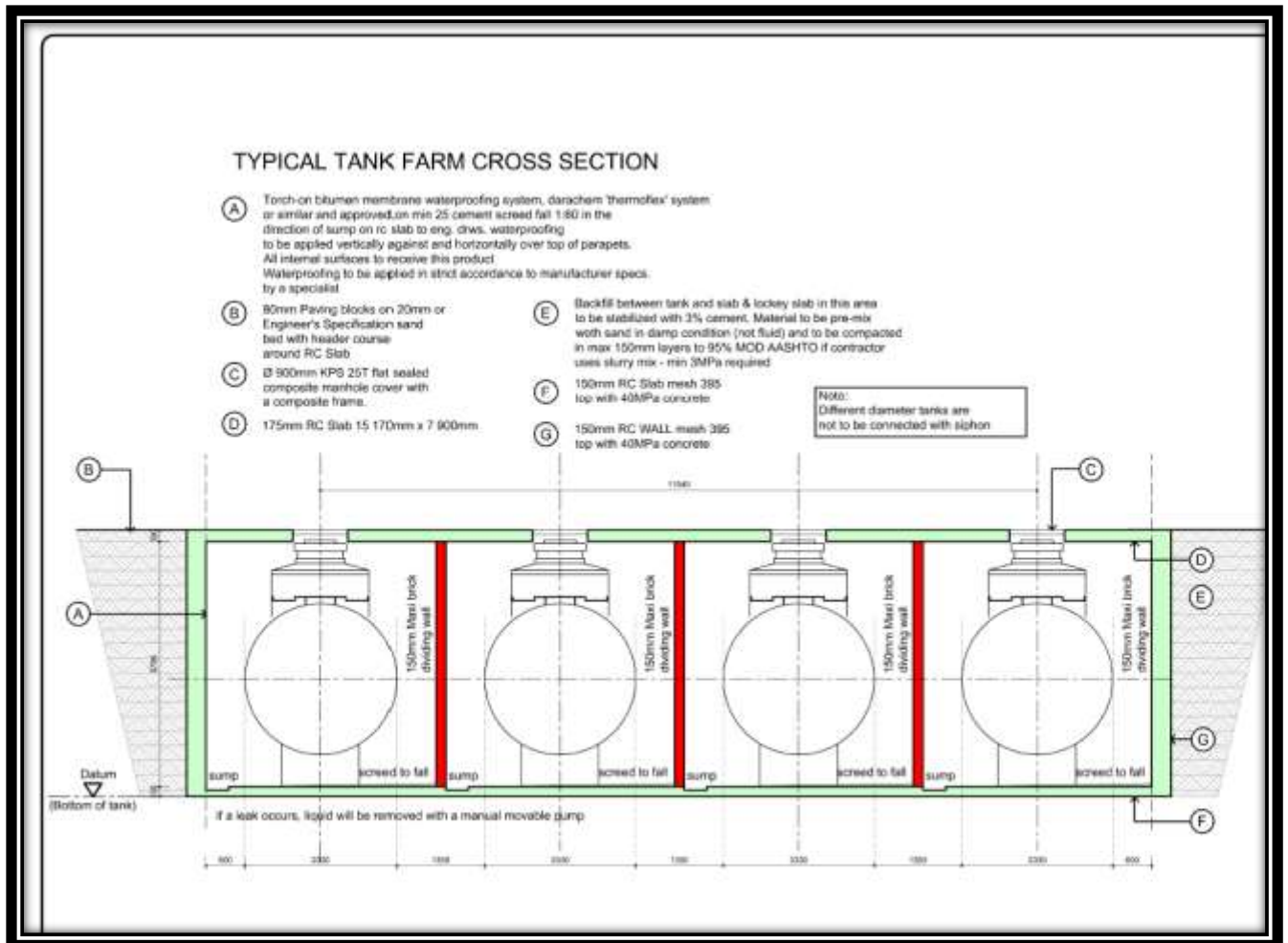


Figure 4: Underground fuel tanks to be installed in sealed bunkers.

RECOMMENDATIONS

Precautionary measures:

Even though the development poses a risk of contamination, sufficient mitigation and management measures exist and can be implemented to ensure the environmental sustainability and viability of the development. The development is therefore supported, based on implementation of the following recommendations and precautionary measures:

The requirements stipulated in SANS 10089 must be complied with, including but not limited to:

- Steel tanks and coatings shall comply with the requirements of SANS 1535.
- Fibre-reinforced plastic tanks shall comply with the requirements of SANS 1668, and all materials used in contact with the tank shall be compatible with the fibre-reinforced resin.
- Installation of fuel leak observation wells adjacent to the tanks.
- A full system integrity test in accordance with an approved test method shall be carried out on the tank after installation
- An efficient stormwater management system must be designed implemented on site.

- Stormwater from the site must drain into a sealed oil sump constructed directly downstream of the site in order to intercept possibly contaminated surface run-off from the apron and parking areas.
- All surface areas where the handling of fuel will take place (apron area) must be sealed by means of concrete slabs underlain by bitumen at the intersections of the concrete slabs, to prevent the infiltration of liquids into the underlying soil. The soil material underlying this layer must be adequately compacted to prevent ingress of liquids through zones of weakness (i.e.: along joints) within the surface seal.
- The buried fuel tanks should be installed according to the SANS 10089-3:2010 standards with a minimum of four fuel leak observation wells around the tanks. This is recommended to detect any leakage or ingress of liquid pollutants in the area surrounding the tanks. The observation boreholes adjacent to the tanks must be constructed to allow easy accessibility for monitoring purposes.
- The regular reconciliation of the volumes of petroleum products is recommended to ensure the early detection of leaks.
- Care should be taken that all fuel lines and fuel dispensers are leak-proof, especially in the light of the corrosion risk posed by the topsoil covering the area. A spillage contingency plan must be developed

6. DESCRIPTION OF THE PROPERTY

The property is located on Erf 3726, Erf 3727 and Erf 3728 Danville, Mahikeng Local Municipality, North West Province. The proposed development falls within the Mafikeng Local Municipality area of jurisdiction and is situated directly south of, and is bordered by, the newly upgraded section of the R503 road (Nelson Mandela Drive) between Lichtenburg and Mahikeng as you enter Mahikeng from Lichtenburg. (See Photograph 1) The newly constructed traffic circle (See Photograph 2) is located on the north western corner of the site. The ring road that connects with the N18 (N18 Bypass, Dr James Moroka Drive) borders the site on west. See Photograph 4. (See figure 1a and Figure 1b). The site is located 1km away from Bophelong Regional Hospital/Mahikeng Provincial Hospital. The site has excellent visibility from all directions on the N18 Bypass and the R503.

The R503 has through flow traffic daily, while Mafikeng Provincial Hospital/Bophelong Regional Hospital has in flow of people daily—Health Workers, Patients and Visitors. The Hospital is the main activity generator near the site located ± 1 Km away. An informal taxi rank is also located near the Hospital. The residents of Mosiane View and Danville can even walk to the site—convenience.

The proposed development is located within a critical biodiversity area. See Figure 5 for a copy of the Sensitivity Map as was generated from the 2015 North West Biodiversity Map as contained in the BGIS Land Use Decision Support (LUDS) Tool. Also see Figure 6 for a copy of a Sensitivity map as was determined by the Ecological Fauna and Flora Habitat Specialist.

Figure 5 illustrates the fact that the entire site is located within a Critical Biodiversity Area (CBA) while Figure 6 highlights the highly disturbed character of the site. The site is visibly disturbed. Informal dumping at the site is extensive. See Photograph 4 and 5. Old roads run through the site. See Photograph 6. Fowl-smelling water is present within the road reserve of the R503 (See Photograph 7). This might be stormwater or sewage as a sewage pump station is located on the north-western corner of the site. See Photograph 8. Disturbances include excavations of the past. Bush encroachment of shrub-height *Vachellia* species (Thorns) is noticeable at some areas at the site. Alien invasive weeds are widespread at disturbed areas at the site.

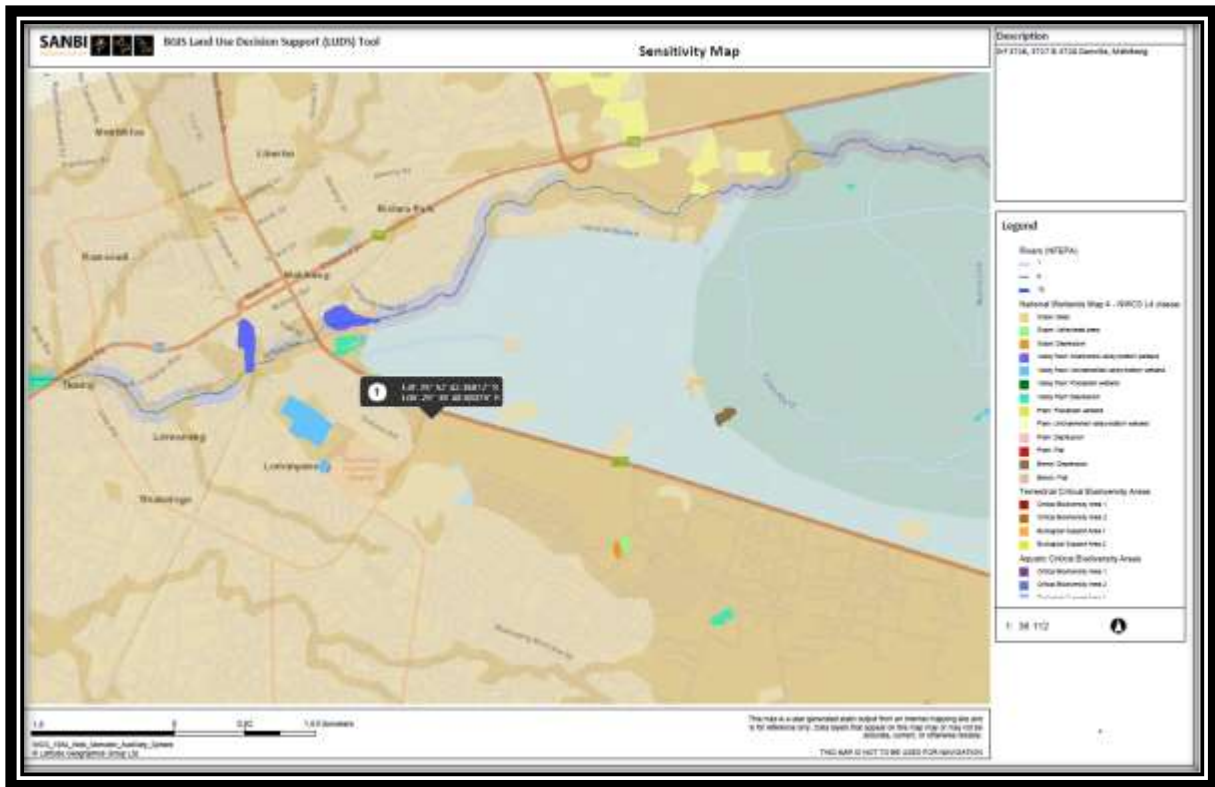


FIGURE 5: SENSITIVITY MAP (2015 North West Biodiversity Map as contained in the BGIS Land Use Decision Support (LUDS))



Red outline

Boundaries of the site



Orange-brown outline and shading

Medium-low sensitivity (on a smaller scale some parts are very low sensitivity)

FIGURE 6: SENSITIVITY MAP (Sensitivity map as was determined by the Ecological Fauna and Flora Habitat Specialist)



Photograph 1: R503 (Nelson Mandela Drive) road between Lichtenburg and Mahikeng as you enter Mahikeng from Lichtenburg.



Photograph 2: The newly constructed traffic circle



Photograph 3: The ring road that connects with the N18 (Dr James Moroka Drive) borders the site on west



Photograph 4: Informal dumping at the site is extensive



Photograph 5: Informal dumping at the site is extensive



Photograph 6: Old roads run through the site. Once again also note the extensive informal dumping.



Photograph 7: Fowl-smelling water is present within the road reserve of the R503.



Photograph 8: Sewage pump station is located on the north-western corner.

The Surveyor-general 21-digit site reference number are:

T	O	J	O	0	0	0	4	0	0	0	0	3	7	2	6	0	0	0	0
T	O	J	O	0	0	0	4	0	0	0	0	3	7	2	7	0	0	0	0
T	O	J	O	0	0	0	4	0	0	0	0	3	7	2	8	0	0	0	0

Site Co-ordinates

	Latitude (S):			Longitude (E):		
Alternative S1 (preferred or only site alternative)	25°	52'	42,36"	25°	39'	48.68"

7. DESCRIPTION OF THE ENVIRONMENT THAT MAY BE AFFECTED BY THE PROJECT

7.1 BIO-PHYSICAL ASPECTS

7.1.1 GEOLOGY TOPOGRAPHY AND SOIL

The site is located on a shallow slope towards the northwest. According to the Geological map for the area, (Geological map 2525 Mafikeng. Scale 1:250 000. The Geological Survey of South Africa) the site is underlain by basaltic amygdaloidal lava, agglomerate & tuff of the Allanridge Formation, and amygdaloidal lava & tuff of the Rietgat Formation, Platberg Group, of the Ventersdorp Supergroup.

Typical soil profile

Dry to slightly moist, dark to dark reddish brown, dense or stiff, intact sandy clay and lava or calcrete gravel. Hillwash or pebble marker, sometimes with large well rounded lava boulders.

Dry, kaki speckled black, dense, intact sandy clayey gravel. Moderately to slightly weathered lava.

Special care must be taken to ensure adequate surface drainage to prevent the accumulation of water next to structures.

The site contains slightly compressible and slightly too medium and highly expansive soil, and normal to special foundations will be required as zoned. Some problems regarding excavatability can be expected on specific small portions of the site. Storm water diversion measures such as ponding pools are recommended to control peak flows during thunderstorms. All embankments must be adequately compacted and planted with grass to stop any excessive erosion and scouring of the landscape

No dolomite occurs in the area and no stability investigation is required. No rocky ridges are present.



Geological map 2525 Mafikeng. Scale 1:250 000. The Geological Survey of South Africa

7.1.2 CLIMATE

The climate of the area is typical of the South African interior. In the discussion of this variable, certain aspects of rainfall, temperature and wind that can influence the project will be highlighted.

It must be noted that the climatic data are recorded in the Department of Environmental Affairs (1988) climatic data records. Data for Mafikeng weather station (0508/261 0) is available. The station has continuous records since 1920.

7.1.2.1. Rainfall

The average annual rainfall for the area is 553mm per annum. The highest annual rainfall recorded during the period for which the record is available is 868 mm (1918), while a yearly low of 265mm was recorded in 1930. Of note is the maximum-recorded daily rainfall of 101mm that was recorded on 16/12/1942.

The highest recorded monthly rainfall was recorded during January 1976 namely 360mm. Of importance is the fact that monthly minima of zero rainfall have been recorded for 6 months of the year.

The variability of rainfall as well as the high intensity events will definitely influence the project. On average however, the impact of rainfall can be considered as positive, as sufficient water is generally available for sustaining vegetation. Extreme dry conditions during dry spells will negatively affect the project due to the secondary effects on vegetation as well as the possibility of fire hazards. Extreme maximum events can also have a negative effect on the project during all its phases.

The overall impact can therefore be considered to be “variable” during the construction and operational phases (local in extent and long term in duration). The likelihood that these impacts may occur is probable, medium in intensity and significance. Steps to mitigate negative effects will be described in various sections of the Management Plan.

Due to the scale of the operation, the rainfall of the area cannot be affected by the project and is therefore “Not Applicable.”

7.1.2.2. Temperature

The average daily maximum temperature for the winter months for the area is approximately 20° C. The average daily minimum for that time of the year is in the order of 4,5° C.

During the summer months, the average daily maximum is in the order of 29° C and the daily average minimum approximately 16°C. The highest daily maximum recorded was 40,2°C while the lowest recorded temperature was -2,5°C.

In combination with a dry spell, such hot temperatures may be favourable for the spreading of veldt fires.

The general impact of this variable on the project can be considered as positive during the construction and operational phases. The impacts can however be considered as having low intensity impacts of low significance. The extent is local and short term in duration.

Due to the scale of the project, it is clear that it will have no impact on the environment.

7.1.2.3. Wind

The average wind direction for the area during the summer months is from the north-to-north easterly quadrant, while during the early spring the direction is more north westerly. Southerly winds generally occur during the winter, but are not frequent. Normally very little wind is experienced during the winter due to the presence of the high-pressure cell situated over the country during that time of the year.

The wind speeds are normally fairly low, but high wind speeds may occur during early spring and during of thundershowers.

Wind can be considered as having a low intensity, and a low significance negative impact on the construction and operational phases of the project. The probability is probable and the impacts are local but short in duration. The project can have no influence on the wind and is therefore “not applicable.

Climate Change

According to: WIREs Climate Change 2014, 5605-620. Doi:10.1002/wcc.295: “Climate change is a key concern within South Africa. Mean annual temperatures have increased by at least 1.5 times the observed global average of 0.65°C over the past five decades and extreme rainfall events have increased in frequency. These changes are likely to continue. Climate change poses a significant threat to South Africa’s water resources, food security, health, infrastructure, as well as its ecosystem services and biodiversity. Considering South Africa’s high levels of poverty and inequality, these impacts pose critical challenges for national development. In relation to water, impact studies for the water resources sector have begun to look beyond changes in streamflow to changes in the timing of flows and the partitioning of streamflow into base flows and stormflows, reservoir yields, and extreme hydrological events. Spatially the eastern seaboard and central interior of the country are likely to experience increases in water runoff. Higher frequencies of flooding and drought events are projected for the future. Complexities of the hydrological cycle, influences of land use and management and the linkages to society, health, and the economy indicate far higher levels of complexity in the water resources sector than in other sectors. What has emerged is that land uses that currently have significant impacts on catchment water resources will place proportionally greater demands on the catchment’s water resources if the climate were to become drier. The influence of climate change on water quality is an emerging research field in South Africa, with assessments limited to water temperature and non-point source nitrogen and phosphorus movement. A critical interaction that has not been explored is between changes in water quality and quantity and the combined impacts, such changes might have impact on various types of water use, e.g., irrigation, domestic consumption, or aquatic ecosystems support”.

7.1.3 SURFACE DRAINAGE

The area lies within the drainage basin of the Molopo River. Plate flow is the dominant drainage pattern on the sites. The natural topography of the Proposed Development slopes towards the north-western corner of the stand (towards the roundabout) where storm water is dispersed in a northern direction crossing the R503 road by means of existing rectangular concrete culverts. Storm water follows natural streams in a north-western direction towards Cookes Lake which in turn overflows into the Molopo River.

In addition to storm water generated on the Proposed Development area, storm water from Danville crosses Bophelong Hospital Road in an eastern direction at the said intersection whereas storm water generated on the southern side of the R503 flows in a western direction to also cross the R503 at the same location next to the roundabout in a northern direction. Open unlined storm water channels in the road reserve convey storm water to the said crossing

Surface drainage will have an influence on the project on a local scale and long in duration. The influence is positive in the sense that no major ground works are necessary to overcome possible erosion by sheet flow. The intensity and significance is low and of a probable probability.

The project will have a negative influence on the environment during the construction phase as the natural overland flow will be disturbed during this phase. If the prescribed management plan for the operational phase is adhered to, no undue stress will be placed on the environment - a positive impact can be expected. The likelihood of these impacts occurring is probable, but the intensity and significance, are judged low. The extent is local and the duration long.

Absence of wetlands

Wetlands such as floodplain wetlands, channelled valley-bottom wetlands, unchannelled valley-bottom wetlands, depressions, seeps and wetland flats appear to be absent at the site. In conclusion no wetlands are found at the site.

7.1.4 GROUND WATER

Possible infiltration into the groundwater must be taken into account. During the construction phase, no spills of lubricants or construction worker sewage should be allowed to pollute the ground water. During the operational phase, fuel storage tanks must also not pollute groundwater. These aspects are addressed in the EMP.

7.1.5 FAUNA AND FLORA

Site is situated at the Grassland Biome which is represented by the Klerksdorp Thornveld vegetation type (Mucina & Rutherford, 2006). A brief overview of the vegetation type, which serves as an outline of the ecological context of the site, follows.

Klerksdorp Thornveld (Gh 13)

Distribution: In South Africa the Klerksdorp Thornveld is present in the North West Province in two sets of patches, one in the Wolmaransstad, Ottosdal and Hartbeesfontein region, and the other from the Botsalano Game Park north of Mafikeng in the vicinity of Madibogo in the south. Altitude for the entire vegetation type is 1260 – 1580 m (Mucina & Rutherford 2006).

Vegetation and landscape features: Plains or slightly irregular undulating plains with open to dense *Acacia karroo* bush clumps in dry grasslands (Mucina & Rutherford 2006). Geology and soils: Shale, slate and quartzite of the Pretoria Group with interlaid diabase sills and Hekpoort lava supporting relatively shallow and rocky soils (Glenrosa and Mispah forms). Equally represented are eutrophic red plinthic soils (Hutton form) derived mainly from a thick succession of volcanics and sediments of the Ventersdorp Supergroup (Mucina & Rutherford 2006).

Climate: Warm-temperate, summer-rainfall region, with overall mean annual precipitation of 533 mm. Summer temperatures are high. Frequent frosts occur in winter (Mucina & Rutherford 2006).



Important taxa of the Klerksdorp Thornveld listed by Mucina & Rutherford (2006): Small Trees: *Acacia karroo*, *Acacia caffra*, *Celtis africana*, *Searsia lancea*, *Ziziphus mucronata*. Tall Shrubs: *Acacia hebeclada*, *Diospyros lycioides* subsp. *lycioides*, *Ehretia rigida*, *Grewia flava*, *Gymnosporia buxifolia*, *Searsia pyroides*, *Tarchonanthus camphoratus*. Woody Climber: *Asparagus africanus*. Low Shrubs:

Asparagus laricinus, *Asparagus suaveolens*, *Felicia muricata*, *Anthospermum hispidulum*, *Anthospermum rigidum* subsp. *pumilum*, *Aptosimum elongatum*, *Gnidia capitata*, *Gomphocarpus fruticosus* subsp. *fruticosus*, *Helichrysum dregeanum*, *Leucas capensis*, *Pavonia burchellii*, *Pentzia globosa*, *Solanum supinum* var. *supinum*, *Triumfetta sonderi*, *Ziziphus zeyheriana*. Graminoids: *Aristida congesta*, *Cynodon dactylon*, *Eragrostis lehmanniana*, *Eragrostis trichophora*, *Microcloa caffra*, *Panicum coloratum*, *Sporobolus fimbriatus*, *Themeda triandra*, *Andropogon shirensis*, *Antheophora pubescens*, *Aristida junciformis* subsp. *galpinii*, *Aristida stipitata* subsp. *graciliflora*, *Brachiaria nigropedata*, *Brachiaria serrata*, *Bulbostylis burchellii*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Diheteropogon amplexans*, *Elionurus muticus*, *Eragrostis curvula*, *Eragrostis obtusa*, *Eragrostis racemosa*, *Eragrostis superba*, *Eustachys paspaloides*, *Heteropogon contortus*, *Setaria sphacelata*, *Sporobolus africanus*, *Tragus berteronianus*, *Trichoneura grandiglumis*, *Triraphis andropogonoides*. Herbs: *Acalypha angustata*, *Acanthospermum australe*, *Berkheya onopordifolia* var. *onopordifolia*, *Berkheya setifera*, *Blepharis integrifolia* var. *clarkei*, *Chamaesyce inaequilatera*, *Chascanum adenostachyum*, *Dicoma macrocephala*, *Helichrysum nudifolium* var. *nudifolium*, *Hermannia lancifolia*, *Hibiscus pusillus*, *Jucticia anagalloides*, *Lippia scaberima*, *Nidorella microcephala*, *Nolletia ciliaris*, *Pollichia campestris*, *Rhynchosia adenodes*, *Salvia radula*, *Selago densiflora*, *Teucrium trifidum*, *Tolpis capensis*. Geophytic Herbs: *Bulbine narcissifolia*, *Ledebouria marginata*, *Ornithogalum tenuifolium* subsp. *tenuifolium*, *Raphionacme hirsuta*. Herbaceous Climber: *Rhynchosia venulosa*.

Note: Not all of the above listed plant species for the vegetation types occur at the site in the study area.



Indications of ecological sensitivity at the site

	Red outline	Boundaries of the site
	Orange-brown outline and shading	Medium-low sensitivity (on a smaller scale some parts are very low sensitivity)

Site is situated at the Grassland Biome which is represented by the Klerksdorp Thornveld vegetation type (Mucina & Rutherford, 2006). A brief overview of the vegetation type, which serves as an outline of the ecological context of the site, follows.

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Important taxa of the Klerksdorp Thornveld listed by Mucina & Rutherford (2006): Small Trees: *Acacia karroo*, *Acacia caffra*, *Celtis africana*, *Searsia lancea*, *Ziziphus mucronata*. Tall Shrubs: *Acacia hebeclada*, *Diospyros lycioides* subsp. *lycioides*, *Ehretia rigida*, *Grewia flava*, *Gymnosporia buxifolia*, *Searsia pyroides*, *Tarchonanthus camphoratus*. Woody Climber: *Asparagus africanus*. Low Shrubs: *Asparagus larcinus*, *Asparagus suaveolens*, *Felicia muricata*, *Anthospermum hispidulum*, *Anthospermum rigidum* subsp. *pumilum*, *Aptosimum elongatum*, *Gnidia capitata*, *Gomphocarpus fruticosus* subsp. *fruticosus*, *Helichrysum dregeanum*, *Leucas capensis*, *Pavonia burchellii*, *Pentzia globosa*, *Solanum supinum* var. *supinum*, *Triumfetta sonderi*, *Ziziphus zeyheriana*. Graminoids: *Aristida congesta*, *Cynodon dactylon*, *Eragrostis lehmanniana*, *Eragrostis trichophora*, *Microcloa caffra*, *Panicum coloratum*, *Sporobolus fimbriatus*, *Themeda triandra*, *Andropogon shirensis*, *Antheophora pubescens*, *Aristida junciformis* subsp. *galpinii*, *Aristida stipitata* subsp. *graciliflora*, *Brachiaria nigropedata*, *Brachiaria serrata*, *Bulbostylis burchellii*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Diheteropogon amplexans*, *Elionurus muticus*, *Eragrostis curvula*, *Eragrostis obtusa*, *Eragrostis racemosa*, *Eragrostis superba*, *Eustachys paspaloides*, *Heteropogon contortus*, *Setaria sphacelata*, *Sporobolus africanus*, *Tragus berteronianus*, *Trichoneura grandiglumis*, *Triraphis andropogonoides*. Herbs: *Acalypha angustata*, *Acanthospermum australe*, *Berkheya onopordifolia* var. *onopordifolia*, *Berkheya setifera*, *Blepharis integrifolia* var. *clarkei*, *Chamaesyce inaequilatera*, *Chascanum adenostachyum*, *Dicoma macrocephala*, *Helichrysum nudifolium* var. *nudifolium*, *Hermannia lancifolia*, *Hibiscus pusillus*, *Jucticia anagalloides*, *Lippia scaberima*, *Nidorella microcephala*, *Nolletia ciliaris*, *Pollichia campestris*, *Rhyncosia adenodes*, *Salvia radula*, *Selago densiflora*, *Teucrium trifidum*, *Tolpis capensis*. Geophytic Herbs: *Bulbine narcissifolia*, *Ledebouria marginata*, *Ornithogalum tenuifolium* subsp. *tenuifolium*, *Raphionacme hirsuta*. Herbaceous Climber: *Rhynchosia venulosa*.

Note: Not all of the above listed plant species for the vegetation types occur at the site in the study area.



Indications of ecological sensitivity at the site

- | | | |
|---|----------------------------------|---|
|  | Red outline | Boundaries of the site |
|  | Orange-brown outline and shading | Medium-low sensitivity (on a smaller scale some parts are very low sensitivity) |



Photograph 9: View of part of the site. Bush encroachment of shrub-height *Vachellia* species (Thorns) is noticeable at some areas at the site.

Photo: R.F. Terblanche



Photograph 10: Resprouting *Vachellia hebeclada* (Candlepod Thorn) at the site.

Photo: R.F. Terblanche



Photograph 11: Foliage of the widespread *Senegalia mellifera* (Black Thorn) of which a few are present at the site.

Photo: R.F. Terblanche



Photograph 12: Foliage of the widespread *Senegalia mellifera* (Black Thorn) of which a few are present at the site.

Photo: R.F. Terblanche



Photograph 13: The alien invasive weed *Verbena aristigera*, at the site.

Photo: R.F. Terblanche

Habitat and vegetation characteristics

Plants

Extinct, threatened, near threatened and other plant species of high conservation priority in North West Province are listed in Tables 4.2 – 4.8. (Of the Fauna and Flora Habitat Report. Appendix C of this Report). Protected tree species are listed in Table 4.9. (Of the Fauna and Flora Habitat Report. Appendix C of this Report). The presence or not of all the species listed in the tables were investigated during the survey. None of the Threatened and Near Threatened plant species are likely to occur on the site. No other plant species of particular conservation concern is likely to occur at the site.

Vertebrates

Mammals

Since the site falls outside reserves, threatened species such as the black rhinoceros (*Diceros bicornis*) and the African wild dog (*Lycaon pictus*) are obviously not present. No smaller mammals of particular high conservation significance are likely to be found on the site as well.

Birds

With bird species which often have a large distributional range, their presence does not imply that they are particularly dependent on a site as breeding location. Literature sources that were mainly consulted are Barnes (2000), Hockey, Dean & Ryan, P.G. (2005) and Chittenden (2007). No threat to any threatened bird species or any bird species of particular conservation importance are foreseen.

Reptiles

The Southern African Reptile Conservation Assessment (SARCA) was launched in May 2005 (Branch, Tolley, Cunningham, Bauer, Alexander, Harrison, Turner & Bates, 2006). Its primary aim is to produce a conservation assessment for reptiles of South Africa, Lesotho and Swaziland within

a four year period, ending 2009 (Branch *et al.*, 2006). Therefore a full up-dated conservation assessment of reptiles, taking into account the recent IUCN (2001) criteria, will only be available in the near future. While the conservation statuses of reptile species are under revision Alexander & Marais (2007) as well as Tolley & Burger (2007) give useful indications of possible red listings in the near future. There appears to be no threat to any reptile species of particular high conservation importance if the site is developed.

Amphibians

No frog species that occur in the North West are listed as Threatened species (Vulnerable, Endangered or Critically Endangered) or Near Threatened species according to IUCN Amphibian Specialist Group (2013). Table 4.17 lists *Pyxicephalus adspersus* (Giant Bullfrog) as Least Concern globally. Suitable habitat for Giant Bullfrog at site appears to be absent.

Invertebrates

Butterflies

Studies about the vegetation and habitat of threatened butterfly species in South Africa showed that ecosystems with a unique combination of features are selected by these often localised threatened butterfly species (Deutschländer and Bredenkamp 1999; Edge 2002, 2005; Terblanche, Morgenthal & Cilliers 2003; Lubke, Hoare, Victor & Ketelaar 2003; Edge, Cilliers & Terblanche, 2008). Threatened butterfly species in South Africa can then be regarded as bio-indicators of rare ecosystems.

Four species of butterfly in Gauteng Province and North West Province combined are listed as threatened in the recent butterfly conservation assessment of South Africa (Mecenero *et al.*, 2013). The expected presence or not of these threatened butterfly species as well as species of high conservation priority that are not threatened, at the site.

Assessment of threatened butterfly species

***Aloeides dentatis dentatis* (Roodepoort Copper)**

The proposed global red list status for *Aloeides dentatis dentatis* according to the most recent IUCN criteria and categories is Endangered (Mecenero *et al.*, 2013). *Aloeides dentatis dentatis* colonies are found where one of its host plants *Hermannia depressa* or *Lotononis eriantha* is present. Larval ant association is with *Lepisiota capensis* (S.F. Henning 1983; S.F. Henning & G.A. Henning 1989). The habitat requirements of *Aloeides dentatis dentatis* are complex and not fully understood yet. See Deutschländer and Bredenkamp (1999) for the description of the vegetation and habitat characteristics of one locality of *Aloeides dentatis* subsp. *dentatis* at Ruimsig, Roodepoort, Gauteng Province. There is not an ideal habitat of *Aloeides dentatis* subsp. *dentatis* on the site and it is unlikely that the butterfly is present at the site.

***Chrysoiritis aureus* (Golden Opal/ Heidelberg Copper)**

The proposed global red list status for *Chrysoiritis aureus* according to the most recent IUCN criteria and categories is Endangered (Mecenero *et al.*, 2013) *Chrysoiritis aureus* (Golden Opal/ Heidelberg Copper) is a resident where the larval host plant, *Clusia pulchella* is present. However, the distribution of the butterfly is much more restricted than that of the larval host plant (S.F. Henning 1983; Terblanche, Morgenthal & Cilliers 2003). One of the reasons for the localised distribution of *Chrysoiritis aureus* is that a specific host ant *Crematogaster liengmei* must also be present at the

habitat. Fire appears to be an essential factor for the maintenance of suitable habitat (Terblanche, Morgenthal & Cilliers 2003). Research revealed that *Chrysorits aureus* (Golden Opal/ Heidelberg Copper) has very specific habitat requirements, which include rocky ridges with a steep slope and a southern aspect (Terblanche, Morgenthal & Cilliers 2003). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon is highly unlikely.

***Lepidochrysops praeterita* (Highveld Blue)**

The proposed global red list status for *Lepidochrysops praeterita* according to the most recent IUCN criteria and categories is Endangered (G.A. Henning, Terblanche & Ball, 2009; Mecenero *et al.*, 2013). *Lepidochrysops praeterita* is a butterfly that occurs where the larval host plant *Ocimum obovatum* (= *Becium obovatum*) is present (Pringle, G.A. Henning & Ball, 1994), but the distribution of the butterfly is much more restricted than the distribution of the host plant. *Lepidochrysops praeterita* is found on selected rocky ridges and rocky hillsides in parts of Gauteng, the extreme northern Free State and the south-eastern Gauteng Province. No ideal habitat appears to be present for the butterfly on the site. It is unlikely that *Lepidochrysops praeterita* would be present on the site and at the footprint proposed for the development.

***Orachrysops mijburghi* (Mijburgh's Blue)**

The proposed global red status for *Orachrysops mijburghi* according to the most recent IUCN criteria and categories is Endangered (Mecenero *et al.*, 2013). *Orachrysops mijburghi* favours grassland depressions where specific *Indigofera* plant species occur (Terblanche & Edge 2007). The Heilbron population of *Orachrysops mijburghi* in the Free State uses *Indigofera evansiana* as a larval host plant (Edge, 2005) while the Suikerbosrand population in Gauteng uses *Indigofera dimidiata* as a larval host plant (Terblanche & Edge 2007). There is no suitable habitat for *Orachrysops mijburghi* on the site and it is unlikely that *Orachrysops mijburghi* would be present on the site.

Conclusion on threatened butterfly species

There appears to be no threat to any threatened butterfly species if the site is developed.

Assessment of butterfly species that are not threatened but also of high conservation priority

***Colotis celimene amina* (Lilac tip)**

Colotis celimene amina is listed as Rare (Low density) by Mecenero *et al.* (2013). In South Africa *Colotis celimene amina* is present from Pietermaritzburg in the south and northwards into parts of Kwa-Zulu Natal, Gauteng, Limpopo, Mpumalanga and the North West Provinces (Mecenero *et al.* In press.). Reasons for its rarity are poorly understood. It is highly unlikely that *Colotis celimene amina* would be resident at the site.

***Lepidochrysops procera* (Savanna Blue)**

Lepidochrysops procera is listed as Rare (Habitat specialist) by Mecenero *et al.* (2013). *Lepidochrysops procera* is endemic to South Africa and found in Gauteng, KwaZulu-Natal, Mpumalanga and North West (Mecenero *et al.*, 2013). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon at the site is highly unlikely.

***Metisella meninx* (Marsh Sylph)**

Henning and Henning (1989) in the first South African Red Data Book of Butterflies, listed *Metisella meninx* as threatened under the former IUCN category Indeterminate. Even earlier in the 20th century Swanepoel (1953) raised concern about vanishing wetlands leading to habitat loss and loss of populations of *Metisella meninx*. According to the second South African Red Data Book of butterflies (Henning, Terblanche & Ball, 2009) the proposed global red list status of *Metisella meninx* has been Vulnerable. During a recent large scale atlassing project the *Conservation Assessment of Butterflies of South Africa, Lesotho and Swaziland: Red List and Atlas* (Mecenero *et al.*, 2013) it was found that more *Metisella meninx* populations are present than thought before. Based on this valid new information, the conservation status of *Metisella meninx* is now regarded as Rare (Habitat specialist) (Mecenero *et al.*, 2013). Though *Metisella meninx* is more widespread and less threatened than perceived before, it should be regarded as a localised rare habitat specialist of conservation priority, which is dependent on wetlands with suitable patches of grass at wetlands (Terblanche In prep.). Another important factor to keep in mind for the conservation of *Metisella meninx* is that based on very recent discoveries of new taxa in the group the present *Metisella meninx* is species complex consisting of at least three taxa (Terblanche In prep., Terblanche & Henning In prep.). The ideal habitat of *Metisella meninx* is treeless marshy areas where *Leersia hexandra* (rice grass) is abundant (Terblanche In prep.). The larval host plant of *Metisella meninx* is wild rice grass, *Leersia hexandra* (G.A. Henning & Roos, 2001). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon at the site is highly unlikely.

***Platylesches dolomitica* (Hilltop Hopper)**

Platylesches dolomitica is listed as Rare (Low density) by Mecenero *et al.* (2013). Historically the conservation status of *Platylesches dolomitica* was proposed to be Vulnerable (Henning, Terblanche & Ball 2009). However this butterfly which is easily overlooked and has a wider distribution than perceived before. *Platylesches dolomitica* has a patchy distribution and is found on rocky ledges where *Parinari capensis* occurs, between 1300 m and 1800m (Mecenero *et al.* 2013, Dobson Pers comm.). Owing to a lack of habitat requirements and ideal habitat the presence of the taxon at the site is highly unlikely.

Fruit chafer beetles

No *Ichnestoma stobbiai* or *Trichocephala brincki* were found during the surveys. There appears to be no suitable habitat for *Ichnestoma stobbiai* or *Trichocephala brincki* at the site. There appears to be no threat to any of the fruit chafer beetles of particular high conservation priority if the site were developed.

Scorpions

None of these rock scorpions have been found at the site and the habitat does not appear to be optimal

Conclusions

- Vegetation at most of the site is conspicuously degraded, modified or transformed. Indigenous tree species at the site include *Vachellia karroo* (Sweet Thorn), *Vachellia tortilis* subsp. *heteracantha* (Umbrella Thorn), *Vachellia hebeclada* (Candlepod Thorn), *Senegalia mellifera* (Black Thorn) and *Ziziphus mucronata* (Buffalo-thorn). The alien invasive tree species *Melia azedarach* also occurs at the site as well as the alien invasive succulent *Opuntia ficus-indica*. Indigenous grass species

include *Eragrostis lehmanniana*, *Eragrostis rigidior*, *Aristida congesta*, *Cynodon dactylon*, *Chloris virgata* and *Heteropogon contortus*. Indigenous forbs and dwarf shrubs include *Gazania krebsiana*, *Bulbine narcissifolia*, *Euphorbia inaequilatera* and *Felicia muricata*.

- Alien invasive weed species are visible at the widespread disturbed areas at the site. These alien invasive weeds include *Argemone ochroleuca*, *Verbena aristigera*, *Flaveria bidentis*, *Datura ferox*, *Gomphrena celosioides*, *Schkuhria pinnata*, *Tagetes minuta* and *Verbesina encelioides*.
- The site is visibly disturbed. Informal dumping at the site is extensive. Old roads run through the site. Fowl-smelling water is present at the northeastern boundary of the site. Disturbances include excavations of the past. Bush encroachment of shrub-height *Vachellia* species (Thorns) is noticeable at some areas at the site. Alien invasive weeds are widespread at disturbed areas at the site.
- Wetlands are absent at the site.
- Rocky ridges are absent at the site.
- Grassland at the site is represented by the Klerksdorp Thornveld (Gh 13) which is not listed as a Threatened Ecosystem according to the National List of Threatened Ecosystems (2011).
- No Threatened or Near Threatened plant or animal species appear to be resident at the site. No other plant or animal species of particular conservation concern appear to be present at the site.
- There is little scope for the site to be part of a corridor of particular conservation importance.
- Ecological sensitivity at the site is medium and low (at some areas approaching very low sensitivity at a finer scale).
- Following the mitigations which will be upheld and planned footprint for development all the impact risks listed above are moderate or low.
- If the development is approved a key issue would be continued monitoring and eradication of alien invasive plant species. It is in particular alien invasive species such as *Melia azedarach* (Syringa) and invasive *Prosopis glandulosa* (Mesquite) which should not be allowed to establish.

If the development is approved an opportunity presents itself to cultivate indigenous plant species which would benefit urban nature conservation.

Outline of main landscape and habitat characteristics of the site

HABITAT FEATURE	DESCRIPTION
Topography	The area proposed for the development is on gentle slopes (flat plain).

Rockiness	No rocky ridges are present.
Presence of wetlands	Presence of wetlands at the site is unlikely. Fowl-smelling water was present at the northwestern boundary of the site, which indicates artificial (and likely polluted) sources of water at this part of the site. While some water may gather at the northwestern part of the site from the elevated road, as well as what appears to be leaks, a functional active channel appears to be absent.
Vegetation	<p>Vegetation at most of the site appears to be degraded or modified. Indigenous tree species at the site include <i>Vachellia karroo</i> (Sweet Thorn), <i>Vachellia tortilis</i> subsp. <i>heteracantha</i> (Umbrella Thorn), <i>Vachellia hebeclada</i> (Candlepod Thorn), <i>Senegalia mellifera</i> (Black Thorn) and <i>Ziziphus mucronata</i> (Buffalo-thorn). The alien invasive tree species <i>Melia azedarach</i> also occurs at the site as well as the alien invasive succulent <i>Opuntia ficus-indica</i>. Indigenous grass species include <i>Eragrostis lehmanniana</i>, <i>Eragrostis rigidior</i>, <i>Aristida congesta</i>, <i>Cynodon dactylon</i>, <i>Chloris virgata</i> and <i>Heteropogon contortus</i>. Indigenous forbs and dwarf shrubs include <i>Gazania krebsiana</i>, <i>Bulbine narcissifolia</i>, <i>Euphorbia inaequaliterata</i> and <i>Felicia muricata</i>.</p> <p>Alien invasive weed species are visible at the widespread disturbed areas at the site. These alien invasive weeds include <i>Argemone ochroleuca</i>, <i>Verbena aristigera</i>, <i>Flaveria bidentis</i>, <i>Datura ferox</i>, <i>Gomphrena celosioides</i>, <i>Schkuhria pinnata</i>, <i>Tagetes minuta</i> and <i>Verbesina encelioides</i>.</p>
Signs of disturbances	The site is visibly disturbed. Informal dumping at the site is extensive. Old roads run through the site. Fowl-smelling water is present at the northwestern boundary of the site. Disturbances include excavations of the past. Bush encroachment of shrub-height <i>Vachellia</i> species (Thorns) is noticeable at some areas at the site. Alien invasive weeds are widespread at disturbed areas at the site.
Connectivity	There is little scope for the site to be part of a corridor of particular conservation importance.

7.2. SOCIO ECONOMIC FACTORS

7.2.1. SOCIAL AMENITIES

The opinion is being held that the proposed development will strengthen the retail sector within the Mahikeng Local Municipality, due to the provision of a shopping centre and filling station within the urban area. The site is also located at the intersection of

the R503 Lichtenburg Road and Bophelong Hospital Road. The intersection has recently been reconstructed to incorporate a new roundabout as part of the upgrading of the R503 road. The intersection has been identified as a “Gateway Project” in the Mahikeng Local Municipality IDP 2020-21. By strengthening the retail sector within the Mahikeng Local Municipality, the proposed development will contribute to the broadening of the income base of the Mahikeng Local Municipality.

In view of the objectives contained within the Mahikeng Local Municipality Spatial Development Framework Final Draft Report - December 2018, the Mahikeng Local Municipality envisages to serve the social needs and requirements of the population more properly and to become economically competitive, when compared to other town and cities. The proposed development addresses the need identified by the Mahikeng Local Municipality, for the provision of additional business properties, to be alienated by means of full title.

During the construction phase, temporary employment will be created. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to economic spin-offs that will result.

The feasibility study conducted by WSP (See Appendix E) to establish the need for the development determined: It is estimated that the proposed new filling station will sell approximately **372 493 litres** of fuel per month during its third year of operation. The Retail Study compiled by Fernridge Solutions concluded that the site has good visibility and accessibility from the R503 and N18 Bypass, limited competition in the catchment area and that the site is overall a good site for retail development.

7.2.2. AIR QUALITY

“The extent and toxicity of emissions is not necessarily a concise indicator of contributions to ground-level air pollution concentrations or of risks to health and the environment. Such contributions are also a function of the height of emission, temporal variations in the release of pollutants, and the proximity of the source to the people or the environment affected by exposure to the pollutant (such as, for instance, children, or the elderly, or people who are ill, or others who may be particularly sensitive receptors to a specific pollutant above a certain concentration). If an industry is operating close to a school or hospital or centre for the elderly, the potential exposure (in combination with the other contributing factors) is high.

Three factors govern the significance of household fuel-burning emissions:

- (i) the low level of emissions (that is, their height above the ground is generally about 3 m, within people’s breathing zone);*
- (ii) the simultaneous occurrence of peak emissions (during the coldest months of winter and in the early mornings and throughout the evenings) and poor atmospheric dispersion (stable atmosphere with low wind speeds, with the possible development of temperature inversions); and*
- (iii) the release of such emissions within high human exposure areas, given that such emissions generally occur in dense, low-income settlements where population density is high (in addition, the pollution is not only outdoors, but frequently indoors as well, due to poor ventilation, so it affects the whole family).*

The significance of vehicle emissions as contributors to air-pollutant concentrations and health risks is similarly increased by the low level (close to the ground) of the emissions, and their proximity to highly populated areas – on highways, for example, with emissions being particularly high when traffic is congested. Vehicle emissions tend to peak early in the morning and in the evenings, when the potential for atmospheric dispersion is reduced (for example, wind speeds are generally low in the early mornings and evenings, reducing their potential for dispersing pollution).

Given the high volumes of pollutants emitted from fuel-burning within the industrial and power-generation sectors, their contribution to ambient concentrations and public health risks is often lower than might be expected. This is because these sources are generally characterized by constant releases, relatively high above ground level, and further away from residential settlements than are household fuel-burning and vehicle emissions.

Ranking the significance of different sources of pollution on the basis of the total emissions for which each source is responsible would, for example, place industrial emissions above household fuel-burning. If the aim is to reduce impacts on human health, however, then household fuel-burning would need to be targeted as a top priority (Scorgie et al., 2004d).

Historically, air pollution control in South Africa has primarily emphasized the implementation of 'command and control' measures in the industrial sector. The shift from source-based control, to the management of the air that people breathe, emphasizes the importance of targeting a wider range of sources and using more flexible and varied approaches. It means paying greater attention to ambient air quality, as it is more important (and more cost-effective, in many cases) to make sure that the ambient air complies with air quality standards. This approach ensures that human and environmental health is protected and that the cumulative impact of pollution from a number of sources is addressed.

Approaches adopted or considered for future implementation have included: regulation (for example, the use of Atmospheric Emission Licences for Listed Activities); market instruments (such as atmospheric user-charges and pollution taxes); the potential for voluntary agreements, education and awareness raising; and emissions trading. International experience shows that adopting a mix of instruments and interventions is more effective than using a single instrument to improve air quality across various types of source. Although direct regulation remains important in controlling industrial sources, there is evidence that specifying emission limits is more effective than specifying the use of particular technologies, so as to give companies flexibility in selecting the method of achieving success that suits them best. This approach is advocated as being more cost-effective and more likely to stimulate technological advances in pollution control methods and production processes.

For large point sources (that is, sources of pollution that are concentrated on one site, but that have large, constant volumes of many types of pollution) that are few in number, instruments such as emissions trading have been advocated as an effective way to manage pollutant emissions and reduce the costs of compliance.

Implementing an efficient social protection system to alleviate poverty is central to maintaining conditions that facilitate not only economic growth but also environmental sustainability. Many South African households – including those with access to electricity – use coal, wood, and paraffin, due to the relative cost-effectiveness of such fuels for heating (that is, space heating) and cooking purposes.

Many low-cost housing developments and informal settlements are located close to industrial and mining operations, as such land is both available and inexpensive. Poorer communities are more likely to suffer from poor service delivery, including inadequate waste removal that sometimes results in refuse

being set alight illegally. These examples show that poverty alleviation could help to improve air quality by enabling people to choose practices that are friendlier to the environment.”

https://www.environment.gov.za/sites/default/files/docs/stateofair_airqualityand_sustainable_development.pdf Date visited: 17/03/2020.

The proposed development is planned and will eventually be developed with the above mentioned in mind. In addition to the above, it should be noted that the project will however create a certain amount of dust during the construction phase. If proper dust suppression measures are implemented this variable will have very little impact (low in intensity and significance during the construction phase).

7.2.3. NOISE

It is a fact that a certain amount of noise will be generated during the construction phase of the project. Noise levels should however rarely exceed the allowable limits. It is unlikely that the project will create any more noise during the operational phase than that already experienced on site with it being bordered by N-12.

7.2.4. ARCHAEOLOGY AND CULTURAL SITES

Background research indicates that there are some cultural heritage sites and features in the larger geographical area within which the study area falls. No sites, features or material of cultural heritage (archaeological and/or historical) origin or significance were identified in the study area during the physical assessment. The informal dumping of residential household refuse and building rubble occurs throughout the study area. The area itself is surrounded by residential, industrial and business related developments and as a result the larger geographical location has been extensively altered from its original natural and historical landscape. Telephone lines, as well as a dirt road that runs from east to west roughly in the middle of the study area, and a dirt & tar road that comes off the R503 and runs approximately north-south through the land has impacted on the area as well.

With the original natural & historical landscape largely altered and with the recent impacts it is believed that should any sites, features or material of cultural heritage origin or significance have existed here in the past, it would have been largely disturbed or destroyed as a result.

It should be noted that although all efforts are made to cover a total area during any assessment and therefore to identify all possible sites or features of cultural (archaeological and/or historical) heritage origin and significance, that there is always the possibility of something being missed. This will include low stone-packed or unmarked graves. This aspect should be kept in mind when development work commences and if any sites (including graves) are identified then an expert should be called in to investigate and recommend on the best way forward.

Finally, from a Cultural Heritage point of view it can therefore be concluded that the proposed Retail Business and Filling Station Development should be allowed to continue.

7.2.5 AESTHETICS

Mahikeng, is the capital city of the North-West Province. The capital falls within Ngaka Modiri Molema District Municipality. The city is also located close to South Africa's border with Botswana. The proposed development falls within the Mafikeng Local Municipality area of jurisdiction and is situated directly south of and is bordered by the newly upgraded section of the R503 road between Lichtenburg and Mahikeng

as you enter Mahikeng from Lichtenburg. The newly constructed traffic circle is located on the north western corner of the site. The ring road that connects with the N18 (Dr James Moroka Drive) borders the site on west.

Although the site is located within a CBA, vegetation at the site appears to be degraded, modified or in some areas transformed. Disturbances that have caused impacts to vegetation at the site include hitherto cleared areas, small excavations, dirt tracks, trampling, informal dumping, a pavement, planting of exotic trees and establishment of alien invasive weeds. The site borders on tar roads at its northern and western boundaries.

Visual Intrusion is defined as the level of compatibility or congruence of the project with the particular qualities of the area, or its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape or townscape.

High visual intrusion – results in a noticeable change or is discordant with the surroundings;

Moderate visual intrusion – partially fits into the surroundings, but clearly noticeable;

Low visual intrusion – minimal change or blends in well with the surroundings.

The proposed development will change the scenic resources of the local area from an undeveloped site to a filling station. The visual intrusion is considered to be moderate as the proposed development partially fits into the surroundings but will be clearly noticeable.

The proposed development will require additional lighting on and in buildings and possibly along roads. This will change the night landscape from unlit to lit

8. ENVIRONMENTAL MANAGEMENT OBJECTIVES AND TARGETS

The following table is a summary of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process.

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
DOCUMENTATION AND TRAINING		
The necessary documentation must be available in the site office	Ensure that all concerned is aware of the EMPr and related environmental aspects	Availability of documents Trained and informed workforce.
SITE ACCESS & TRAFFIC MANAGEMENT		
Access roads may increase the construction footprints	Construction vehicles, machinery and workers must be restricted to the designated access roads, and may not drive through undeveloped vegetation outside of the existing access route except where that vegetation falls within the authorised working area (development footprint) at the site.	Minimizing eradication of vegetation.
VEGETATION CLEARING		
Vegetation will be cleared from within the footprint of the working area, before earthmoving and construction activities commence.	Vegetation clearing may only commence once the working area has been clearly demarcated to the ECO's satisfaction.	Land clearing must be restricted to the demarcated working area, and no vegetation may be cleared outside of the demarcated working area.
TOPSOIL & SUBSOIL MANAGEMENT		
Topsoil (where present) will be removed from any area where physical disturbance of the surface will occur.	Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas on site	The topsoil must be adequately protected from being blown away or eroded by storm water. Removed subsoil should be stockpiled separately from topsoil. Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped on the site
EXCAVATIONS & EARTHWORKS		
It will be necessary to employ heavy machinery (excavators, back-actors, bulldozers, dump trucks etc.) for the earthmoving required	Use of heavy machinery can substantially increase the likelihood, intensity and significance of potential negative environmental impacts, and it is thus essential that earthworks be performed under constant supervision, and that operators must be made aware of all the environmental obligations, as there is always the potential to inflict damage to sensitive areas.	Use of machinery should be restricted to only that which is strictly required, and the unnecessary or excessive movement/ use of such machinery must be kept to a minimum. Machinery must enter and exit the site via the indicated access roads, and may not enter/ exit the river channel at any other location. Excavations and earth-moving may only take place within the demarcated working area
DANGEROUS AND TOXIC MATERIALS (CHEMICALS)		
Safe storage of chemicals See also below for further aspects on this subject	Clean environment	No spills of chemicals

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
<p>Availability of safety kits to prevent oils/toxic materials spreading in the environment</p> <p>Proper storage must be provided for chemicals , paint and construction materials needed</p>	Safe storage of materials	Proper storage provided
STORAGE OF OIL AND FUEL		
Safe handling of fuel and oil and prevention of spills.	Clean environment	<p>No spills of oil or fuel</p> <p>No leakages of oil</p>
USE OF OIL AND CHEMICALS		
<p>Drip trays must be provided for vehicles in storage yard</p> <p>Wash bay and oil trap to be provided</p>	<p>No spills of oil</p> <p>Cleaning area for vehicles</p>	<p>No oil spills from vehicles</p> <p>No oil or fuel into environment due to cleaning of vehicles or equipment</p>
STORAGE OF CEMENT		
Safe handling of cement	Clean environment	No spills of cement
STORAGE OF EQUIPMENT AND MATERIALS		
Safe and proper storage of equipment and material	Safe and proper storage of equipment and material	Neat, clean and ordered storage of material
CONCRETE		
The contractors must provide information on proposed handling of concrete.	Minimise the possibility of concrete residue entering into the surrounding environment	No evidence of contaminated soil on the construction site
TOILETS AND ABLUTION FACILITIES		
Clean sanitary environment	Clean and sanitary environment	Toilets for workers in accordance with the instructions in the EMP
WASTE MANAGEMENT		
A clean and waste free environment	Clean environment with waste handled in accordance with the EMP	No waste in the environment
WORKSHOP EQUIPMENT, MAINTENANCE AND STORAGE OF MATERIAL		
Clean and safe work area	Clean and safe work area	Safe and clean work and storage area
FIRES		
No burning of waste and or fires originating from the construction area	No burning of waste and or fires originating from the construction area	No fire incidents
OTHER ENVIRONMENTAL ASPECTS		
<p>Stockpiles</p> <p>All stockpiled material must be easily accessible without any environmental damage to adjacent grasslands/farmlands.</p> <p>All temporarily stockpiled material must be stockpiled in such a way that the spread of materials are minimised.</p> <p>The stockpiles may only be placed within the demarcated areas - the location of which must be approved by the ER or ECO.</p> <p>Stockpiled material at batching plant must be contained to prevent the spread of gravel in the area.</p> <p>Erosion, sedimentation and storm water</p> <p>No erosion and or sedimentation</p>	<p>Properly constructed and well maintained stockpiles</p> <p>• Minimise scarring of the soil</p>	<p>No erosion or spread of material from stockpiles</p> <p>Gravel stockpiles must be properly managed</p> <p>No erosion or sedimentation.</p>

ENVIRONMENTAL ASPECTS	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS
<p>Vegetation</p> <p>The contractor must avoid vegetated areas that will not be cleared.</p>	<p>surface and land features</p> <ul style="list-style-type: none"> • Minimise disturbance and loss of soil • Minimise construction footprint <p>Minimise impacts on vegetation</p>	<p>Limit impact on vegetation</p>
<p>Waste management</p> <p>Any illegal dumping of waste must not be tolerated. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request. Bins must be clearly marked for ease of management. Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's wastes generated on the site.</p>	<ul style="list-style-type: none"> • Sustainable management of waste; to keep the site neat and tidy. This will control potential influx of vermin and flies thereby minimising the potential of diseases on site and the surrounding environment. It will also minimise the potential to pollute soils, water resources and natural habitats 	<ul style="list-style-type: none"> • Disposal of rubble and refuse in an appropriate manner with no rubble and refuse lying on site • Sufficient containers available on site
<p>Dust</p> <p>Dust production must be controlled by regular watering of roads and works area, should the need arise.</p>	<p>Reduce dust fall out</p>	<p>No visible signs of dust</p>
<p>SAFETY</p>	<p>Children's access to construction site controlled,</p> <p>Access to construction camp controlled</p> <p>Safety aspects considered</p>	<p>No children on construction site</p> <p>Safety fence and controlled access available</p> <p>Safety signs with necessary information displayed</p>

9. ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES

9.1 ASSESSMENT CRITERIA

Impacts were rated and are discussed in detail – see BAR for detailed impact assessment.

9.2 ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES

9.2.1 THE FOLLOWING ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES HAS BEEN IDENTIFIED FOR THE “NON-OPERATIONAL” (PRE-CONSTRUCTION AND CONSTRUCTION PHASE) PHASE OF THE PROPOSED DEVELOPMENT:

1. A full copy of the signed EA from DEDECT in terms of NEMA, granting approval for the development must be available on site
2. A copy of the EMPr as well as any amendments thereof must be available on site
3. A suitably qualified ECO must be appointed.
4. Impacts on the environment must be minimised during site establishment and the development footprint must be kept to the approved development area.
5. Vegetation clearing may not commence until such time as the development footprint has been clearly defined.
6. No clearance of vegetation outside of the development footprint may occur.
7. At the end of the construction phase the site and its surrounding area must be free from any pollution that originated as a result of the construction activities.
8. No disturbance of topsoil & subsoil may commence until such time as the development footprint has been clearly defined.
9. No disturbance of topsoil & subsoil outside of the development footprint may occur.
10. At the end of the construction phase the site and its surrounding area must be free from any chemical, fuel, oil and cement spills that originated as a result of the construction activities.
11. At the end of the construction phase the site and its surrounding area must be free from any sewage that originated as a result of the construction activities.
12. At the end of the construction phase the site and its surrounding area must be free from any hazardous or general waste pollution that originated as a result of the construction activities.
13. Dust prevention measures must be applied to minimise the generation of dust.
14. Noise prevention measures must be applied to minimise the generation of unnecessary noise pollution as a result of construction activities on site.
15. Absolutely no burning of waste is permitted.
16. Fires will only be allowed in facilities especially constructed for this purpose.
17. No hunting of animals will be allowed.
18. No intentional destruction of any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance may occur.

19. All Contractors and sub-contractors must abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.

9.2.2 THE FOLLOWING ENVIRONMENTAL IMPACT MANAGEMENT OUTCOMES HAS BEEN IDENTIFIED FOR THE “OPERATIONAL” PHASE OF THE PROPOSED DEVELOPMENT:

1. A full copy of the signed EA from DEDECT in terms of NEMA, granting approval for the development must be available on site
2. A copy of the EMPr as well as any amendments thereof must be available on site
3. Records of Environmental Monitoring must be available on site.
4. The site and its surrounding area must be kept free from any pollution that originated as a result of the operational activities.
5. The site and its surrounding area must be free from any chemical, fuel, and oil spills that originated as a result of the operational activities.
6. The site and its surrounding area must be free from any hazardous or general waste pollution that originated as a result of the operational activities.
7. The operator of the site must abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.

10. MITIGATION MEASURES

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE	A full copy of the signed EA from DEDECT in terms of NEMA, granting approval for the development must be available on site	Obtain the Environmental Authorization and plan to have a copy of the signed EA on site.	Ensure that a signed copy of the EA is available in the site office	No action required	The Applicant, assisted by the EAP to be monitored by the ECO
	A copy of the EMPr as well as any amendments thereof must be available on site	Ensure that a site specific EMPr is compiled and approved and plan to have a copy of the approved document on site	Ensure that a copy of the approved EMPr is available in the site office	No action required	The Applicant, assisted by the EAP to be monitored by the ECO
	A suitably qualified ECO must be appointed.	Prior to the start of construction activities, an ECO must be appointed to ensure that an Environmental	Ensure that the ECO document is available on site and that everyone on site is informed and trained regarding their Environmental obligations in terms of the EA and EMPr.	No action required	The Applicant and the ECO

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
		Control document is compiled. This document must explain the roles and responsibilities of everyone involved and must also contain an Environmental awareness training manual.	Records of training sessions must be kept on site.		
			ECO's report must be an item on monthly site meeting agenda	No action required	The project manager.
		The ECO must ensure that the contractor provides method statements for the various environmental aspects.	The method statements must be available in the site office	No action required	The Applicant and the contractor must ensure that the method statements are developed and approved by the ECO
SITE ESTABLISHMENT	Impacts on the environment must be minimised during site	A Land surveyor must peg the parameters of the	Construction vehicles, machinery and workers must be restricted to only operate within the approved development footprint.	No action required	The developer must ensure that a Land surveyor

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
	establishment and the development footprint must be kept to the approved development area.	development footprint.	<p>The development footprint must be clearly demarcated and the extent of this area must be communicated to all contractors and sub-contractors.</p> <p>Existing access roads must be utilised to access the site camp(s) and working/ construction areas</p> <p>Appropriate traffic management strategies must be implemented to ensure the safety of construction vehicles and other road-users. If needed, signage to warn other road users of the presence of construction vehicles should be erected at appropriate locations, where the signage will be clearly visible to potentially affected road users.</p>		pegs the parameters of the development footprint and that all concerned are trained in this regard. The ECO will monitor compliance.
VEGETATION CLEARING	<p>Vegetation clearing may not commence until such time as the development footprint has been clearly defined.</p> <p>No clearance of vegetation outside of the development footprint may occur.</p>	A Land surveyor must peg the parameters of the development footprint.	Land clearing must be restricted to the demarcated working area, and no vegetation may be cleared outside of the demarcated working area.	No action required	The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard. The ECO

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
					will monitor compliance.
STORM AND WASTE WATER MANAGEMENT	At the end of the construction phase the site and its surrounding area must be free from any pollution that originated as a result of the construction activities.	The developer must compile a storm water management plan.	Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager	No action required	The developer must ensure that a storm water management plan is developed. The ECO must monitor compliance.
			All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility.		
			No wastewater may run freely into any naturally vegetated areas. Run-off containing high sediment loads must not be released into drainage channels		
			Approval must be obtained from DW&S for any activities that require authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998).		
			Surface water or storm water must not be allowed to concentrate, or to flow down cut or fill sloped routes without erosion protection measures being in place		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>Storm water from the site must drain into a sealed oil sump in order to intercept possibly contaminated surface run-off from the apron and parking areas.</p> <p>All surface areas where the handling of fuel will take place (apron area) must be sealed by means of concrete slabs underlain by bitumen at the intersections of the concrete slabs, to prevent the infiltration of liquids into the underlying soil. The soil material underlying this layer must be adequately compacted to prevent ingress of liquids through zones of weakness (i.e.: along joints) within the surface seal.</p> <p>The buried fuel tanks should be installed according to the SANS 10089-3:2010 standards with a minimum of four fuel leak observation wells around the tanks. This is recommended to detect any leakage or ingress of liquid pollutants in the area surrounding the tanks. The observation boreholes adjacent to the tanks must be constructed to allow easy accessibility for monitoring purposes.</p> <p>Ensure that storm water channels do not discharge straight down contours. These must</p>		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>be aligned at such an angle to the contours that they have the least possible gradient</p> <p>To reduce the loss of material by erosion, the contractor must ensure that disturbance on site is kept to a minimum. The contractor is responsible for rehabilitating all eroded areas in such a way that the erosion potential is minimised after construction has been completed</p>		
TOPSOIL & SUBSOIL	No disturbance of topsoil & subsoil may commence until such time as the development footprint has been clearly defined.	A Land surveyor must peg the parameters of the development footprint.	Land clearing must be restricted to the demarcated working area, and no disturbance of topsoil & subsoil outside of the demarcated working area will be allowed.	No action required	<p>The developer must ensure that a Land surveyor pegs the parameters of the development footprint and that all concerned are trained in this regard.</p> <p>The Contractor will be responsible for the removal and correct stockpiling</p>
			Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			landscaping and rehabilitation of disturbed areas.		of the topsoil and subsoil.
			The topsoil must be adequately protected from being blown away or eroded by storm water. The topsoil storage area must be located on a level area outside of any surface drainage/ storm-water channels, and at a location where it can be protected from disturbance during construction and where it will not interfere with construction activities.		The ECO will monitor compliance.
			Removed subsoil should be stockpiled separately from topsoil. Handling of topsoil should be minimized as much as possible, and the location of the topsoil berm should be chosen carefully to avoid needing to relocate the topsoil berm at a later date. Ideally, topsoil is to be handled twice only, once to strip and stockpile, and once to replace, level, shape and scarify. The topsoil berm may be a few meters wide but should ideally not be more than 0.5m high to allow sufficient light and air penetration.		
	No disturbance of topsoil & subsoil		Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped.		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
	outside of the development footprint may occur.				
DANGEROUS AND TOXIC MATERIALS	At the end of the construction phase the site and its surrounding area must be free from any chemical, fuel, oil and cement spills that originated as a result of the construction activities.	CHEMICALS			The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
		The Contractor must provide method statements for the storage and handling of chemicals on site.	All hazardous substances must be stored in suitable containers as defined in the Method Statement;	No Action required	
			Containers must be clearly marked to indicate contents, quantities and safety requirements		
			All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers		
			Bunded areas to be suitably lined with a SABS approved liner		
			An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis		
			All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);		
			All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet		
Employees handling hazardous substances / materials must be aware of the potential					

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available		
		FUEL AND OIL			
		The Contractor must provide method statements for the storage and handling of fuel and oil on site.	The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard. The ECO will monitor compliance.
			Fuel storage tanks must be located in a portion of the construction camp where they do not pose a high risk in terms of water pollution (i.e. they must be located away from water courses)		
			The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 110% of the total capacity of all the storage tanks/ bowsers		
			The floor of the bund must be sloped, draining to an oil separator		
			Additional leak observation wells must be installed around the tank, in line with SANS 10089-3:2010.		
			Provision must be made for refuelling at the storage area by protecting the soil with an		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained</p> <p>All empty externally dirty drums must be stored on a drip tray or within a bunded area</p> <p>Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice (SUNSORB is a recommended product that is environmentally friendly)</p> <p>Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used</p> <p>The responsible operator must have the required training to make use of the spill kit in emergency situations</p> <p>In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008.</p>		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>During servicing of vehicles or equipment, a suitable drip tray must be used to prevent spills onto the soil.</p> <p>Leaking equipment must be repaired immediately or be removed from site to facilitate repair</p> <p>Construction area must be monitored for oil and fuel spills</p> <p>Drip trays (minimum of 10cm deep) must be placed under all vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilised. The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing.</p>		
		CONCRETE AND CEMENT			
		<p>The contractors must provide and maintain a method statement for "cement and concrete batching". The method statement</p>	<p>The mixing of concrete must only be done at specifically selected sites on mortar boards or similar structures to contain run-off into soils rocky outcrops, streams and natural vegetation</p> <p>Cleaning of cement mixing and handling equipment must be done using proper cleaning trays</p>	No Action required	<p>The Contractor will be responsible for providing method statements. He will also be responsible for</p>

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
		<p>must provide information on proposed storage, washing & disposal of cement, packaging, tools and plants</p>	<p>All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a licensed facility</p> <p>Any spillage that may occur must be investigated and immediate remedial action must be taken</p> <p>The visible remains either of concrete, solid, or from washings, must be physically removed immediately or disposed of as waste to a registered landfill site</p> <p>Cement batching areas must be located in an area where residues are contained and that the location does not fall within storm water channels</p>		<p>training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>
TOILETS AND ABLUTION FACILITIES	At the end of the construction phase the site and its surrounding area must be free from any sewage that originated as a result of the construction activities.	The contractor must provide method statement for the operation and maintenance of toilets and ablution facilities.	<p>The contractor is responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet must be provided per 30 persons and should include male and female toilets.</p> <p>Sanitary arrangements must be to the satisfaction of the ECO. The contractor must keep the toilets in a clean, neat and hygienic condition. The contractor must supply toilet</p>	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>paper to all toilets at all times. Toilet paper dispensers must be provided in all toilets</p> <p>The contractor must be responsible for the cleaning, maintenance and servicing of the toilets. The contractor must ensure that no spillage occurs when the toilets are cleaned or emptied.</p> <p>The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances</p> <p>Toilets out on site must be secured to the ground and have a sufficient locking mechanism operational at all times</p>		The ECO will monitor compliance.
WASTE MANAGEMENT	At the end of the construction phase the site and its surrounding area must be free from any hazardous or general waste pollution that originated as a result of the construction activities.	The contractors must provide and maintain a method statement for "solid waste management". The method statement must provide information on the proposed licensed facility to be utilised	<p>Waste must be separated into recyclable and non-recyclable waste, and must be separated as follows:</p> <ul style="list-style-type: none"> • Hazardous waste: including (but not limited to) old oil, paint, etc. • General waste: including (but not limited to) paper, plastic, glass and construction rubble <p>Any illegal dumping of waste must not be tolerated, this action will result in a fine and if</p>	No Action required	The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
		and details must be kept of record keeping for auditing purposes	<p>required further legal action will be taken. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request.</p> <p>Bins must be clearly marked for ease of management</p> <p>All refuse bins must have a lid secured so that animals cannot gain access</p> <p>Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's waste generated on the site</p> <p>Subcontractor(s) contracts must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMP. Proof of this undertaking must be issued to the ECO</p> <p>All solid and chemical wastes that are generated must be removed and disposed of at</p>		The ECO will monitor compliance.

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>a licensed waste disposal site. The contractor is to provide proof of such to the ECO</p> <p>Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site</p> <p>A suitably positioned and clearly demarcated waste collection site must be identified and provided The waste collection site must be maintained in a clean and orderly manner. A covered container (Like a skip, with a cover), must be used to contain refuse from campsite bins, rubble and other construction material</p>		
DUST	Dust prevention measures must be applied to minimise the generation of dust.	The contractors must provide and maintain a method statement for "dust control". The method statement must provide information on the proposed source of water to be utilised.	<p>All forms of dust pollution must be managed in terms of the National Environmental Management: Air quality Act, 2004 (Act No 39 of 2004)).</p> <p>Acceptable dust fall rates for residential areas are:</p> <p>Dust fall rate (D) (mg/m²/day, 30 days average): D<600</p> <p>Permitted frequency of exceeding dust fall rate: Two within a year, not sequential months</p>	No Action required	<p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>A standard test method to be used for measuring dust fall rate and the guideline for locating sampling points shall be ASTM D1739. The latest version of this method shall be used.</p> <p>Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be revegetated or stabilised as soon as is practically possible.</p> <p>Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present</p> <p>The construction camp must be watered during dry and windy conditions to control dust fallout.</p> <p>Dust production must be controlled by regular watering of roads and work area, should the need arise</p> <p>During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level</p>		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind</p> <p>Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO</p> <p>Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas</p>		
NOISE	Noise prevention measures must be applied to minimise the generation of unnecessary noise pollution as a result of construction activities on site.	The contractors must provide and maintain a method statement for noise.	<p>All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained.</p> <p>Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise Management.</p> <p>It is proposed that normal working hours are between 08h00 and 17h00 (Mondays to Saturdays). No work will be allowed on</p>	No Action required	<p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
			<p>Sundays or outside of the abovementioned hours.</p> <p>Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers.</p>		
FIRES	Absolutely no burning of waste is permitted.	The contractors must provide and maintain a method statement for "fires", clearly indicating where and for what, fires will be utilised plus details on the fuel to be utilised	Absolutely no burning of waste is permitted.	No Action required	<p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>
	Fires will only be allowed in facilities especially constructed for this purpose.		Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractor's camps. Wood, charcoal or anthracite are the only fuels permitted to be used for fires. The contractor must provide sufficient wood (fuel) for this purpose.		
			Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air.		
			The contractor must designate a smoking area for the labour force so as to prevent unanticipated incidents of veldt fires.		
			No wood is to be collected, chopped or felled for fires from private or public property as well as from no-go or sensitive areas within the site and any surrounding natural vegetation		

NON-OPERATIONAL ENVIRONMENTAL MANAGEMENT PROGRAMME					
ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
FAUNA	No hunting of animals will be allowed.	Plan to ensure that all activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962)	<p>All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna species as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake, a specialist must be called in to safely relocate the animal.</p> <p>Environmental induction training and awareness must include aspects dealing in safety with wild animals into and on site. Focus on animals such as snakes and other reptiles that often generate fear by telling workers how to move safely away and to whom to report the sighting. Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones, etc.</p>	No Action required	<p>The Contractor will be responsible for providing method statements. He will also be responsible for training of staff in this regard.</p> <p>The ECO will monitor compliance.</p>
HERITAGE	No intentional destruction of any sites, features or material of cultural heritage	Conduct a Phase 1 HIA for the development to identify any sites, features or material	In terms of the National Heritage Act, 1999 (Act No. 25 of 1999), construction personnel must be alert and must inform the local heritage agency within 48 hours should they come across any signs of heritage resources.	No action required	<p>The developer and applicant.</p> <p>Study to be conducted by a</p>

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ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
	(archaeological and/or historical) origin or significance may occur.	of cultural heritage (archaeological and/or historical) origin or significance.	<p>Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance.</p> <p>Should any archaeological artefacts be exposed during site activities, work on the area where the artefacts were found must cease immediately and the ECO must be notified immediately.</p> <p>All work must cease immediately, if any human remains are uncovered. Such material, if exposed, must be reported to the South African Police Services, so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences</p>		<p>suitable qualified specialist.</p> <p>Findings to be monitored by the ECO.</p>
CRIME, SAFETY AND SECURITY	All Contractors and sub-contractors must abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.	Plan to appoint a health and safety officer for the construction site.	The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations	No actions required	Health and safety officer.
		Compile an Emergency Response Action Plan (ERAP) prior to	The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of		

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ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS			RESPONSIBLE PERSON
		Pre-construction phase	Construction phase	Operational phase	
		the commencement of the project	<p>the ground, accidents to employees, use of hazardous substances and materials, etc.</p> <p>The contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site.</p> <p>Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc</p> <p>All unattended open excavations must be adequately fenced or demarcated.</p> <p>Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.</p> <p>Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS. The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area</p> <p>Workers must be instructed not to trespass onto adjacent land. Trespassers will be prosecuted.</p>		

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ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS	RESPONSIBLE PERSON
		Operational phase	
ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE	A full copy of the signed EA from DEDECT in terms of NEMA, granting approval for the development must be available on site	Ensure that a signed copy of the EA is available on site.	The Applicant/Operator of the facility.
	A copy of the EMPr as well as any amendments thereof must be available on site	Ensure that a copy of the approved EMPr is available on site.	
	Records of Environmental Monitoring must be available on site.	Ensure that copies of all monitoring outcomes/reports are kept on site.	
STORM AND WASTE WATER MANAGEMENT	The site and its surrounding area must be kept free from any pollution that originated as a result of the operational activities.	Storm water from the site must drain into a sealed oil sump constructed directly downstream of the site in order to intercept possibly contaminated surface run-off from the apron and parking areas.	The Applicant/Operator of the facility.
		Runoff from the surfaced areas at the filling station must be strictly controlled, and contaminated water must be collected, stored and disposed of off-site (by a recognized service provider).	
		All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility.	
		Natural storm water runoff not contaminated by construction activities can be discharged directly into the drainage system.	

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ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS	RESPONSIBLE PERSON
		Operational phase	
		No wastewater may run freely into any naturally vegetated areas. Run-off containing high sediment loads must not be released into drainage channels	
		Approval must be obtained from DW&S for any activities that require authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998).	
		Surface water or storm water must not be allowed to concentrate, or to flow down cut or fill sloped routes without erosion protection measures being in place	
		Ensure that storm water channels do not discharge straight down contours. These must be aligned at such an angle to the contours that they have the least possible gradient	
DANGEROUS AND TOXIC MATERIALS	The site and its surrounding area must be free from any chemical, fuel, and oil spills that originated as a result of the operational activities.	CHEMICALS	The Applicant/Operator of the facility.
		All hazardous substances must be stored in suitable containers as defined in the Method Statement;	
		Containers must be clearly marked to indicate contents, quantities and safety requirements	
		All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers	
		Bunded areas to be suitably lined with a SABS approved liner	
		An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis	

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ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS	RESPONSIBLE PERSON
		Operational phase	
		All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);	
		All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet	
		FUEL AND OIL	
		The regular reconciliation of the volumes of petroleum products must be done to ensure the early detection of leaks.	
		The onsite borehole must be used as a groundwater monitoring point .	
		Groundwater quality samples must be taken at the monitoring borehole. Samples must be taken quarterly for the first year, to determine the monitoring trends, after which monitoring on a bi-annual basis must be continued. All major physical constituents as per SANS 241 must be analysed. Hydrocarbon contamination must be conducted additionally. Once trends have been established, the sampling must be focused on the major determinants, including hydrocarbon contamination.	
		A combined sample must be taken, by means of bailing, from the fuel leak observation wells on a biannual basis to and submitted to an accredited laboratory to ensure the detection of any pollution taking place at the immediate vicinity of the storage tanks.	
		All empty oil cans must be stored in suitable leak proof containers that is situated within a bunded area.	

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ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS	RESPONSIBLE PERSON
		Operational phase	
		Spill kits must be available on site. Spill kits must be made up of material/product that is in line with environmental best practice (SUNSORB is a recommended product that is environmentally friendly)	
		No petrol and diesel to be supplied/used until petrol and diesel is registered under the emergency services by-laws. This is an annual registration.	
		The responsible operator must have the required training to make use of the spill kit in emergency situations	
		In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008.	
		Tanker Trucks delivering fuel must be in good working order.	
		Before connecting any pipes to the delivery tanker trucks, make sure all valves, lines, and connections are secure in order to reduce the chance of either leaks or being doused during transfer.	
		Never leave equipment unattended during transfer operation.	
		Ensure all valves are closed properly before disconnecting pipes from delivery tanker trucks.	
		After the pipes have been disconnected, inspect the truck for any leaks. No trucks will be allowed to leave the area if they are leaking.	

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ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS	RESPONSIBLE PERSON
		Operational phase	
WASTE MANAGEMENT	The site and its surrounding area must be free from any hazardous or general waste pollution that originated as a result of the operational activities.	Waste must be separated into recyclable and non-recyclable waste, and must be separated as follows: <ul style="list-style-type: none"> • Hazardous waste: including (but not limited to) old oil, paint, etc. • General waste: including (but not limited to) paper, plastic, glass and construction rubble 	The Applicant/Operator of the facility
		Bins must be clearly marked for ease of management.	
		All refuse bins must have a lid secured so that the wind and animals cannot gain access.	
		All solid and chemical wastes that are generated must be removed and disposed of at a licensed waste disposal site.	
		Absolutely no burning of waste is permitted	
CRIME, SAFETY AND SECURITY	The operator of the site must abide to the rules and regulations of the Occupational Health and Safety Act, 85 of 1993.	The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).	The Applicant/Operator of the facility.
		The operator of the site must ensure that all emergency procedures are in place. Emergency procedures must include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc.	
		The operator of the site must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations.	

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ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT MANAGEMENT OUTCOME	ENVIRONMENTAL IMPACT MANAGEMENT ACTIONS	RESPONSIBLE PERSON
		Operational phase	
		Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats.	
		Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS. The operator of the must ensure that information posters on AIDS are displayed.	

11. ENVIRONMENTAL AWARENESS PLAN

11.1 INTRODUCTION

Training is essential for ensuring that the EMP provisions are implemented efficiently and effectively. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard.

The Construction Contractor and the Operator of the facility must make allowance for all construction workers (including all subcontractors) and operators of the site during the operational phase that will be working at the site, to attend environmental awareness training sessions (undertaken by the ECO) before commencing work on site. During this training, the ECO will explain the EMP and the conditions contained therein. Attention will be given to the construction and operational processes and how the EMP fits into these processes.

In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimized and environmental compliance maximized.

Environmental awareness training and education should be ongoing throughout the construction phase, and should be undertaken regularly if deemed necessary (especially if it becomes apparent that there are repeat contraventions of the conditions of the EMP), or as new workers come to site. Translators should be utilized where needed.

Environmental awareness could be fostered in the following manner:

- Induction course for all workers on site, before commencing work on site.
- Refresher courses as and when required.
- Daily toolbox talks at the start of each day with all workers coming on site, where workers might be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working.

Courses must be given by suitably qualified personnel and in a language and medium understood by workers/employees.

11.2 ORGANISATIONAL STRUCTURE

This section describes the roles and responsibilities of the key stakeholders involved in the development, implementation and review of the EMP.

11.2.1 PROJECT PROPONENT

The Project Proponent will be the **MG DEVCO (Pty) Ltd**. Ultimately, they will be responsible for the development and implementation of the EMP and for ensuring that the conditions in the eventual

Environmental Authorization (EA) are satisfied. Although construction activities will be contracted out, the liability associated with non-compliance still rests with the Project Proponent. The Project Proponent (and not the Contractor or operator of the facility) is therefore responsible for liaising directly with the relevant authorities with respect to the preparation and implementation of the EMP and meeting EA conditions.

The Project Proponent must inform the Contractor and Operator of the facility of the EA and EMP obligations, as well as **Method Statements** to be prepared and environmental training to be undertaken by the Contractor in terms of these obligations.

The Project Proponent must identify a **Project Manager (PM)** who has overall responsibility for managing the Project, Contractors, Operators and for ensuring that the environmental management requirements are met. During the construction phase, the Project Manager will be the Proponent's construction manager; during the operations phase this role will be fulfilled by the operations manager.

All decisions regarding environmental procedures and protocol must be approved by the Project Manager, who also has the authority to stop any construction activity in contravention of the EMP or EA.

An **Environmental Control Officer (ECO)** must be employed by the Project Proponent for the duration of the project. The ECO should have appropriate training and experience in the implementation of environmental management specifications. The ECO provides feedback to the Project Manager regarding all environmental matters. Contractors are answerable to the ECO (or Project Manager, depending on contractual arrangements) for non-compliance with the requirements stated in the EMP or EA.

11.2.2 ENVIRONMENTAL CONTROL OFFICER (ECO)

The appointed Environmental Control Officer (ECO) is responsible for monitoring the site at regular intervals (including pre-construction set-up and final rehabilitation), in order to ensure that the provisions of this EMP is adhered to and that sound environmental management is ensuing on site.

The ECO must inspect all areas of the site that may be affected by construction-related activities, including the working area, site camp, stockpile areas and access roads. After each ECO inspection the ECO must compile an ECO report detailing the ECO's observations on site, any instances of non-compliance and any issues or aspects that require attention, follow-up or remedial action. The ECO reports must be submitted to the Applicant, the ER, Construction Contractor(s) and the Competent Authority. The ECO inspection reports should include both photographic and written records.

The ECO will have the following responsibilities:

- Maintenance, update and review of the EMP.
- Liaison between the Project Proponent, Contractors, authorities and other lead stakeholders on all environmental concerns.
- Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective.

- Monitoring the performance of the Contractor (and Sub-contractors) and ensuring compliance with the EMP and associated Method Statements.
- Validating the regular site inspection reports, which are to be prepared by the Contractor's Environmental Officer (EO).
- Checking the EO's *record of environmental incidents* (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken.
- Checking the EO's *public complaints register* in which all complaints are recorded, as well as action taken.
- Issuing of site instructions to the Contractor for corrective actions required.
- Assisting in the resolution of conflicts.
- Communication of all modifications to the EMP to the relevant stakeholders.
- Conducting regular audits to ensure that the system for implementing the EMP is operating effectively.

11.2.3 CONTRACTOR

The Contractor should appoint a **Contractor's Representative**, who is responsible for the on-site implementation of the EMP and EA. The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. The Contractor's Representative ensures that all Sub-contractors working under the Contractor abide by the requirements of the EMP.

The Contractor is answerable to the Project Manager (PM) for all environmental issues associated with the project. Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria.

The Contractor will be required to provide the following **Method Statements**, setting out in detail how the management actions contained in an EMP and EA will be implemented in order to ensure that the environmental management objectives are achieved. The Method Statements must be reviewed and approved by the Project Proponent.

- > Stockpiles
- > Excavation stabilisation
- > Oil and chemicals
- > Cement
- > Storage of fuel and oils

- > Use of dangerous and toxic materials
- > Toilets and ablution facilities
- > Waste Management
- > Dust
- > Workshop equipment, maintenance and storage
- > Noise
- > Fires
- > Erosion and sedimentation
- > Flora and Fauna (Including no-go areas)
- > Crime, safety and security
- > Hydrology

The Contractor may appoint an **Environmental Officer (EO)**, or officers, if more than one is required. Their primary role is to coordinate the environmental management activities of the Contractor on site. The EO may be required to perform the following roles:

- Support the ECO in the monitoring and execution of the Contractors or Sub-contractors' Method Statements by maintaining a permanent presence on site.
- Inspect the site as required to ensure adherence to the management actions of the EMP, EA and the Method Statements.
- Complete Site Inspection Forms on a regular basis (eg. daily or weekly).
- Provide inputs to the regular (eg. monthly) environment report to be prepared by the ECO.
- Liaise with the construction team on issues related to implementation of, and compliance with, the EMP and EA.
- Maintain a *record of environmental incidents* (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken, for submission to the Project Proponent.
- Maintain a *public complaints register* in which all complaints are recorded, as well as action taken, for submission to the Project Proponent.

11.3 CHECKLISTS

The table below provide the main mitigation measures and/or management interventions to minimise or reduce the negative impacts and enhance positive impacts identified by the specialists associated with the proposed development.

The intent is for the document to be a live, dynamic document that should be maintained and updated throughout the project lifecycle, *inter alia*, by including the necessary Environmental Authorisation from the approving Authority as an attachment.

The table below provide the main mitigation measures and/or management interventions appropriate to the Planning and Construction Phases of the proposed project. The tables present the objectives to be achieved and the management actions that need to be implemented in order to reduce the negative impacts and enhance the positive impacts per management activity. The associated monitoring and implementation frequencies and the responsible person(s) are indicated.

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
1. Construction and operational activities planning	The construction/operational activities must conform to the conditions of authorisation contained in the Environmental Authorisation and mitigation measures contained within this EMPr	Proponent	Continuous
2. Appointment of the ECO	The Proponent must appoint an independent Environmental Control Officer (ECO) who must monitor the Contractor's compliance with the EMPr and who must complete ECO checklist reports (audits) on a regular basis (at least once a month).	Proponent	Once-off
	The Proponent must provide the ECO with a copy of the EMPr.	ECO	Once-off
	The ECO must form part of the project management team and should attend the monthly project progress meetings.	ECO	Continuous
	The Contractor must ensure that the construction crew attend an environmental briefing and training session presented by the ECO prior to commencing activities on site.	ECO, Contractor	Once-off
3. EMPr	This EMPr must be made binding to the main Contractor and to individual Contractors, and must be included in the tender documentation for the construction contract.	Proponent	Once-off
4. Licences/ permits and permissions	The Proponent must ensure that all pertinent licences/permits, certificates and permissions required for the project have been obtained prior to any activities commencing on site and ensure that they are strictly enforced/adhered to. These documents must be made available on site at all times, and the Contractor must be made aware of their content.	Contractor, Proponent, ECO	Prior to commencement of work
	The Contractor must maintain a database of all pertinent permits and permissions required for the contract.	Contractor, Proponent, ECO	Continuous
5. Method Statements	The Contractor must submit written Method Statements to the PM and ECO for the activities identified during consultation.	Contractor, PM, ECO	As required
	Method Statements must be submitted at least five working days prior to the proposed commencement of work on an activity to allow the PM (and/or ECO) time to study and approve the method statement.	Contractor, PM, ECO	As required
	The Contractor may not commence work on that activity until such time as the Method Statement has been approved in writing.	Contractor, PM, ECO	Continuous
	The Contractor must carry out the activities in accordance with the approved Method Statement.	Contractor, PM, ECO	Continuous

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Under certain circumstances, the PM may require changes to an approved Method Statement. In such cases the proposed changes must be agreed upon in writing between the Contractor and the PM, and appropriate records retained.	Contractor, PM, ECO	Continuous
	Approved Method Statements must be readily available on the site and must be communicated to all relevant personnel. Approval of the Method Statement shall not absolve the Contractor from any of his/her obligations or responsibilities in terms of the EMPr specifications.	Contractor, Proponent	Continuous
6. Existing services and infrastructure	The Contractor must ensure that existing services (e.g. roads, pipelines, power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the PM, ensuring the necessary way-leaves; permissions and permits are in place.	Contractor, PM, ECO	Continuous
	The Contractor must be responsible for the repair and reinstatement of any existing infrastructure that is damaged, or services which are interrupted, at his/her own cost.	Contractor	As required
	The Contractor must adhere to any time limits for the repairs that may be stipulated by the PM in consultation with the Contractor.	Contractor, ECO	As required
7. Environmental incidents	The Contractor must take timeous corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves. The Contractor must adhere to any time limits for such corrective actions that may be stipulated by the ECO in consultation with the PM.	ECO, Contractor	Continuous
8. Labour	Local labour must be used wherever possible to stimulate the local economy.	Contractor	Once-off
	The Contractor should use labour intensive construction measures where appropriate, practical and financially feasible.	Contractor	Once-off
	The workforce should be trained to benefit individuals beyond the completion of the project.	Contractor	Once-off
	The Contractor should use local suppliers where possible.	Contractor	Once-off
	The PM must ensure that all staff working on the project must be in possession of a South African Identity Document or a relevant work permit. A register must be kept on site of all staff working on site.	PM	Continuous
	Equal opportunities for employment should be created to ensure that all sectors of society (especially women) have equal access to such opportunities.	Contractor	Continuous
9. Training of staff	The Contractor must ensure that all construction staff receive environmental awareness training concerning, amongst others, the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts, protection of any animals encountered on site, no-go areas, the use of toilets and basic sanitation, and basic health and safety on site.	Contractor, ECO	Once-off
	It is the Contractor's responsibility to provide the site foreman with environmental training (including explaining the content of the EMPr and any Conditions of Approval) and is to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.	Contractor, ECO	Once-off
	Training must be provided to the staff members in the use of the appropriate fire-fighting equipment.	Contractor, Health and Safety Officer	Once-off
	The Contractor must ensure that all staff operating machinery/construction vehicles are adequately trained to carry out the designated tasks.	Contractor, Health and Safety Officer	Once-off

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
10. Worker health and safety	<p>A Health and Safety Plan must be developed and implemented by the Contractor for the construction period to ensure worker safety.</p> <p>Should any injury be obtained as a result of work the Contractor must ensure the necessary medical attention is received.</p> <p>The necessary Health and Safety file and incident register must be kept on site at all times.</p>	Contractor, Health and Safety Officer	Continuous
11. Site access & traffic management	<p>Construction vehicles, machinery and workers must be restricted to the designated access roads, and may not drive through undeveloped vegetation outside of the existing access route except where that vegetation falls within the authorised working area (development footprint) at the site.</p>	Contractor ECO	Continuous
12. Vegetation clearing	<p>Vegetation clearing may only commence once the working area has been clearly demarcated to the ECO's satisfaction.</p>	Proponent Contractor ECO	Once-off
13. EMPr	<p>This EMPr must be made binding to the main Contractor and to individual Contractors, and must be included in the tender documentation for the construction contract.</p>	Proponent	Once-off
14. Topsoil & subsoil management	<p>Removed topsoil and subsoil should be stockpiled for the duration of the active construction period, and utilized for the final landscaping and rehabilitation of disturbed areas on site.</p> <p>The topsoil must be adequately protected from being blown away or eroded by storm water.</p> <p>Removed subsoil should be stockpiled separately from topsoil.</p> <p>Topsoil should be the final layer applied during rehabilitation, after subsoil/ spoil material has been placed and shaped on the site</p>	Contractor ECO	Continuous
15. Excavations earthworks &	<p>Use of heavy machinery can substantially increase the likelihood, intensity and significance of potential negative environmental impacts, and it is thus essential that earthworks be performed under constant supervision, and that operators must be made aware of all the environmental obligations, as there is always the potential to inflict damage to sensitive areas.</p> <p>Use of machinery should be restricted to only that which is strictly required, and the unnecessary or excessive movement/ use of such machinery must be kept to a minimum.</p> <p>Machinery must enter and exit the site via the indicated access roads, and may not enter/ exit the river channel at any other location.</p> <p>Excavations and earth-moving may only take place within the demarcated working area</p>	Contractor ECO	Continuous
16. Groundwater contamination	<p>Ensure vehicles are serviced and refuelled in bunded areas</p>	Contractor	Continuous
	<p>Ensure vehicles are checked weekly for faults and serviced timeously if faulty</p>	Contractor	As required
	<p>Should any leaks occur ensure contaminated soil is dug up to 1 cm below the level of visible contamination and disposed of as hazardous waste</p>	Contractor	As required
	<p>Drip trays should be placed under all vehicles remaining stationary for more than 24 hours</p>	Contractor	Continuous
17. Noise	<p>Limit construction activities to normal working hours</p>	Contractor	Continuous

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Coincide any excessively noisy activities to minimise duration of inconvenience	Contractor	As required
	Ensure noise standards are complied with and that construction staff are provided with personal protective equipment when undertaking noisy operations	Contractor	Continuous
18. Safety	No children on construction site. Safety fence and controlled access should be enforced Safety signs with necessary information displayed	Proponent Contractor ECO	Continuous
19. No go areas	Any sensitive areas identified as such by the ECO need to be considered no-go areas.	Contractor, ECO	Monthly
20. Stockpiles	Soil stockpiles must not be situated within 50m of any water course.	Contractor, ECO	Monthly
	If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.	Contractor, ECO	Monthly
	Stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding.	Contractor, ECO	Monthly
	Where contamination of soil is expected, analysis must be done prior to disposal of excess soil to determine the appropriate disposal method. Proof from an applicable waste disposal site where contaminated soils are dumped if and when a spillage / leakage occur must be provided to the ECO upon request.	Contractor, ECO	Monthly
	Stockpiles must not exceed 2m in height unless otherwise permitted by the PM and / or ECO.	Contractor, ECO	Monthly
21. Erosion control	Wind screening and stormwater control must be undertaken where required by the ECO to prevent soil loss from the site.	Contractor, ECO	Twice monthly
	The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion, if required by the ECO. Other erosion control measures that can be implemented are as follows: <ul style="list-style-type: none"> • Brush packing with cleared vegetation; • Mulch or chip packing; • Planting of vegetation; and • Hydro-seeding / hand sowing. 	Contractor, ECO Contractor, ECO	Twice monthly
	Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented.	Contractor, ECO	Twice monthly
	All erosion control mechanisms need to be regularly maintained.	Contractor, ECO	Twice monthly
	Re-vegetation of disturbed surfaces must occur as soon as possible after construction activities are completed.	Contractor, ECO	Twice monthly
	No impediment to the natural water flow o site other than approved erosion control or rehabilitation works is permitted.	Contractor, ECO	Twice monthly
	Stockpiles not used in three (3) months after stripping should be seeded to prevent dust and erosion, as advised by the ECO	Contractor, ECO	Twice monthly
22. Hazardous materials	Use and or storage of materials, fuels and chemicals which could potentially leak into the ground must be controlled.	Contractor, ECO	Monthly
	Any hazardous substances must be stored at least 50m from any of the watercourses on site in a bunded area.	Contractor, ECO	Monthly
	The Contractor must ensure that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry. Such materials may also be temporarily stored on drip-trays.	Contractor, ECO	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp must be collected and removed from the site for appropriate disposal at a licenced waste disposal facility or sewage works.	Contractor, ECO	Monthly
	All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material. Such bunded areas must be regularly emptied of accumulated rainwater. Wastewater from such emptying, if contaminated, must be disposed at an appropriately licenced waste disposal facility or sewage works.	Contractor, ECO	Monthly
	In the event of a spill, the Contractor must take prompt action to clear polluted areas and prevent spreading of the pollutants. The Contractor will be liable to arrange for professional service providers to clear affected areas, if required.	Contractor, ECO	As required
	Proper facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater. These pollution prevention measures for storage must include a bunded containment area with a wall high enough to contain at least 110% of any stored volume. This containment area must be sited at least 50m away from any drainage line, in a site approved by the ECO.	Contractor, ECO	Monthly
	Cement storage and batching must only take place in a bunded area, and any runoff		
	Any spillage, which may occur, must be investigated and immediate action must be taken. This must be reported to the ECO and to the relevant authorities if so required by the ECO.	Contractor, ECO	As required
23. Cement and concrete batching	Concrete must not be mixed on the ground, but in a bunded area with any runoff captured for disposal as hazardous wastewater.	Contractor, ECO	Continuous
	The batching area is to be located in an area of low environmental sensitivity, as approved by the ECO.	Contractor, ECO	Once-off
	Cement bags must only be stored in a covered, bunded area and not directly on the ground. Used cement bags must be disposed of as hazardous waste.	Contractor, ECO	Weekly
24. Hydrology and stormwater	Silt fences must be used where required by the ECO to remove any suspended silt from stormwater before it enters the stormwater system.	Contractor, ECO	Monthly
	Temporary cut-off drains and berms must be used where necessary to capture stormwater and promote infiltration.	Contractor, ECO	Monthly
	Stormwater and surface water must be diverted away from excavation trenches, and care must be taken to avoid surface stormwater from the site running into the seasonal pan on the site.	Contractor, ECO	Monthly
	No rubble, litter or sand may be deposited into any freshwater systems or water courses.	Contractor, ECO	Monthly
25. General materials handling, use and storage	Choice of location for storage areas must take into account prevailing winds, distances to the seasonal watercourses (50m minimum), general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary.	Contractor, ECO, Health and Safety Officer	Once-off
	Storage areas must be designated, demarcated and fenced. Storage areas must be secure so as to minimize the risk of crime. They must also be safe from access by unauthorised persons. Fire prevention facilities must be present at all storage facilities.	Contractor, ECO	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	Material Safety Data Sheets (MSDSs) must be readily available on site for all chemicals and hazardous substances to be used on site. Where possible, the available MSDSs should include information on ecological impacts and measures to minimise negative environmental impacts during accidental spills.	Contractor, ECO, Health and Safety Officer	Once-off, as required
	Clear signage must be placed at all storage areas containing hazardous substances / materials.	Contractor, ECO, Health and Safety Officer	Once-off
	The Contractor must be responsible for the training and education of all personnel on site who will be handling the hazardous material about its proper use, handling and disposal. The Contractor must ensure that information on the management of spill and accidental ingestion is kept on site. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.	Contractor, Health and Safety Officer	Once-off
	The provisions of the Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act 85 of 1993 and the SABS Code of Practice must be adhered to. This applies to solvents and other chemicals possibly used in the construction time.	Contractor, Health and Safety Officer	Continuous
	The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.	Contractor, Health and Safety Officer	Continuous
	All excess cement and concrete mixes must be contained on the construction site prior to disposal off site.	Contractor, ECO	Monthly
	Hazardous substances must be stored at least 50m away from any water bodies on site to avoid pollution.	Contractor, ECO	Monthly
26. Fuel storage	Topsoil and subsoil to be protected from contamination.	Contractor, ECO	Monthly
	Fuel and material storage must be away from stockpiles on site in appropriate containers in a bunded area.	Contractor, ECO	Twice monthly
	Chemicals must be mixed on an impermeable surface and provisions must be made to contain spillages or overflows into the soil.	Contractor, ECO	Monthly
	Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. Drip trays may be used for temporary storage of such materials.	Contractor, ECO	Monthly
	Contaminated soil must be contained and disposed of off-site at an approved hazardous waste disposal site.	Contractor, ECO	Monthly
27. Transportation	Material must be appropriately secured to ensure safe passage between destinations during transportation. Loads must have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor must be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.	Contractor, ECO, Health and Safety Officer	Monthly
28. General waste management	Litter generated by the construction crew must be separated on site into general waste and recyclables and collected in covered rubbish bins. General waste is to be removed to a licenced landfill site on a weekly basis and recyclables must be taken to a recycling centre monthly.	Contractor, ECO	Weekly/ Monthly
	Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires shall be allowed on site, unless in designated areas approved by the PM and by the ECO or by the Health and Safety Officer.	Contractor, ECO, PM, Health and Safety Officer	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
	The Contractor must supply waste bins/skips throughout the site at locations where construction personnel are working. The bins must be provided with lids and an external closing mechanism to prevent their contents blowing out and must be scavenger-proof to deter animals that may be attracted to the waste. The Contractor must ensure that all personnel immediately deposit all waste in the waste bins for removal by the Contractor. Bins must be emptied on a weekly basis and the waste removed to the construction camp where it must be properly contained in scavenger, water and windproof containers until disposed of. The bins must not be used for any purposes other than waste collection.	Contractor, ECO	Monthly
	Ensure that no litter, refuse, wastes, rubbish, rubble, debris and builders waste generated on the premises be placed, dumped or deposited on adjacent/surrounding properties during or after the construction period of the project.	Contractor, ECO	Monthly
	If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled.	Contractor, ECO	Monthly
29. Hazardous waste management	The waste, resulting from the use of hazardous materials, must be disposed of at a registered hazardous waste disposal site by a certified waste disposal Contractor as approved by the ECO. A disposal certificate must be obtained from the disposal Contractor.	Contractor, ECO	As required
	Staff must be trained in the identification of hazardous waste.	Contractor, ECO	As required
	Temporary storage and disposal of hazardous waste is regulated by legislation which must be complied with, i.e. the Occupational Health and Safety Act.	Contractor, ECO	Monthly
30. Noise	The Contractor must aim to adhere to the relevant noise regulations and limit noise to within standard working hours.	Contractor, ECO	Monthly
	Construction site camp and other noisy facilities must be located well away from noise sensitive neighbours.	Contractor, ECO	Once-off
	Truck traffic must be routed away from noise sensitive areas, where possible.	Contractor, ECO	As required
	All noise and sounds generated must adhere to SABS 0103 specifications for maximum allowable noise levels for residential areas. No pure tone sirens or hooters may be utilised except where required in terms of SABS standards or in emergencies.	Contractor, ECO	Monthly
	Noisy operations must be combined so that they occur where possible at the same time.	Contractor, ECO	Monthly
	Construction activities must be contained to reasonable working hours. Night-time activities near noise sensitive receptors must not be allowed.	Contractor, ECO	Monthly
	With regard to unavoidable noisy construction activities, the Contractor must liaise with local residents to inform them of such events.	Contractor	As required
	As construction workers operate in a noisy environment, it must be ensured that their working conditions comply with the requirements of the Occupational Health and Safety Act (Act No 85 of 1993). Where necessary, ear protection gear must be worn.	Contractor, ECO, Health and Safety Officer	Monthly
	Noise suppression measures must be applied to all construction equipment where required. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.	Contractor, ECO, Health and Safety Officer	Monthly

Activity/Impact	Action Required	Responsible Party	Monitoring Frequency
31. Worker health and safety	Safety measures, work procedures and first aid must be implemented on site.	Contractor, , Health and Safety Officer	Monthly
	A Health and Safety Plan in terms of the Occupational Health and Safety Act (Act No. 85 of 1993) must be drawn up to ensure worker safety.	Contractor, Health and Safety Officer	Once-off
	Workers must be thoroughly trained in using potentially dangerous equipment.	Contractor, Health and Safety Officer	As required
	Contractors must ensure that all equipment is maintained in a safe operating condition.	Contractor	Monthly
	A safety officer must be appointed.	Contractor	Once-off
	A record of health and safety incidents must be kept on site.	Contractor, , Health and Safety Officer	Monthly
	Any health and safety incidents must be reported to the project manager immediately.	Contractor, , Health and Safety Officer	As required
	First aid facilities must be available on site at all times. All incidents requiring first aid occurring on site must be recorded in the incidents book on site.	Contractor, , Health and Safety Officer	Monthly
	A record must be kept of medication administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against the Contractor.	Contractor, , Health and Safety Officer	Monthly
32. Personal Protective Equipment	Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents.	Contractor, ECO, Health and Safety Officer	Monthly
	Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn where necessary i.e. dust masks, ear plugs etc.	Contractor, ECO, Health and Safety Officer	Monthly
	No person is to enter the portion of the site where construction activities are being undertaken without the necessary PPE.	Contractor, ECO, Health and Safety Officer	Monthly
33. Fauna and Flora	SABS Standards and specifications governing dangerous processes such as welding must be strictly applied, with a view to proper protection of the public and workers.	Contractor, ECO, Health and Safety Officer	As required
	Implement the eradication programme for invasive species in terms of the Conservation of Agricultural Resources Act (Act No. 43 of 1983).	Contractor, ECO	Monthly
	Institute the rehabilitation of areas as soon as construction activity allows it.	Contractor, ECO	As required
	No disturbance, capture or injury of any fauna will be permitted. Should any fauna be found on site it must be removed from site by the ECO or a suitably qualified person.	Contractor, ECO	Continuous

12. MONITORING, AUDITING AND REPORTING

The Applicant **MG DEVCO (Pty) Ltd** is responsible for ensuring that all environmental management measures prescribed in this EMP, as well as any other conditions specified by the relevant authorities, are implemented and adhered to during all phases of the proposed

development. The Applicant may delegate the responsibilities for implementing the requirements to other persons/entities, however the Applicant remains responsible for ensuring that the delegated responsibilities are carried out.

It is the responsibility of the project team or their delegate to ensure that regular monitoring of environmental issues addressed in this management plan is undertaken. The applicant is responsible for the monitoring of the infrastructure.

Site inspections to determine maintenance needs during the operational phase are imperative for good housekeeping.

Internal environmental audits must be undertaken at regular monthly intervals throughout the construction phase to ensure compliance.

The applicant will be responsible for maintaining a database of all records pertaining to the environment for the study area.

All incidents such as spills of toxic or any other substance that may negatively affect the environment must be reported to the relevant authorities.

FINES

The ECO can impose fines on the Contractor for any contraventions of this EMPR. The imposition of fines will enable the ECO to ensure that the requirements of the EMPR are taken seriously by the Contractor.

The Contractor shall be advised in writing of the nature of the infringement and the amount of the fine. The Contractor shall also take the necessary steps (e.g. training) to prevent a recurrence of the infringement.

The Contractor is also advised that the imposition of spot fines does not replace any legal proceedings the authorities, landowners and/or members of the public may institute against the Contractor.

In addition to the fine, the Contractor shall be required to make good any damage caused as a result of the infringement at his own expense.