Rehabilitation, Closure and Liability Management Plan in support of an application by Sasol Mining (Pty) Ltd for the amendment of the Blesbokspruit 90 IS and Rolspruit 127 IS renewed prospecting right

DMR reference numbers: MP 30/5/1/1/2/3080 PR and 14073 PR (renewal)
EXECUTIVE SUMMARY

Sasol Mining (Pty) Ltd has appointed ILISO Consulting (Pty) Ltd, trading as NAKO ILISO, to manage the environmental impact assessment process in terms of the provisions of the National Environmental Management Act, 1998 (107 of 1998) (NEMA), by conducting a Basic Assessment Report (BAR) in respect of the amendment of the renewed prospecting right for coal over various portions of the farms Blesbokspruit 90 IS and Rolspruit 127 IS with Department of Mineral Resources (DMR) reference numbers MP 30/5/1/1/2/3080 PR and 14073 PR (renewal). The proposed amendments are:

- To add the farm Rianel 98 IS into the prospecting right,
- Increase the vertical boreholes from six to forty, and
- Add a directional drilling site on the property Rolspruit 127 IS.

The main aim in developing this rehabilitation and closure plan is to:

- Mitigate the impacts caused by exploration drilling or prospecting activities;
- Restore land back to a satisfactory standard, taking the current biodiversity and future proposed land use into consideration; and
- Prevent any future (not currently anticipated) risks to the environment and people by looking at knowledge gaps that will need to be addressed during operation as part of the rehabilitation, as well as upon closure.

The rehabilitation plan compiled for the proposed project has followed a clear process and is detailed below:

- Legal requirements;
- Soil Preparation for rehabilitation;
- Re-vegetation;
- Alien invasive control plan;
- Monitoring criteria; and
- Costs involved.

A closure liability assessment has been conducted to form part of the BAR and Environmental Management Programme (EMP). The contents of this report is based on the requirements as stipulated under Government Notice Regulations Number (GN.R) 1147 and has resulted in fulfilling the legal requirements for this application of renewal for the prospecting right.
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<td>Basic Assessment Report</td>
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<tr>
<td>DEA:</td>
<td>Department of Environmental Affairs</td>
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<td>DMR:</td>
<td>Department of Mineral Resources</td>
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<td>DWS:</td>
<td>Department of Water and Sanitation</td>
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<td>EA:</td>
<td>Environmental Authorisation</td>
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<td>ECO:</td>
<td>Environmental Control Officer</td>
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<td>EIR:</td>
<td>Environmental Impact Report</td>
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<td>EMP:</td>
<td>Environmental Management Programme</td>
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<td>EP:</td>
<td>Environmental Practitioner</td>
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<td>PRA:</td>
<td>Prospecting Rights Application</td>
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<tr>
<td>RCL:</td>
<td>Rehabilitation and Closure Liability plan</td>
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<td>SHE:</td>
<td>Safety, Health and Environmental Officer</td>
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List of Definitions:

**Alien Invasive Plants:** A species that is not an indigenous species; or an indigenous species trans located or intended to be trans located to a place outside its natural distribution range in nature, however it’s not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

**Accelerated soil erosion:** Soil erosion induced by human activities.

**Annual Rehabilitation Closure and liability Plan:** Updating of this plan on a yearly basis and updating the quantum calculation, to ensure enough funds are available for rehabilitation.

**Bare soil:** Un-vegetated surface, unaltered by humans.

**Compacted soil surface:** A soil surface that has been hardened by an outside source, causing the soil to be more compacted than the surrounding area.

**Continual Improvement:** This is a recurring process resulting from Management Reviews used to enhance the requirements of the Environmental Management Programme in order to improve the overall environmental compliance and performance of an organisation.

**Desiccation cracks:** The soil surface is cracked from surface wash.

**Development Footprint:** In respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity.

**Dispersive:** Is a process that occurs in soils that are particularly vulnerable to erosion by water. In soil layers where clays are saturated with sodium ions (“sodic soils”), soil can break down very easily into fine particles and wash away.

**Duplex soils:** Group of texture contrast soils where the B horizon is dominated by a texture class one and a half (or more) finer than the A horizon (the B horizon is often dispersive). The A horizon is often water repellent and impervious causing a crust.

**Endemic:** Species found in a specific habitat in a specific geographical area, no other species of its kind is found outside of that habitat and geographical area.

**Centre of Endemism:** A name for a geographical area and habitat with endemic species therein.

**Environment:** Means the aggregate of surrounding objects, conditions and influences that influence the life and habits of man or any other organism or collection of organisms.

**Erosion control measures:** The protection of the soil surface and prevention of soil particles from being dislodged and carried away by wind and water through the use of mulch, blankets, mats, or vegetation cover.

**Financial Provision:** Quantum calculation, economic value of the rehabilitation.

**Gabions:** A wirework container filled with rock, broken concrete, or other material with a geotextile fabric lining the centre of the cage.

**Geotextile fabric:** A fabric which allows liquid to flow through and traps sediment.

**Gullies:** Channels cut by flow of water; the depth of the feature is greater than the width and it is caused by surface flow.
Hammocking: Is confined to soils with sandy-texture surface layers and is the result of re-sorting of sand by wind and water. The fine grained soil accumulate around obstacles.

Environmental Policy: Sets the overall intention and direction of the organisation with regard to its environmental compliance and performance as agreed upon by top management. The Policy provides a framework for action and for the setting of environmental objectives and targets.

Indigenous: Means a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.

Invasive: Means any species whose establishment and spread outside of its natural distribution range- (a) threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; (b) may result in economic or environmental harm or harm to human health.

Rehabilitation: Restore an area to what it was prior to disturbance.

Remediation: Restore the ecological function of the area but unable to restore it to its original state.

Ripping: Breaking up the compacted surface at 300mm deep to improve infiltration rates.

Scarifying: Braking up soil clods that have been exposed as a result of ripping.

Sediment control measures: The removal of soil particles after they have been dislodged (through settling or filtration).

Sheet erosion: Is the progressive removal of very thin layers of soil across extensive areas by wind and water.

Soil conservation work: Means any work which is constructed on land for-
(a) the prevention of erosion or the conservation of land which is subject to erosion;
(b) the conservation or improvement of the vegetation or the surface of the soil;
(c) the drainage of superfluous surface or subterranean water;
(d) the conservation or reclamation of any water source; or
(e) the prevention of the silting of dams and the pollution of water.

Soil Degradation: Is a negative alteration of the natural soil profile, directly or indirectly related to human activity.

Soil Erodibility: The susceptibility for soil to erosion.

Soil Erosion: Is a natural process whereby the ground level is lowered by wind or water action and may occur as a result of inter alia chemical processes and or physical transport on the land surface.

Soil Erosion pavements: A surface covered by pebbles and rock fragments, protecting the underlying surface from further erosion.

Soil Erosion Potential: The susceptibility of the soil to be eroded.

Species: means a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population.

Sow seeds: Scatter seeds on the surface of the ground

Till: To incorporate the seeds in to the soil by ploughing or rolling
Waste (domestic): Means waste, excluding hazardous waste that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes.

Waste (inert): Means waste that does not undergo any significant physical, chemical or biological transformation after disposal; does not burn, react physically or chemically biodegrade or otherwise adversely affect any other matter or environment with which it may come into contact; and does not impact negatively on the environment, because of its pollutant content and because the toxicity of its leachate is insignificant.

Waste (General): Means waste that does not pose an immediate hazard or threat to health or to the environment, and includes domestic waste; building and demolition waste; business waste; and inert waste.

Waste (Hazardous): Means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Waste disposal facility: Means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premise.

Water repellent: When a soil surface has been dehydrated the surface becomes hydrophobic and stops therefore stops infiltration and increases runoff.

Sensitive Receptors: A person or place where involuntary exposure to pollutants released by the proposed project could take place.
1. INTRODUCTION

This document is a Rehabilitation and Closure Liability plan (RCL) which acts as a guideline to be applied by all contractors and employees of Sasol Mining for the prospecting activities on the renewed amended prospecting right granted to Sasol Mining on portions of the farms Blesbokspruit 90 IS, Rolspruit 127 IS and Rianel 98 IS, with Department of Mineral Resources (DMR) reference numbers MP 30/5/1/1/2/3080 PR and 14073 PR (renewal). In terms of the National Environmental Management Act, 1998 Act (Act No. 107 of 1998) (NEMA) Regulation GN.R 940 promulgated on 31 October 2014 and GN.R 1147 promulgated 20 November 2015, Financial Provision for Rehabilitation is to be established with three rehabilitation sub-sections in the plan (rehabilitation annually, for closure and residual) must be submitted with the final BAr to DMR for authorisation of the prospecting right. Thus, this plan is a legal requirement and the approach will be to outline all the objectives to achieve rehabilitation and guidelines on how to achieve these objectives.

The main principles are therefore as follows:

- Adhere to all statutory and other legal requirements;
- To develop landforms supporting stable and functioning ecosystems, are aesthetically acceptable on closure and will gradually sustain the desired land-uses post closure;
- Ensure safety & health of all stakeholders and their animals during rehabilitation, closure and post closure;
- Ensure that rehabilitation and closure supports productive uses by considering pre-prospecting conditions and the proposed status of the area is in agreement with the stakeholders;
- Promote bio-diversity and biological sustainability to the maximum extent practicable;
- Utilize Rehabilitation and closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance;
- To minimise erosion in areas that are already disturbed;
- To ensure that the impacted areas are free draining, where possible;
- Minimise the establishment of alien vegetation;
- Protect drainage lines and watercourses;
- Ensure that no temporary infrastructure is left on-site during long periods of cessation or upon closure; and
- ensure environmental risks are minimised.

The minimum content of the rehabilitation, decommissioning and mine closure plan are specified in regulations promulgated in terms of NEMA GN.R 1147, 2015: Regulations Pertaining to the Financial Provision for prospecting, exploration, mining or production operations.

- Details of the team that prepared the plan and the professional registrations and experience of the preparers;
- Objective of the final rehabilitation, decommissioning and closure plan;
- An overview of environmental and social context that may influence closure activities or be influenced by closure activities, including stakeholder issues, expectations on proposed final land use and comments that have informed the plan;
Details of the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks/impacts and describes the nature of residual risks/impacts that will need to be monitored and managed post closure;

A schedule, budget, roles and responsibilities for rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure;

Identification of knowledge gaps while on site and how these will be addressed and filled (through on site toolbox talks);

Details of the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure;

Future monitoring, auditing and reporting requirements, including a re-assessment of the risks/impacts to determine whether after the implementation of the closure strategy the residual risk is acceptable to the prospecting operation and stakeholder; and

Assumptions and inputs, scope changes, the effect of a further year's inflation, new regulatory requirements and any other material developments.

2. PROJECT BACKGROUND AND LOCALITY

Sasol Mining has been mining coal in the Secunda area for more than fifty years and requires additional areas as a significant portion of the mining right areas have been exhausted. To sustain Sasol’s petrochemical operations, Sasol Mining has commenced with the implementation of a long-term strategy to ensure that Sasol’s operations will extend beyond 2050 sustainably.

To this end, Sasol Mining submitted various new prospecting and mining right applications and also acquired a number of prospecting and mining rights adjacent to the Secunda Complex from third parties. All these applications are aimed at optimising Sasol Mining’s existing Secunda Complex, thus ensuring the sustainability of Sasol as one of the largest contributors to the local and national economy and the retention of existing employment opportunities.

Among the rights acquired, Sasol Mining obtained a prospecting right for coal from Sandawana Coal Mining Company (Pty) Ltd in August 2014, (prospecting right valid from 16 January 2013 until 15 January 2016) over the following properties:

- Blesbokspruit 90 IS: Portions 1, 8,15-24 and 28; and
- Rolspruit 127 IS: Remainder and Portions 1 and 5.

On 15 October 2015, an application for the renewal of the prospecting right with Department of Mineral Resources (DMR) reference number MP 30/5/1/12/14073 PR was submitted to allow for the drilling of six additional vertical boreholes. It must be noted that the renewal application has not been granted by the DMR yet and that no drilling may commence until the application has been granted. However, it became soon evident that Sasol Mining requires substantially more detail on the coal seam and an application for the amendment of the right was submitted to the DMR on 21 November 2016 to:

- Increase the number of boreholes from 6 to 40;
- Include the farm Rianel 98 IS; and
• Add directional drilling as an alternative prospecting method (currently planned on Portion 1 of the farm Rolspruit 127 IS)

These amendments are considered significant and in terms of the Environmental Impact Assessment Regulations, 2014 (as amended in 2017), GN.R. 982, Regulations 31 and 32 promulgated in terms of NEMA, Sasol Mining has to apply for Environmental Authorisation from the Competent Authority, in this case the DMR.

The detail of the relevant Regulations is provided below:

**Regulation 31:**

“An environmental authorisation may be amended by following the process prescribed in this Part if the amendment will result in a change of scope of a valid environmental authorisation where such changes will result in an increased level or nature of impact where such level or nature of impact was not:

(a) assessed and included in the initial application for environmental authorisation; or

(b) taken into consideration in the initial environmental authorization; and

(c) the changes does not, on its own, constitute a listed or specified activity”

**Regulation 32:**

(1) The holder must-

(a) Within 90 days of receipt by the competent authority of the application made in terms of regulation 31, submit to the competent authority a report, reflecting-

(i) An assessment of all impacts related to the proposed change;

(ii) Advantages and disadvantages associated with the proposed change;

(iii) Measures to ensure avoidance, management and mitigation of impacts associated with such proposed changes; and

(iv) Any changes to the EMPr

In addition to following the NEMA process, Sasol Mining lodged an application in terms of section 102 of the MPRDA to:

• Add the farm Rianel 98 IS to its Blesbokspruit/Rolspruit prospecting right;
• Increase the number of boreholes from six to forty; and
• Add one directional drilling as an alternative prospecting method (to investigate access in the coal seam).
3. ENVIRONMENTAL DESCRIPTION

3.1. Geology and Soils
Shale, Sandstone or mudstone of the Madzaringwe formation (Karoo Supergroup) or the intrusive Karoo suite dolerites feature prominently in the area (Mucina and Rutherford, 2006; 397). Several coal horizons occur as part of a succession of sedimentary rocks belonging to the Vryheid Formation of the Ecca Group (part of the Karoo Supergroup). The economic mining horizon is the Number 4 Lower Coal Seam with a low mining potential for the Number 3 Coal Seam in isolated areas. Apart from the coal seams, the Vryheid Formation consists mostly of sandstones with intercalated siltstone zones. This Vryheid Formation has intensively been intruded by dolerite dykes and sills.

3.2. Climate
Summer rainfall region with cool temperate climate and fluctuating with fluctuation of high extremes temperatures in mid-summer and mid-winter, where the winter months with experience frequent frost over the winter months (Mucina and Rutherford, 2006; 397).

3.3. Vegetation and the Landscape
The various land areas are located within the Soweto Highveld Grassland vegetation type, with a section of the northern portion of the Blesbokspruit-Rolspruit-Rianel prospecting right area (PRA) located within the Eastern Highveld Grassland vegetation type which consists of gently to moderately undulating landscapes on the Highveld plateau supporting short to medium-high dense, tufted grassland dominated almost entirely by Thyma triandra and accompanied by a variety of Heteropogon contortus and Triostachya leucothrix. In undisturbed areas scattered small wetlands occurring with narrow stream alluvium pans and occasional ridges of rocky outcrops interrupt the continuous grassland cover (Mucina & Rutherford, 2006). According to the National Biodiversity Assessment (NBA, 2011), some sections of the various PRAs are located within the remaining of both these vegetation types, both of which is considered to be Vulnerable ecosystems.

According to the National Freshwater Ecosystem Priority Area (NFAPA) database (2011), a portion of the southern section of the Blesbokspruit-Rolspruit-Rianel sites is located within an area considered to be a Freshwater Ecosystem Priority Area, sub-quaternary catchment reach. All the areas contain both natural and artificial wetlands, although the majority of the wetlands are considered to be in a heavily to critically modified ecological condition. Some wetlands are considered (according to the NFAPA database) to be in a natural or good, or a moderately modified ecological condition. All of the properties fall within wetland vegetation types considered to be critically endangered, namely the Mesic Highveld Grassland Group 3 and Group 4 wetland vegetation types (NFAPA, 2011); The NFAPA Rivers database (2011) identified the Rolspruit and an unnamed tributary of the Rolspruit to be associated with the Blesbokspruit-Rolspruit-Rianel Protected River PRA. According to this database, a portion of the Rolspruit is considered to be in a natural/unmodified ecological condition, while the remaining portion as well as the unnamed tributary is modelled as not intact according to the national land cover assessment.
3.4. Heritage

Stone and Iron Age

Very little habitation of the highveld area took place during Stone Age times. Tools dating to the Early Stone Age (ESA) period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River, or in sheltered areas near mountains. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. The MSA is a technological stage characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology. Open sites were still preferred near watercourses. These people were adept at exploiting the huge herds of animals that passed through the area, on their seasonal migration.

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Some sites are known to occur in the larger region (Wadley & Turner 1987). Also, for the first time we get evidence of people’s activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA. The LSA people have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual beliefs – some sites containing rock art are located further to the south in the Bethal region.

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom south of Hartebeespoort Dam dating to AD 470. Having only had cereals (sorghum, millet) that need summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior highveld area. Because of their specific technology and economy, Iron Age people preferred to settle on the alluvial soils near rivers for agricultural purposes, but also for firewood and water.

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and the Mpumalanga highveld.

This wet period came to a sudden end sometime between 1800 and 1820 by a major drought lasting 3 to 5 years. The drought must have caused an agricultural collapse on a large, subcontinent scale.

This was also a period of great military tension. Military pressure from Zululand spilled onto the highveld by at least 1821. Various marauding groups of displaced Sotho-Tswana moved across the plateau in the 1820s. Mzilikazi raided the plateau extensively between 1825 and 1837. The Boers trekked into this area in the 1830s. And throughout this time settled communities of Tswana people also attacked each other.

As a result of this troubled period, Sotho-Tswana people concentrated into large towns for defensive purposes. Because of the lack of trees they built their settlements in stone. These stone-walled villages were almost always located near cultivatable soil and a source of water. Such sites are known to occur near Kriel (e.g. Van Schalkwyk 1998, 2000; Pelser, et al 2007) and in the Standerton region (Derricourt & Ewers 1973).
Historic period

White settlers moved into the area during the first half of the 19th century. They were largely self-sufficient, basing their survival on cattle/sheep farming and hunting. Few towns were established and it remained an undeveloped area until the discovery of coal and later gold. The establishment of the NZASM railway line in the 1880s, linking Pretoria with Lourenço Marques and the world at large, brought much infra-structural and administrative development to the area. This railway line also became the scene of many battles during the Anglo-Boer War and a concentration camp was established near the Balmoral station, north of study area.

During the Anglo-Boer War, a number of skirmishes occurred in the larger region, with one of the last and biggest battles fought that being at Bakenlaagte south of the town of Kriel on 30 October 1901. In line with the ‘scorched earth’ policy, most farmsteads were destroyed by the British during the latter part of the hostilities.

Coal mining occurred only sporadically in the area. However, with the discovery of the Witwatersrand gold fields, the need for a source of cheap energy became important, and coal mining developed on a large scale in various regions. By 1899, at least four collieries were operating in the Middelburg-Witbank district, supplying the gold mining industry.

3.5. Land Cover

The land cover is dominated by game farming, agriculture or grazing lands with occasional farm houses and farm infrastructure. Further detail on the site below:

- It is clear that there are Critical biodiversity areas, wetlands, streams, drainage lines and springs scattered across the landscape. These systems will be conserved and have been considered in the process of allocating the borehole sites and road networks.
- Precautionary measures have been identified and adopted (such as water quality monitoring and water course protection mechanisms) to ensure the protection of the water resources, watercourse and springs.
- The land use practices in the area consist of agriculture (Fodder, Maze and Soya beans). Game breeding and livestock farming. All these aspects were considered when determining where to place boreholes and road networks. The principle adopted during the basic assessment process was to cause the least damage to any productive land or to avoid hindrance to any animals in the process of activities.
- It has been recommended that:
  - all works planned to take place in agricultural lands, should occur when the land is fallow (whenever possible).
  - game camps were avoided, where possible;
  - in the productive grasslands (used to commercially provide fodder) the positions of the boreholes were moved to the peripheries to reduce impact, where possible.

Identified Heritage sites as seen on the sensitivity map Figure 1.
• Two informal burial places approximately 40 m apart were seen. It is possible that these are single burial site, but due to the tall grass, it was difficult to establish this. The smaller section has about 10 graves, and the larger section about 30 graves. Most of them have no headstones with inscriptions. The graves all seems to belong to former farm labourers. These features are viewed to have high significance on a local level.

• The ruins of what seemed to be a farm labourer homestead, consisting of a single house structure. Only the foundations remain. Although no graves were noticed, it is possible that there might be some belonging to infants that were buried in the homestead. This feature is viewed to have low significance on a local level.

• The ruins of a farm labourer homestead, consisting of a number of house structures, refuse middens and a cattle enclosure. Only the foundations of the different features remain. One feature has been identified as a grave: an elongated stone cairn; it is possible that there might be some graves belonging to infants that were buried inside the homestead.

3.6. Social and Socio-Economic Aspects

The main economy in the Govern Mbeki Local Municipality is dominated by mining (39%) and manufacturing (24%) activities, which contributes the most in terms of gross domestic product in the area. The gender distribution for GMM is predominantly evenly spread out with males (52%) dominating females (48%). However, the population income is broken up as follows:

• 17% of the employed population in GMM earn an annual salary of between R9 601 and R19 600, whilst 4% earn between R1 and R4 800;
• 7% earn between R4 801 and R9 600. Further, 19% of the employed population earn an annual salary between R19 201 and R38 400;
• Approximately 62% of the employed population earn a salary between R1 and R38 400 annually, which sets the basis for a low paid labour force and high poverty rates in GMM; and
• Approximately (15%) of the economically active population has no income.

The economy of the municipality is highly reliant on the petrochemical sector and coal mining by companies such as Sasol Mining, Pan African Resources, Anglo Coal, Shanduka Coal, Sudor Coal and other small/emerging mining houses which hold prospecting rights for extraction of the minerals.

4. PROSPECTING METHOD: VERTICAL AND DIRECTIONAL DRILLING

A number of activities will be undertaken when doing vertical and directional drilling for prospecting. The activities are detailed below:
• Maintenance of a road to the directional drilling site, which includes addressing drainage and upgrade of storm water infrastructure;
• Site establishment at the directional drilling site and at the vertical sites;
• No stripping of topsoil over the vertical hole area, however stripping will occur over the actual hole;
• Stripping topsoil over the footprint of the directional drilling site and area to be used for storing equipment;
• Digging two plastic lined sumps at the directional drilling sites (by taking the topsoil off (~150mm) storing it to the side then removing 300mm of fertile soil (dark organic soil) and storing it to the side (topsoil and fertile soil are to be preserved in the same manner) then excavating the remainder of the material and storing it with all inert material excavated or drilled;
• Pouring or constructing or throwing a number of concrete slabs on the directional drilling site for laydown areas, stores and offices.
• Establishing temporary cooking and security facilities.

4.1. Vertical drilling activities

Diamond drilling operations will be carried out for the purpose of retrieving core samples and laboratory analyses will be performed on the core samples to establish the coal quality and rock properties. No pits or trenches will be constructed. Exploration boreholes, each up to a depth of approximately 100 - 300 m averaged over 150m over a proposed period of three years will be drilled. However, a 20% additional or reduction of boreholes may be necessary depending on the new geological information gathered during the initial stages of the drilling program. On average, a borehole takes approximately five days to complete.

The drill rigs are truck-mounted and equipped with diesel driven engines to provide power to the drill. A truck fitted with a water tank is used to provide the water supply for the drilling process. The drill site is not larger than 30 m x 20 m (600 m²) and consists of a drill rig, water pump, caravan and portable chemical toilet.

The directional drill site is not larger than 100 m x 100 m (10 000 m²) and consists of drilling water sumps, a diesel-powered drill rig, a truck transporting drill rods and various other equipment, a generator, portable offices and chemical toilets. There is access control and a security fence around the site.

On completion of the a vertical borehole, it is cemented from the bottom up to 300 mm below surface, and 600 mm from surface in agricultural fields. The site will then be rehabilitated to acceptable standards. Rock fragments or cores are washed out the top of the hole and are sampled at 10 m depth intervals and collected in small bottles and sent to the laboratory for coal analysis.

Topsoil removed from the Vertical drilling hole site is then placed to the top of the hole to allow for vegetation growth. The following can be noted in the operations (see Figure 1):

• Site establishment
• Portable sumps
• Stripping of topsoil over the proposed drilling site the rest of the sites existing vegetation will be mowed.
• Establishing temporary cooking facilities and security facilities.
• Temporary fencing activities to demarcate the area.

Figure 1: Vertical drilling site

4.2. Directional Drilling Operations
A directional percussion (open-hole) borehole will be drilled laterally (up to 1500 m horizontal depth in-seam) and geo-physically surveyed to gather additional geological information between other boreholes. For this purpose, down-hole geophysical instruments and methods will be used to confirm lithological types within the coal seam and overlying strata. Operations at the directional drill site will continue for approximately one year to eighteen months.

4.2.1. Setting out drilling site
The drilling contractor, in conjunction with the representative from Sasol Mining Directional Drilling section, shall establish, verify and mark out the set-out point from where all set-out work will be performed during the construction period. A detailed sketch of the directional drilling site can be seen in Figure 2 below.
Figure 2: Directional Drilling Layout plan with dimensions
The total area for the immediate drilling site is 100 x 100 meters, including a 5 meter firebreak around the perimeter and topsoil stockpile area;

- The area required as hardstands is 70 x 60 meters, on one side of the site; and
- Two sumps 16mx16mx4m to receive the waste water from drilling activities.
- Sump drying pad (10mX10m), all material stored on this slab will be transported to a registered waste facility.

4.2.2. Clearing, grubbing and stripping of topsoil

Although no protected plants were observed during the site visit, the Environmental Practitioner shall evaluate the site for the presence of any protected plant species. If any protected plants are observed they shall be demarcated and protected against accidental or deliberate damage or destruction. The total directional drill site extend shall be cleared and grubbed (see Figure 2) including the five meter firebreak. The road to the directional site are mostly existing and will be resurfaced with dolerite, however these road do not extend all the way to the directional drilling site, and an additional 150m, not wider than 4m, road extension will be built to the directional drilling site, this site is to be cleared, topsoil striped and prepared. The road extension will include stripping of topsoil, compacting the surface and surfacing the road with dolerite. In addition, all activities will be conducted in line with Appendix A.

The process of clearing and grubbing and stripping of topsoil will be done as follows:

- Remove all vegetation and overburden from the site and road areas and stockpile at an agreed location on site for use during the rehabilitation process.
- When preparing an access road to the directional drilling site the topsoil will be stripped to a depth of ~150mm and stored on site at an agreed location (further than 500m of any drainage line or watercourse).
- The topsoil will be stored in windrows of a maximum of 2m height (no double handling will be allowed of the stripped topsoil) and protected to avoid erosion, soil loss and contamination.

4.2.3. Access Road to be established for directional drilling

The extended access road will be cleared to a maximum length of 150m and a width of 4m. After grubbing and clearing of the demarcated road extension, the access road will be restored and build according to the following parameters:

- the aggregate (dolerite) used for road building will be imported from a licensed commercial source.
- the material will be placed on the road surface area.
- the surfacing will then be compact in ±150mm layers to a 95% Mod Ash density.
- a final 300mm layer of weathered dolerite will be placed onto the prepared area.

All earthworks, and/or road works must be constructed in accordance to Appendix A, and the SANS Specifications.
4.2.4. Directional Drill site footprint
The area will be levelled and provision will be made for surface runoff so that no water accumulates on site and the site is free draining. The levelling activity will take place only after all the topsoil has been stripped and fencing erected at the directional drilling site.

4.2.5. Concrete slab
After grubbing, clearing, and topsoil stripping at the directional drilling site, a 500 micron black plastic non U/V resistant sheeting of 40 x 40 meters will be placed at the concrete slab position prior to dolerite placement for the hardstand area. The seams of this sheeting must be heat welded to block any potentially contaminated water ingress into the underlying soils.

A wood floated concrete slab (compressive strength of 35 MPa) 2.5 meter in radius and 500mm thick will then be constructed at the borehole position. The slab will be level with the dolerite surface area surroundings and sloped towards the central drain hole at a 50 mm fall in a circular pattern that dips towards the center. The trench for the slab and drain pipe is usually made after the hardstand has been completed. The central drain of the slab must be 150 mm deep and 1000 mm in diameter. The floor of this central drain must have a slope towards one side so that water can run away in that direction. In that corner, a 150 mm PVC drain pipe, linking the slab and the sumps, must be buried in the ground below the slab, and the concrete poured over. The slope of the PVC run-off pipe must be sufficient to carry cutting debris from the drilling process all the way to the sumps. This trench for the run-off pipe as well as the trench for the concrete slab must be lined with 500 micron plastic sheeting to prevent potentially polluted water ingress.

When there is not sufficient drop in the ground level to the dam, the following shall apply:

1. The minimum thickness of the concrete over the pipe must be 200mm, to allow the pipe to be lifted up into the concrete slab to create a fall.
2. The concrete (ready mixed transported to site) at the bottom of the pipe must go 200mm deeper into the ground. The total thickness of the slab will then be 600mm in the area of the pipe.

4.2.6. Sumps
The two (2) required sumps will be excavated to the following dimensions (or as instructed by Sasol Mining as dictated by site conditions). Maximum side slopes to be 1:1.5. A Civil Engineer has to approve steeper side slopes. If it is possible to dig the sumps first then excess weathered dolerite material from these could be used on site as directed by Sasol Mining personnel.

The sump size is 15m x 15m x 3.4m deep per sump with a capacity of +/-1 800m³ (for the two sumps), divided by a centre wall with a surface width of 5 meters. A lined V- drain of 500mm deep between the sumps needs to be constructed.

The Sumps and V-drain must be lined with 550 GSM reinforced PVC sheets, glued or welded together to prevent leakage (seepage) of water. The excavated topsoil and fertile soil (dark organic matter) must be stockpiled separate from the rest of the excavated material for reuse as topsoil and fertile soil during the rehabilitation process. The rest of the excavated material will be stockpiled directly behind the sumps with a small berm around the sumps preventing surface water / flood water to enter the sumps.
Deviation from the prescribed sump dimensions could be made if ground conditions dictate. Prior written approval from the Sasol Mining representative to do so is required.

(NOTE: The capacity of the two sumps shall always be the same. Site establishment on cultivated land might require the design to differ slightly from Appendix A resulting in additional costs, this is to be agreed upon with Sasol Mining and the drilling contractor.)

4.3. Fencing
All fences and gates will be erected on the boundaries of drilling sites, as per Figure 1 and 2 and Sasol standards and specifications (Appendix A) prior to any commencement of works on the footprint. The site and site dividing fence must be in line with the standard operating procedure. Time will be allowed for fences to be erected prior to the excavation of the sumps. Fences and gates are to remain maintained at all times and gates are not to be left open at any time.

5. REGULATORY REQUIREMENTS AND CONDITIONS FOR CLOSURE

5.1. Summary of applicable legislation
Applicable legislation in South Africa is reviewed and updated/amended on a regular basis to incorporate newly arising scenarios as well as new knowledge gained. Between the DMR and the Department of Environmental Affairs (DEA), there is a shared responsibility to prospect the mineral sustainably and look after the natural environment, hence current legislation overlaps to some degree. Whilst the BA and Rehabilitation and Closure Liability plan are being submitted to the DMR, specifications of current and future legislation and guidelines from NEMA have also been perused and incorporated where deemed applicable in this document.

The legislation used as guideline for this document hence include:

- The MPRDA and associated guidelines.
- The NEMA and all subsequent amendments, especially:
  - Environmental Management (Act No. 107 of 1998) Regulation GN.R 1147, pertaining to the financial provision for prospecting, exploration, mining or production operations, promulgated November 2015 under NEMA.

Herewith a summary of current regulations pertaining to the financial provision for the rehabilitation, closure and post closure of prospecting operations. A holder of a prospecting right must make financial provision through a detailed inventory of required activities for:

(a) Rehabilitation (annual, closure and final or residual).
(b) Decommissioning and closure activities at the end of prospecting or possible premature closure of the mine.

(c) Remediation and management of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water.

(d) An annual assessment reviewing:

(i) the annual rehabilitation plan
(ii) the final rehabilitation, decommissioning and mine closure plan
(iii) the environmental risk assessment report
(iv) the financial provisions related to the above

The above needs to be reviewed on an annual basis and updated according to the necessary actions as well as costs involved.

5.2. Details of Applicable Legislation

Abbreviated Legal Register for Rehabilitation

The following summarises all the Acts focusing on human rights, protection of the environment, accountability and financial provision to be considered by Sasol Mining with the proposed prospecting project:

- National Water Act (Act No. 36 of 1998) (NWA) (section 36), and
- Amendments, with specific reference to the NWA Regulations GN. R 704 of 1999 and use of Water for Mining and Related Activities aimed at the Protection of Water Resources.
- Spatial Planning and Land Use Management Act (Act No. 16 of 2013).
- National Environmental Management Waste Act (Act No. 59 of 2008) and amendment in 2012
- National Heritage Resources Act (Act No. 25 of 1999).
Promotion of Access to Information Act (Act No. 2 of 2000).
Health Act (Act No. 63 of 1997).
Plant Improvement Act (Act No. 53 of 1976).
Occupational Health and Safety Act (Act No. 85 of 1993);
Fertilisers, Farm Feeds, Agricultural remedies and Stock Remedies Act (Act No. 36 of 1947).
Land Survey Act (Act No. 8 of 1997).
Guideline on the Compilation of a Mandatory Code of Practice on Mine Residue Deposits.
Convention of Wetlands of International Importance especially as Waterfowl Habitat RAMSAR (in force in SA from 12 Dec 1975).
The law on Conservation of Agricultural Resources Act (Act No. 43 of 1983) states that the degradation of the agricultural potential of soil is illegal.
The Bill of Rights states that environmental rights exist primarily to ensure good health and well-being, and secondarily to protect the environment through reasonable legislation, ensuring the prevention of the degradation of resources.
The Environmental right is furthered in the National Environmental Management Act (Act No. 107 of 1998) (NEMA), which prescribes three principles, namely the precautionary principle, the “polluter pays” principle and the preventive principle.
It is stated in NEMA that the individual/group responsible for the degradation/pollution of natural resources is required to rehabilitate the polluted source.
Soils and land capability are protected under the National Environmental Management Act (Act No. 107 of 1998) (NEMA), the) and the Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA).
The National Veld and Forest Fire Act 101 (10 July 1998) and the Fertiliser, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947) can also be applicable in some cases.
The National Environmental Management Act (Act No. 107 of 1998) NEMA requires that pollution and degradation of the environment be avoided, or, where it cannot be avoided be minimized and remedied.
The MPRDA requires an EMPR, in which the soils and land capability be described.
The Conservation of Agriculture Resources Act (Act No. 43 of 1983) (CARA) requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and water courses are also addressed.
Minerals and Petroleum Resources Development Act (Act No.28 of 2002)

The legal framework for the Regulation of the mining industry underwent transformation with the promulgation of the Minerals and Petroleum Resources Development Act, (Act No.28 of 2002) (MPRDA), which came into effect on the 1 May 2004. Regulations in support of the MPRDA were published in April 2004 (Government Gazette 26275, Regulation 527). These requirements and a summary of other regulatory considerations are discussed below.

- In section 37 of the MPRDA, it has been confirmed that the principles set out in NEMA apply to all prospecting and mining operations; and the generally accepted principles of sustainable development is to be implemented. This is further supported by the stated objective in the MPRDA, being to “give effect to section 24 of the Constitution by ensuring that the nation’s mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development”.

- Section 38 stipulates that the general objectives of integrated environmental management must be applied in accordance with NEMA, which is to include the assessment and management of impacts identified as part of the environmental management programme (EMP). This process has been detailed in sub-regulation 39 regulation GN.R 527 of NEMA which specifies that the EMP must include environmental objectives and specific goals for mine closure.

- The applicant for a prospecting right must make prescribed financial provision for the rehabilitation or management of negative environmental impacts, which must be reviewed annually (sub-regulation 41) regulation GN.R 527 of NEMA provides principles for mine closure (regulations 56 and 60), which state that the holder of a mining right must ensure:
  - The closure of its mining operation incorporates a process which starts at the commencement of operation and continues throughout the life of mine.
  - Risks pertaining to environmental impact are quantified and managed proactively, which includes gathering relevant information throughout the mine’s operations.
  - Safety and health requirements of the Mine Health and Safety Act (Act No. 29 of 1996) (MHSA) are complied with:
    - Residual and possible latent environmental impacts are identified and quantified.
    - The land is rehabilitated, as far as practicable, to its natural state, or to a predetermined and agreed standard or land use which conforms to the concept of sustainable development.
    - Prospecting operations are closed efficiently and cost effectively.
    - Key objectives for mine closure to guide project design development and management of environmental impacts are included in the EMP.
    - The EMP includes broad future land use objectives.
    - The EMP includes proposed closure costs.

National Environmental Management Act (Act no.107 of 1998)

Sections 28 (1) and (3) of NEMA set out the duty of care principle, which is applicable to all types of pollution and must be taken into account in considering any aspects of potential environmental degradation.

- Every person who causes, has caused or may cause significant pollution or
Degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

The measures required in terms of sub-section (1) may include measures to:
- Investigate, assess and evaluate the impact on the environment.
- Inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment.
- Cease, modify or control any act, activity or process causing the pollution or degradation.
- Contain or prevent the movement of pollutants or the causing of degradation.
- Eliminate any source of the pollution or degradation.
- Remedy the effects of the pollution or degradation.

National Environmental Management Biodiversity Act (Act No.10 of 2004)
Section 75 Control and eradication of listed invasive species and the details are outlined as follows:

1: Control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs.

2: Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

3: The method employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and regrowth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

4: The minister must ensure the coordination and implementation of programmes for the prevention, control or eradication of invasive species.

5: The minister may establish an entity consisting of public servants to coordinate and implement programmes for the prevention, control or eradication of invasive species.

National Environmental Management Biodiversity Act Regulations GN.R 598, 2014 on Alien invasive Species

Category 1b Listed Invasive Species

(1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.

(2) A person in control of a Category 1b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
(4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75 (4) of the Act.

**Category 2 Listed Invasive Species 4.**

(1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.

(2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.

(3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.

(4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3.

**National Water Act (Act No. 36 of 1998)**

Section 19 of the Act sets out the principles for “an owner of land, a person in control of land or a person who occupies or uses land” to:

- Cease, modify or control any act or process causing pollution.
- Comply with any prescribed waste standard or management practice.
- Contain or prevent the movement of pollutants.
- Eliminate any source of pollution.
- Remedy the effects of the pollution.
- Remedy the effects of any disturbance to the bed and banks of a watercourse. It also describes the actions that can be taken by the catchment management agency to enforce the requirements of the Act.

6. **DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)**

Name of the Practitioner: Deon Esterhuizen

Tel No.: 082 445 1781

Fax No. : 012 685 0900

E-mail address: deon@mdte.co.za
7. **DETAILS AND EXPERTIES OF THE EAP**

Deon Esterhuizen has a MSc in Environmental Ecology with 24 years of experience in water related projects. These projects include:

- Water resource management;
- Water quality management;
- Water use registration and licensing of water users; and
- Project management of multi-disciplinary studies.

He also has extensive experience in a wide-range of environmentally related projects, processes and applications for private, commercial and industrial clients, in addition to local, provincial and national government departments. He has gained experience through his involvement in a number of water resources related projects. This includes ensuring the protection, development, conservation, management, sustainable use and control of the water resources in the Gauteng Region's area of responsibility.

During his employment at the Department of Water and Sanitation he co-ordinated the management of the quality of the water resources of a specific catchment on an ongoing basis to achieve effective and sustainable water management. The specific focus areas included:

- Catchment Management Strategies & Plans
- Water Quality Management Plans
- Registration and Licensing of water users
- Assessing water requirements for basic human needs and riverine ecology
- Determining stream-flow assimilative capacity for pollution loads
- Water quality guidelines
- Industrial wastewater treatment and disposal

He has gained experience through environmental related projects as a consultant at ILISO Consulting (Pty) Ltd and BKS (Pty) Ltd in the fields listed below:

- Integrated Environmental Management (IEM) in general
- Environmental Impact Assessments (EIAs)
- Environmental Management Plans (EMP)
- Environmental monitoring and auditing

Deon Esterhuizen has been the project leader and coordinator on a number of large, strategically important and multi-disciplinary projects for various local clients as well as international (Africa) projects. On various occasions he has fulfilled the role of an external reviewer for the Department of Water and Sanitation as well as other consulting firms.
Extended details can be found in Appendix C.

8. CLOSURE

8.1. Objectives
The closure objectives which will drive the closure criteria and which have been developed to support the closure vision are:

- Adhere to all statutory and other legal requirements.
- To develop landforms supporting stable and functioning ecosystems, are aesthetically acceptable on closure and will gradually sustain the desired land-uses post closure.
- Ensure safety & health of all stakeholders and their animals during closure and post closure and that communities using the site after closure are not exposed to unacceptable risks.
- Ensure that closure supports productive uses considering pre-prospecting conditions and are in agreement with commitments to stakeholders.
- Promote bio-diversity and biological sustainability to the maximum extent practicable.
- Utilize closure strategies that promote a self-sustaining condition with little or no need for ongoing care and maintenance.
- To minimise erosion in areas that are already disturbed.
- To ensure that the impacted areas are free draining.
- Minimise the establishment of alien vegetation.
- Protect drainage lines and watercourses.
- Ensure that no temporary infrastructure is left on-site during long periods of cessation or upon closure; and ensure environmental risks are minimised.

8.2. Post Closure Land Use
Post closure land use (PCLU) is normally determined in consultation with stakeholders, i.e. the farmers land in the area is to be restored to pre-prospecting conditions to meet the requirements of the stakeholders, within the context of the closure plan. This activity is normally undertaken for the whole area affected by prospecting activities and integrates stakeholder requirements with risk mitigation. However, due to this being an isolated activity and only having exploration drilling, the closure will be for any new access roads and the actual exploration drilling sites. Given the proposed extent of the disturbance within the PRA, there should be no disturbance remaining post closure in the form of prospecting residues (soil, cores or waste rock) or various open boreholes.

In this case, there will be no tailings or waste rock dumps, permanent infrastructure or open excavations to be rehabilitated.

The overall post closure land use for the PRA has been determined to be:

- Landforms, that sustain indigenous vegetation which limits water and wind erosion and provides sustainable grazing whilst enabling the gradual reestablishment of a more diverse natural species composition.
- Re-establish the area for agricultural purposes.

8.3. Closure Assumptions
The assumptions for the project are as follows:
The areas and components included in the Rehabilitation and Closure Liability plan were presented to NAKO ILISO by Sasol Mining and the BAR specialist reports at the time of this report. The prospecting activities were evaluated according to the information supplied by Sasol Mining. For future annual reviews, all infrastructure and prospecting footprint drawings will be updated to reflect the current on-site situation if needed. It is assumed that upon a premature closure, the same liability will arise as at the end of prospecting closure, but at that stage total area affected and hence cost may be reduced. Life of prospecting closure operations also include the necessary monitoring and mitigation of possible residual and/or latent impacts post mining closure operations. The Rehabilitation and Closure Liability Plan is considered a ‘living document’ that will be reviewed and updated annually to ensure that all new insights and developments are adequately covered. Closure commences once the final core extractions have been completed. Sasol Mining will ensure final re-vegetation of all exposed disturbed areas. Sasol Mining will limit access of unauthorized people during the closure phase, up and until the operation enters the care, maintenance and monitoring period. Water management will be required to limit sediment load releases until such time as the vegetation is established and limits erosion potential on the disturbed rehabilitated areas. Water management infrastructure will be retained until such time as contact water can be released to the environment to prevent soil erosion. The sediments in the various rehabilitated areas are not likely to be classified as hazardous. Salvageable equipment will be removed and transported offsite prior to the commencement of demolition. At closure, all temporary portable ablution facilities and a conservancy tank will be removed on completion of the prospecting activates. All waste generated during activities will be disposed of appropriately, as per the EMPr.

Sasol Mining assumes that the effluent released from the ablution facilities (portable) during the operational period will not have had a significant impact on the soils and groundwater. Therefore, no remedial measures for soil and groundwater contamination are considered in this plan. It is important that the validity of these assumptions is re-visited with each revision of the closure plan to ensure that the final decommissioning and closure plan is based on a sound baseline description.

9. PERFORMANCE ASSESSMENT OF THE AREA

The ecological performance of the area will be determined with the initial fixed point photographs taken during the pre-site establishment. Once the pre-existing photographs have been taken, the area is to be evaluated for the presence and abundance of alien invasive species. This will assist in establishing the performance of the area and the level of degradation. Once the ecological performance of the area is established monitoring activities are to be carried out once rehabilitation activities has commenced as per section 12 of this report.
10. **SUMMARY OF RISK ASSESSMENT**

As per the basic assessment report, the activities that are to be undertaken during the site establishment, operation, decommissioning and rehabilitation are deemed to be of a low to moderate significance. However, if the activities are undertaken in accordance to this plan and the EMPr, the significance of the activities can all be considered very low. Therefore, the initial risk assessment for this prospecting project can be considered as having a very low overall impact on the environment and the long-term impacts or residual impacts should be negligible.

11. **DECOMMISSIONING**

Once all operations have been completed, the following activities will take place:

- Removing of all waste, concrete and foreign material from the site and disposing it at the relevant registered waste facility.
- All plant and machinery will be removed from the site.
- The exposed soil surface areas will be scraped clean and any contaminated soil will be disposed of.
- The drilled hole will be filled with concrete up 300mm below surface for grasslands and 600mm below surface for agricultural fields.
- The area is then prepared for rehabilitation activities to commence which will be included under the rehabilitation section.

12. **REHABILITATION**

Rehabilitation in the true sense of the word is defined as the restoration of an ecosystem process, productivity and services. It is therefore a return of some of the functions of the original pre-disturbed ecosystem, this is evaluated using the historical or pre-existing ecosystem as a reference. The desired results take longer to achieve than re-vegetation projects. However, to achieve rehabilitation over the long term, it is important to restore the area through re-vegetation (which is to establish one or more plant species within the objective to cover the ground with a protective and aesthetically pleasing vegetation cover). Before rehabilitation can take place the site geology, soils, vegetation and ecosystems must be understood:

12.1. **Site Description relating to Rehabilitation**
Specialists have assessed the area and a short description of the typical environmental conditions encountered in the area are summarised below.
12.1.1. Geology and Soils
Shale, Sandstone or mudstone of the Madzaringwe formation (Karoo Supergroup) or the intrusive Karoo suite dolerites feature prominently in the area (Mucina and Rutherford, 2006; 397). Several coal horizons occur as part of a succession of sedimentary rocks belonging to the Vryheid Formation of the Ecca Group (part of the Karoo Supergroup). The economic mining horizon is the Number 4 Lower Coal Seam with a low mining potential for the Number 3 Coal Seam in isolated areas. Apart from the coal seams, the Vryheid Formation consists mostly of sandstones with intercalated siltstone zones. This Vryheid Formation has intensively been intruded by dolerite dykes and sills.

12.1.2. Climate
Summer rainfall region with cool temperate climate and fluctuating with fluctuation of high extremes temperatures in mid-summer and mid-winter, where the winter months with experience frequent frost over the winter months (Mucina and Rutherford, 2006; 397).

12.1.3. Vegetation and the Landscape
The various land areas are located within the Soweto Highveld Grassland vegetation type, with a section of the northern portion of the PRA located within the Eastern Highveld Grassland vegetation type which consists of gently to moderately undulating landscapes on the Highveld plateau supporting short to medium-high dense, tufted grassland dominated almost entirely by Themeda triandra and accompanied by a variety of Heteropogon contortus and Tristachya leucothrix. In undisturbed areas, scattered small wetlands occurring with narrow stream alluvium pans and occasional ridges of rocky outcrops interrupt the continuous grassland cover (Mucina & Rutherford, 2006). According to the National Biodiversity Assessment (NBA, 2011), some sections of the various PRAs are located within the remaining of both these vegetation types, both of which is considered to be Vulnerable ecosystems.

According to the National Freshwater Ecosystem Priority Area (NFEPA) database (2011), a portion of the southern section of the PRA is located within an area considered to be a Freshwater Ecosystem Priority Area, sub-quaternary catchment reach. All the areas contain both natural and artificial wetlands, although the majority of the wetlands are considered to be in a heavily to critically modified ecological condition. Some wetlands are considered (according to the NFEPA database) to be in a natural or good, or a moderately modified ecological condition. All of the properties fall within wetland vegetation types considered to be critically endangered, namely the Mesic Highveld Grassland Group 3 and Group 4 wetland vegetation types (NFEPA, 2011). The NFEPA Rivers database (2011) identified the Rolspruit and an unnamed tributary of the Rolspruit to be associated with PRA. According to this database, a portion of the Rolspruit is considered to be in a natural/unmodified ecological condition, while the remaining portion as well as the unnamed tributary is modelled as not intact according to the national land cover assessment.

12.2. Soil preparation for rehabilitation
Soil preparation is a critical activity which could impact on the viability of the rehabilitation. In general soil preservation is to be undertaken prior to any rehabilitation activity as the preservation of the soil will contribute to the success of rehabilitation. In general, a number of factors are to be considered in soil preservation such as erosion, loss of soil and contamination. The potential for erosion, contamination and therefore a loss of soil is increased in the following situations:
• Areas without vegetation cover
• Excavated areas
• Steep areas
• Areas where the soil has been degraded already
• Dispersive, duplexed soil areas
• Areas with fine grained soil material with a low porosity
• Areas which undergo overland flow of water
• Areas close to water
• Irrigated areas
• Compacted areas
• Rivers
• Drainage lines
• Any areas where developments caused water flow to accelerate on a soil surface
• Coarsely gravelly covered surfaces
• Areas where there have been hydrocarbons spilt on the soil
• Areas of topsoil that have been contaminated with any chemicals or with foreign material

12.2.1. Precautionary management activities to ensure the preservation of soil
12.2.1.1. Stripping of topsoil
The first activity to be undertaking when commencing with any activity is to clear and grub and strip topsoil (~150mm). In the instance of this project the only area to be stripped of topsoil will be the directional drilling footprint. The directional drilling area will be stripped in its entirety prior to the commencement of works. Topsoil will be stripped ~150mm deep over the entire site then stockpiled in designated area (see directional drilling layout plan). The topsoil stockpiles will not be placed in drainage lines, watercourses or in areas where they could be contaminated. Therefore, there should be a clearly demarcated area where the topsoil will be stored. The criteria in storing topsoil or fertile soil is as follows:

• Topsoil (~150mm) and fertile soil (dark organic soil) from the sumps (300mm) will be stored in the same, but separately
• No double handling of topsoil or fertile (dark organic soil) soil will be allowed
• Topsoil and fertile soil will be stored in wind rows further than 32m from drainage lines, rivers or wetlands and in areas where contamination would be unlikely.
• The stockpiles will be protected from environmental elements such as wind, rain or runoff. It is recommended that the following methods be considered as a possible means to protect topsoil and fertile soil stockpiles:
  o Creating cut-off drains so that runoff and storm water do not impact the stockpiles
  o Cover stockpiles with plastic or tarp
  o Vegetate the stockpiles with the indigenous Highveld grass seed mix
  o 2m high berms
  o Fenced off for protection
• Topsoil and fertile soil may not be double handled. Once stripped, it will be stored and then only moved when used for rehabilitation.
• No drip trays or any equipment will be stored on topsoil or fertile soil stockpiles.
• No inert material such as cores, rock, spoil concrete etc will be stored on topsoil or fertile soil.
• No driving of any equipment will be allowed on topsoil or fertile soil.

12.2.1.2. Re-Instatement of soils
The soils will be re-instated once all work is completed on the footprint and all equipment and foreign material have been removed from the site, prior to soil re-instatement the following will need to be undertaken:
• All temporary infrastructure, foreign material, waste or spoil will be removed from all areas.
• Once that is done all exposed areas will be shaped to the original landscape profile.
• The boreholes will be filled with concrete till 300mm below the surface in grazing lands and 600mm in cultivated fields.
• Once the borehole has been filled, the whole area will be ripped (at directional site) up to a depth of 300mm; and the topsoil replaced. Due to the bulking factor of the disturbed topsoil, the topsoil will be placed slightly higher than the surrounding area, over time this will settle.

12.3. Re-vegetation (Directional drilling site and where needed on the vertical drilling sites)
12.3.1. Soil preparation for Seeding
The topsoil will be scarified to 100mm to ensure there are no soil clods visible in the soil. Once the soil clods have been broken up the area is ready for seeding. Seeding is to take place once the first 50mm (during the rainy season) of rain has been received and between the months of October and February, this will increase the survival rate of the grass. Six months after the grass has been planted, the area is to be re-evaluated for vegetation cover with the land owner, if the landowner is dissatisfied the area is to be re-seeded.

12.3.2. Seed Mix to be Considered for use
A combination of the following grasses can be used and are available commercially, (it is important to consult with the farmer when deciding on what grass mix to use):
- Themida Triandra (Red Grass) @ 7kg per ha
- Chlorisa gayana (Rhodes Grass) @ 7kg per ha
- Digitaria eriantha (Smuts finger grass) @ 7kg per ha
- Eragrostis teff @ 10 – 15kg per ha
- Eragrostis curvular @ 10 – 15kg per ha
- Cynodon dactylon (couch grass) @ 10 – 15kg per ha
- Cenchrus ciliaris (Blue Buffalo Grass) @ 10 – 15kg per ha

Once the soil has been prepared, the seeds will be sown and can then be tilled into the ground (for example by rolling).
12.3.3. Alien Vegetation Management
All alien invasive vegetation will be removed. During the growth season the re-vegetated area will be checked for establishment of alien invasive vegetation on a weekly basis, if any alien invasive vegetation is identified the plants will be removed immediately and disposed of as per the EMPr.

The species of Alien invasive plants that potentially can be found on site are listed in terms of the National Environmental Management Biodiversity Act, 2004 (Act no. 10 of 2004) Regulations: GN.R589 of 2014. Two categories of Alien Invasive Species could potentially be found in the project area, these area categories 1b and 2 as defined in Regulation GN.R589. The list is attached as Appendix B.

13. MONITORING AND REPORTING

13.1. Monitoring
Monitoring will be undertaken bi-annually until final closure is received for the activity. The following method should be adopted:

- Assess the situation.
- Take photographs of any soil degradation or alien plants.
- Determine the cause of the soil erosion.
- Inform and show the relevant contractors the soil degradation and the scars.
- Inform the Sasol Mining SHE officer that rehabilitation to take place and guide the manager on what actions to follow.
- Record when the remediation took place to stop the erosion and assist them where needed.
- Report and monitor the progress of the rehabilitation monthly and record all the findings in a site diary.
- All significant incidents will be reported to the competent authority within 24 hours of occurring and a report is to be issued on the incident to the department within 24 hours.
- All actions with regards to the incidents must be reported on a monthly compliance report which will be submitted to the department.
- Monitoring will stop once the vegetation have established.

13.2. Reporting
Bi-Annual Rehabilitation monitoring reports will be drafted after rehabilitation has been completed, outlining the following details:

- Details of the person undertaking the monitoring and the reporting.
- Detailed description of the methods to evaluate the success of the rehabilitation.
- Detailed description of the finding / noncompliance.
- Detailed description of the mitigation required going forward.
- Attached the findings from the previous reporting period as an appendix, and highlight recurring findings.
14. MAINTENANCE AND MANAGEMENT REQUIREMENTS

14.2. Equipment, mechanism or substances that will be used to manage soil erosion/ rehabilitation or vegetation establishment when managing storm water area:

The Contractor or Sasol Mining may use the following instruments, or those it sees fit, to combat erosion when necessary:

- Reno mattresses
- Slope attenuation
- Hessian material
- Shade catch nets
- Gabion baskets
- Mulching Run-off control (increase the amounts of runoff areas to disperse the water)
- Silt fences
- Storm water channels and catch pits
- Shade / catch nets
- Soil bindings
- Geofabric
- Hydroseneding and/or re-vegetating
- Mulching over cleared areas
- Stone packing
- Tilling (roughing the surface)

14.3. Methods to prevent accelerated erosion

The drilling sites are situated in areas with high natural erosion potential. Efforts to ensure that all soil surfaces are protected by vegetation or covered, should be implemented to avoid the surface being eroded by wind or water. The following practices should be considered and adhered to where feasible or appropriate:

- Ensure that all water on site (rain water or water wastage from the construction process) does not result in any surface flow (increase velocity and capacity of water) as a result of the poor drainage systems.
- Ensure that pooling of water on site is avoided, as the site and the general area consists of dispersive soils, pooling will cause an increase of infiltration on one area, causing the subsurface to begin eroding.
- Ensure that heavy machinery does not compact those areas which are not intended to be compacted (i.e. areas intended to be outside of the designated footprint), as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped to loosen soils.
- Ensure that compacted areas have adequate drainage systems to avoid pooling and surface flow.
- Prevent the concentration or flow of surface water or stormwater down cut or fill slopes, or along pipeline routes or roads, and ensure measures to prevent erosion are in place prior to construction.
• Ensure that stormwater and any runoff generated by hard surfaces should be discharged into energy dissipation structures i.e. retention swales or areas with rock rip-rap. These areas should be grassed with indigenous vegetation. These energy dissipation structures should be placed in a manner that surface flows are managed prior to being discharged back into a natural watercourse to support the maintenance of natural base flows within the ecological systems and prevent erosion, i.e. hydrological regime (water quantity and quality) is maintained.
• Ensure siltation and sedimentation through the use of the erosion equipment mentioned structures.
• Ensure that all stormwater control features have soft engineered areas that attenuate flows, allowing for water to percolate into the local ground water table in low quantities (to reduce runoff but prevent subsurface erosion).
• Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation.
• Ensure that large tracts of bare soil which would cause dust pollution in high winds, or have high erosion susceptibility and increase sedimentation downstream are controlled through temporary surface covering.
• Ensure no diversion of water flows.
• Ensure that dust control measures are implemented where necessary, but prevent over-wetting/ saturating the area (to cause pooling) and run-off (that may cause erosion and sedimentation).
• Watercourse (stream) crossings should not trap any run-off, thereby creating inundated areas, but allow for free-flowing watercourses.

14.4. ‘Watering and rainfall’
Watering will only be undertaken if needed and conditions are seen to be unfavorable for growth. The natural rainfall can be seen as a mechanism for watering, the following points are to be taken into consideration when undertaking rehabilitation:

• Watering may accelerate re-growth of alien plants therefore alien invasive plant recruitment will need to be monitored and an alien management and removal program implemented.
• Movement of livestock in newly rehabilitated (while the grass is establishing during watering) areas must be restricted, where possible, while taking into consideration drinking areas/paths.
• Watering the rehabilitated areas should be undertaken if there is no rain in the wet/rainy season essentially, but if this is not possible, an initial watering period (supplemental irrigation) will be required to ensure plant establishment (germination and established growth).
• If no rain occurs, generous watering during the first two weeks, or until the seeds have germinated, is required (unless adequate rainfall occurs) i.e. seed beds will need to be kept moist for germination to occur.
• For grass to establish (once germination has occurred), rainfall or irrigation is needed at regular intervals, ideally every few days and possibly every day if weather conditions require it.
• During dry periods, with no rainfall, 100 litres per m² (or 100mm of rain) over a month or more, may be necessary to establish plants capable of surviving dry weather, the farmer is to be consulted with regards to potential watering.
15. SUCCESS OF REHABILITATION

Rehabilitation will occur during operation or where feasible, as areas for plant rehabilitation become available, the directional drilling site is to be rehabilitated once exploration drilling has been completed.

- The rehabilitation period post exploration drilling is estimated to be over a period of 6 (minimum) to 12 months (maximum).
- The ultimate responsibility of planning and coordination of any rehabilitation work, in both timing and extent, rests with Sasol Mining.
- The rehabilitation phase (including post seeding maintenance) should be at least 6 months (depending on time of seeding and rainfall) to ensure establishment of plants with a minimum of 80% cover achieved (excluding alien plant species).
- If the plants have not established and the 80% is not achieved within the specified maintenance period, maintenance of these areas shall continue until at least 80% cover is achieved (excluding alien plant species).
- Additional seeding or mowing activities may be necessary to achieve 80% cover.
- Succession of natural plant species should be encouraged.
- Once cover is achieved rehabilitation can be deemed as successful.
- Evaluation of cover will be determined using fixed point photography, see details below.

16. PHOTOGRAPHIC EVIDENCE OF SITE BEFORE PROSPECTING ACTIVITIES COMMENCES

Photographic evidence is to be collected at each site prior to the commencement of site establishment and prospecting activities. The method to collect the evidence is as follows.

- The time of the day and the date will be recorded.
- The photographer will use a known object for scale i.e. a 1.5 meter stick, and take pictures 1 meter from the ground in all relevant directions.
- The photographer is to stand in the center of the drilling site footprint, and take photographs in each wind direction. North, North East, East, South East, South, South West, West, North West and North.
- Once all photographs are taken, the photographs will be filed.

17. ACCEPTABLE COVER DETERMINATION OF REHABILITATION

Fixed Point Photography

The initial photographic evidence will be used in planning rehabilitations activities, but can also be used to evaluate the success of rehabilitation, through fixed point photography at vertical drilling sites that are located in grasslands and on the vertical drilling temporary mowed roads. Vegetation cover abundance will be evaluated with the 100 step point method to determine vegetation cover and species richness over the directional drilling site and on the directional drilling site road extension.

The photographic activity method used during pre-prospecting activities will be repeated after all material has been removed from site and again a year later.
Once all the pictures have been taken they can then be compared to the initial pictures, if the vegetation cover is similar (an 80% representative of what was there on the initial photographs) the site can be seen as successfully rehabilitated.

**100 Step point method**

This method is to be undertaken by an ecologist to determine species composition on the directional drilling site and on the road extension (if the road is to be rehabilitated). The method to be included will be as follows:

- 100 approximate meter steps will be taken from the center of the site
- At every step the species the marker touches will be recorded
- If there is an alien plant in the position or bare ground that is to be recorded
- Once all data is collected the ecologist is to calculate the percentage of increases, decreases, are ground and aliens.

The information from this will be considered when evaluating the site for acceptable cover. The site is to have less than 20% bare ground combined with alien vegetation, therefore grass composition is to be on 80% of the site to reach acceptable cover.

**Vegetation Cover Abundance**

This method is to be undertaken by an ecologist to determine the vegetation cover abundance on the directional drilling site and on the road extension (if the road is to be rehabilitated). The Braun-Blanquet method to establish vegetation cover abundance is to be used to determine basal cover. Once this method has been completed the percentage of basal cover is to be determined and only once 80 % basal cover has been achieved the site can be considered to have reached acceptable cover.

**Agricultural Fields**

The borehole sites within agricultural fields will be evaluated after activities have been completed. The landowner will be consulted to confirm that rehabilitation activities were completed according to the RCL. Sasol Mining and the Landowner will signoff confirming that each drilling site has been rehabilitated successfully, and that closure has been achieved.

**18. QUANTUM CALCULATION**

The calculation of the financial provision is based on the “Guideline for the evaluation of the quantum of closure related provision provided by a mine” compiled by DMR in January 2005 and the DMR Master Rates for 2016.

The following was assumed:

- Weighing Factor 1: Nature of the terrain/accessibility - Generally flat over the mine area.
- A weighing factor of 1.00 was applied to each of the closure components.
- Weighing Factor 2: Proximity to urban area - Peri-urban, less than 150 km from a developed urban area:
  - A weighing factor of 1.05 was applied to the Preliminary and General items only.
- Contingency: 10%.
  - Add 10% of Subtotal 1.
  - VAT: 14%
  - Preliminary and General costs: 6%.
- Add 6% to Subtotal 1 if Subtotal 1 is less than R 100,000,000.00 and add 12% to Subtotal 1 if Subtotal 1 is more than R 100,000,000.00.
- Risk Class: C (Low Risk).
- Environmental Sensitivity: Low.

The DMR Master rate was updated with the annual CPIX of 6.4% as obtained from Statistics South Africa. The calculated rates are therefore as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
<th>Unit</th>
<th>(A) Quantity</th>
<th>(B) Master rate</th>
<th>(C) Multiplication factor</th>
<th>(D) Weighting factor 1</th>
<th>(E=A<em>B</em>C*D) Amount (Rand)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dismantling of processing plant and related structures (Including overland conveyors and power lines)</td>
<td>m²</td>
<td>0.00</td>
<td>R 13.63</td>
<td>1.00</td>
<td>1.00</td>
<td>R -</td>
<td></td>
</tr>
<tr>
<td>2(A)</td>
<td>Demolition of steel buildings and structures</td>
<td>m²</td>
<td>0.00</td>
<td>R 189.87</td>
<td>1.00</td>
<td>1.00</td>
<td>R -</td>
<td></td>
</tr>
<tr>
<td>2(B)</td>
<td>Demolition of reinforced concrete buildings and structures</td>
<td>m²</td>
<td>0.00</td>
<td>R 279.80</td>
<td>1.00</td>
<td>1.00</td>
<td>R -</td>
<td></td>
</tr>
</tbody>
</table>

- All existing access roads are to be used for the vertical Drilling sites and no access roads will be upgraded.
- Tracks will be created from the access road to some of the holes, this distance covers an area of 9,284 m².
- At the directional drilling site 600 m² of new road will be developed and the entire existing road will be upgraded.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4(A)</td>
<td>Demolition and rehabilitation of electrified railway lines</td>
<td>m</td>
<td>0.00</td>
<td>R 329.77</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>4(B)</td>
<td>Demolition and rehabilitation of non-electrified railway lines</td>
<td>m</td>
<td>0.00</td>
<td>R 179.87</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>5</td>
<td>Demolition of housing and/or administration facilities</td>
<td>m²</td>
<td>0.00</td>
<td>R 379.73</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>6</td>
<td>Opendcast rehabilitation including final voids and ramps</td>
<td>ha</td>
<td>0.00</td>
<td>R193 263.00</td>
<td>1.00</td>
<td>0.52</td>
</tr>
<tr>
<td>7</td>
<td>Sealing of shafts, audits and inclines</td>
<td>m³</td>
<td>2332.90</td>
<td>R 101.93</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>8(A)</td>
<td>Rehabilitation of overburden and spoils</td>
<td>ha</td>
<td>0.00</td>
<td>R 132 705.93</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>8(B)</td>
<td>Rehabilitation of processing waste deposits and evaporation ponds (basic, salt Producing waste)</td>
<td>ha</td>
<td>0.00</td>
<td>R 165 282.83</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>8(C)</td>
<td>Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal Rich waste)</td>
<td>ha</td>
<td>0.00</td>
<td>R 480 059.69</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>9</td>
<td>Rehabilitation of subsided areas</td>
<td>ha</td>
<td>0.00</td>
<td>R 111 121.23</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>10</td>
<td>General surface rehabilitation</td>
<td>ha</td>
<td>1.6</td>
<td>R 105 125.48 – 75% = R26 281.37</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

- Vertical hole =13.04m³ each
- Sumps for directional drilling =900m³ each
- Directional hole = 11.3m³
- (40 vertical holes + 1 directional hole+2 directional sumps)

**Note:** Directional Borehole site footprint was included in this item. 100m x 100m only as this is the only site that is cleaned and grubbed and exists for a long period of time. The area does not have buildings to demolish only 3 cement.
slabs (with a total area covered by the slabs of approximately 115m²), therefore the DMR rate was reduced by 75% making the new rate as R26 281.37.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Area (ha)</th>
<th>Cost (R)</th>
<th>Rate</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>River diversions</td>
<td>0.00</td>
<td>105 123.45</td>
<td>1.00</td>
<td>R -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Fencing</td>
<td>m</td>
<td>119.91</td>
<td>1.00</td>
<td>R -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Water management monitoring (SW and GW)</td>
<td>ha 1</td>
<td>39 971.66</td>
<td>1.00</td>
<td>R 39 971.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>1 year of maintenance and aftercare. Directional</td>
<td>ha</td>
<td></td>
<td>1.00</td>
<td>R -</td>
</tr>
<tr>
<td></td>
<td>Drilling site access road and site: R 22 384.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical drilling site access roads and sites: R47 706.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total: R70 090.29</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Specialist study</td>
<td></td>
<td></td>
<td>R -</td>
<td>Not required</td>
</tr>
</tbody>
</table>

Subtotal 1 | R 561 613.43
Preliminary and General (6% of Subtotal 1) | R 33 696.80
Weighing Factor 2 (1.05) | R 35 381.64
Contingency (10.0% of Subtotal 1) | R 56 161.34
Sub-total 2 | R 686 855.21
Grand total including 14% Vat | R 783 014.94

19. **PUBLIC PARTICIPATION**

Public participation was undertaken to meet the requirements of section 23 of NEMA, specifically the General Environmental Objectives, that include:

- Promotion of integrated environment management through the EIA process and implementing section 2; and
• Social engagement and the public's rights and opportunities to participate in this process.

Consultation with the public forms an integral component of the environmental authorisation process. This process enables I&APs (e.g. directly affected landowners, national-, provincial- and local authorities, and local communities etc.), to raise their issues and concerns regarding the proposed activities, which they feel should be addressed in the EIA (in this case the Basic Assessment Process (BA) process. The Public Participation Process (PPP) has thus been structured to provide I&APs with an opportunity to gain more knowledge about the proposed project, to provide input through the review of documents/reports, and to voice any issues or concern at various stages throughout the EIA process.

The objectives of public participation are to provide information to the public, identify key issues and concerns at an early stage, respond to the issues and concerns raised, provide a review opportunity, and to document the process properly. The PPP will be managed to meet these objectives throughout the BA. The approach followed for the PPP is according to Chapter 6 of the EIA Regulations, 2014 published in Government Notice No. 982 of 4 December 2014.

The PPP conducted to date is summarised below:

<table>
<thead>
<tr>
<th>Task</th>
<th>Details</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&amp;AP notification (relevant authorities and I&amp;APs)</td>
<td>An I&amp;AP database was developed for the project by establishing the jurisdiction of organisations, individuals and businesses in proximity to the project site or within an interest in the proposed development. The database of I&amp;APs includes the landowner, the adjacent landowners, relevant district and local municipal officials, relevant national and provincial government officials, and organisations. This database is being augmented via chain referral during the BA process and will be continually updated as new I&amp;APs are identified throughout the project lifecycle.</td>
<td>Continuous process</td>
</tr>
<tr>
<td>I&amp;AP identification</td>
<td>Site notices with a size of 600 mm x 420 mm were erected at strategic points to inform the general public of the proposed projects and the PPP.</td>
<td>5 May 2017</td>
</tr>
<tr>
<td>Site notices</td>
<td>Initial notification letters were sent to various stakeholders including affected farm owners and organs of state. Emails were sent to the identified I&amp;APs, notifying them of the availability of the Background Information Document (BID) for the proposed project for perusal and comment. Authorities and I&amp;APs will be given 30 days within which to register and submit initial comments on the proposed project.</td>
<td>12 May 2017</td>
</tr>
<tr>
<td>Initial Notification</td>
<td>The Echo and Ridge newspapers were used to advertise the project.</td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>Details</td>
<td>Date</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Comments received</td>
<td>The comments received from the landowners to date, are captured in the</td>
<td>Continuous</td>
</tr>
<tr>
<td></td>
<td>Issues and Response Report.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Land owner visits were visited on 31 March 2017, 10 May 2017 and 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>June 2017 – and signoffs of the roads was completed on 20 June 2017</td>
<td></td>
</tr>
<tr>
<td>Comment on DBAr</td>
<td>All the relevant stakeholders will be notified of the availability of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the DBAR to provide their comments.</td>
<td></td>
</tr>
</tbody>
</table>

21. CONCLUSION

The Rehabilitation and Closure Liability Plan is a living document that can be reviewed and adjusted annually, the purpose of the document is to assist Sasol Mining with successfully rehabilitating the prospecting sites, quantify the costs and manage potential negative environmental impacts to ensure sustainable rehabilitation. This document forms part of the BAr and EMPr, and provides a management framework to guide decisions and work streams during the design, construction, operation and decommissioning phases of the project.
21. REFERENCES

Any disturbed areas should be immediately rehabilitated in order to stabilise landscapes and prevent exposed surfaces from becoming susceptible to erosion. Water velocity off hard surfaces must be reduced and diffused before water is returned to natural systems in order to minimise the risk of creating erosion channels. If any erosion features develop, they should be stabilised using typical measures, such as gabions, weirs, rock-packing, etc.

Wetlands and Highveld grasslands are considered to have high ecological value due to their function in the landscape. Wetlands and drainage lines (wetlands) represent particularly vital natural sponge systems, purification systems or watering systems to promote growth. The grasslands are becoming more endangered as development increases causing fragmentation of the habitat, its function is therefore critical to be conserved so that the ecological value of the grasslands can be kept, if the grasslands become degraded the landscape as a whole will become increasingly fragmented into smaller, more isolated patches destroying the corridor of species movement over the area. Hence the grasslands are considered to be CBAs (critical biodiversity area)

The most sensitive landscape features for planning purposes in the study area will be the presence of dams, wetlands and drainage lines. Constructing infrastructure in wetland areas has been avoided wherever possible. Crossings must result in minimum disruption of surface flow patterns; ensure substrate continuity between areas up and downstream of the structure; and should not result in a step in the bed profile.

OBJECTIVE: Erosion and Sediment Control, Water Quality Management, Pans and Wetlands

<table>
<thead>
<tr>
<th>Project component/s</th>
<th>Project components affecting the objective:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Drilling rigs (directional and vertical)</td>
</tr>
<tr>
<td></td>
<td>• access roads</td>
</tr>
<tr>
<td></td>
<td>• Sealed surfaces (e.g. concrete surfaces, compacted road surfaces, paved roads / areas).</td>
</tr>
<tr>
<td></td>
<td>• All other infrastructure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Erosion and soil loss associated with both wind and water</td>
</tr>
<tr>
<td></td>
<td>• Increased runoff</td>
</tr>
<tr>
<td></td>
<td>• disturbance of indigenous vegetation cover</td>
</tr>
<tr>
<td></td>
<td>• Soil and rock removal</td>
</tr>
<tr>
<td></td>
<td>• Soil mixing, wetting, stockpiling, compaction</td>
</tr>
<tr>
<td></td>
<td>• Soil pollution</td>
</tr>
<tr>
<td></td>
<td>• Accelerated soil erosion</td>
</tr>
<tr>
<td></td>
<td>• Increased deposition of soil into drainage systems</td>
</tr>
<tr>
<td></td>
<td>• Increased run-off over the site</td>
</tr>
<tr>
<td></td>
<td>• Dust pollution</td>
</tr>
</tbody>
</table>
### Activities/risk sources

- Water and wind erosion of cleared and excavated areas
- Stormwater run-off from sealed surfaces
- Accidental spills of petrochemical products (e.g. transformer oils associated with the operation of substations) or cement on-site, or during transport of these products to the site
- Site preparation prospecting and earthworks
- Foundations or plant equipment installation
- Mobile construction equipment movement on site
- River/stream/drainage line road crossings.
- Roadside drainage ditches.

### Mitigation:

**Target/Objective**

- No accelerated erosion at road crossings.
- No accelerated erosion in roadside drainage ditches.
- Overland flows unimpeded by roads within the specialist study area.
- Unchanged surface runoff characteristics in relation to the pre-development state
- No loss of indigenous vegetation cover due to infrastructure associated deposition.
- No loss of indigenous vegetation cover due to the development of deflation hollows adjacent to infrastructure.
- No accelerated overland flow related surface erosion as a result of a loss of vegetation cover.
- Maintenance of an indigenous vegetation cover adjacent to infrastructure.
- Minimal loss of vegetation cover due to construction related activities.
- No or insignificant loss of wetland area in the specialist study area.
- No accelerated overland flow related surface erosion as a result of a loss of vegetation cover.
- Maintenance of an indigenous vegetation cover adjacent to infrastructure.
- Minimal loss of vegetation cover due to construction related activities.
- No or insignificant loss of wetland area in the specialist study area.
- No Alien invasive plants

### Mitigation: Action/control

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Responsibility</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant search and rescue: Remove native plant species from disturbance areas for re-use in the rehabilitation phase.</td>
<td>Sasol Mining SHE officer</td>
<td>Pre-drilling</td>
</tr>
<tr>
<td>All frogs, lizards and domestic animals that may get hurt are to be rescued and taken to an area where the animal will survive.</td>
<td>Sasol Mining EP</td>
<td>During construction and drilling</td>
</tr>
<tr>
<td>Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion. All stockpiles will be positioned away from drainage lines. Limit the height of stockpiles to reduce compaction of the original surface.</td>
<td>Sasol Mining SHE officer</td>
<td>During site establishment and any activity related to earthworks as well as the duration of drilling and operation</td>
</tr>
<tr>
<td>Soil conservation, stockpile topsoil for re-use in rehabilitation phase: Protect stockpile from erosion. Stockpiles of topsoil need to be landscaped to ensure that no stockpile is stored higher than 2m. These levels are to prevent damage by erosion whilst encouraging regrowth of indigenous vegetation (shallow rooted vegetation). Such stockpiles will be positioned away from drainage lines.</td>
<td>Sasol Mining SHE officer</td>
<td>Before and during establishment and drilling</td>
</tr>
<tr>
<td>Mitigation: Action/control</td>
<td>Responsibility</td>
<td>Timeframe</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>regrowth will not only stabilise the topsoil, but additionally preventing further degradation to limit the loss of soil and seed banks loss. Rescued plants can be planted onto topsoil stockpiles if the altered habitat is suitable for such species.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of establishment and drilling</td>
</tr>
<tr>
<td>Disturbance of vegetation and topsoil will be kept to a practical minimum.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of establishment and drilling</td>
</tr>
<tr>
<td>Water velocity quantity must be reduced and diffused where required before water is returned to natural systems.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of establishment and drilling</td>
</tr>
<tr>
<td>Channelling water through the area must be avoided as this is a dispersive environment. Drainage management must be controlled and implemented. Installing drainage systems through the substrate soil must be avoided.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of establishment and drilling</td>
</tr>
<tr>
<td>It may be necessary to use geotextiles and/or wind nets or other means to limit wind erosion of exposed areas, where wind erosion could present difficulties and result in the loss of valuable topsoil.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of establishment and drilling</td>
</tr>
<tr>
<td>Any stockpiles will be protected against wind erosion (e.g. surrounded by shade cloth fences or damped down on a regular basis).</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of establishment and drilling</td>
</tr>
<tr>
<td>Use silt traps / bunds / reno mattresses to trap sediment wherever possible and re-vegetate affected areas as soon as is practical.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of establishment and drilling</td>
</tr>
<tr>
<td>Vehicular traffic will be controlled during construction and operation, confining access and roadways, where possible, to proposed or existing road alignments.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of prospecting</td>
</tr>
<tr>
<td>Particular care should be taken in the design of road drainage line crossings in order to ensure there is no step in the channel bed, substrate continuity is maintained and no undue constriction of flow takes place.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of prospecting</td>
</tr>
<tr>
<td>As far as possible, access to the prospecting area should be restricted to a single access point.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of prospecting</td>
</tr>
<tr>
<td>Internal access roads should be kept to a minimum.</td>
<td>Sasol Mining SHE officer</td>
<td>During site establishment</td>
</tr>
<tr>
<td>Use existing roads wherever possible. Ensure new roads have culverts that are suitably sized. Ideally use adjoining box culverts on larger drainage lines. Partially embed culverts to ensure substrate continuity between the areas above and below the culvert.</td>
<td>Sasol Mining SHE officer</td>
<td>During site establishment</td>
</tr>
<tr>
<td>Movement of vehicles on-site is to be on approved and formalised access roads only, which shall be adequately maintained throughout establishment and prospecting. Where temporary tracks are</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of project</td>
</tr>
<tr>
<td>Mitigation: Action/control</td>
<td>Responsibility</td>
<td>Timeframe</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>required, these are to be rehabilitated as soon as the use of the track is no longer required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spill kits will be made available on-site for the clean-up of spills and leaks of contaminants.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>A drip tray mechanism should be placed under the pipes pouring concrete at all times to prevent spills from occurring on site.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Mixing concrete and grout on site should be done to ensure no soil is polluted.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>When cleaning concrete machinery the waste water and material should be contained and disposed of within an operations dirty water system or at a registered waste facility.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Establishment and prospecting equipment will be refuelled within designated refuelling locations, or where remote refuelling is required, appropriate drip trays should be utilised to prevent any spillages making contact with the natural environment.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>All stored fuels to be secure and clearly marked and maintained within a bunded area.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Chemical and fuel storage areas should be inspected regularly to ensure bund stability, integrity and function are not compromised.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Prospecting and establishment machinery should be stored in an appropriately designated areas and drip trays are to be used where necessary.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Oily water from bunds at the substations will be removed from site by licensed contractors and disposed of at a registered waste facility.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>The sediment control and water quality structures used on-site should be monitored and maintained in a fully operational state at all times.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of the project</td>
</tr>
</tbody>
</table>
### Mitigation: Action/control

<table>
<thead>
<tr>
<th>Action/control</th>
<th>Responsibility</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upon the completion of Prospecting, the area will be cleared of potentially polluting materials.</td>
<td>Sasol Mining SHE officer</td>
<td>Completion of drilling</td>
</tr>
<tr>
<td>Areas required to be cleared during establishment and prospecting will be clearly marked in the field to avoid unnecessary disturbance of adjacent areas.</td>
<td>Sasol Mining SHE officer</td>
<td>Establishment</td>
</tr>
<tr>
<td>Avoid any activities within wetland areas, wherever possible. Crossings must result in minimum disruption of surface flow patterns, ensure substrate continuity between areas up and downstream of the structure and must not result in a step in the bed profile.</td>
<td>Sasol Mining SHE officer</td>
<td>Establishment and drilling</td>
</tr>
<tr>
<td>Keep the loss of vegetation cover adjacent to surface water resources to a minimum.</td>
<td>Sasol Mining SHE officer</td>
<td>During drilling</td>
</tr>
<tr>
<td>Re-vegetate areas where there has been a loss of vegetation as soon as is practically possible.</td>
<td>Sasol Mining SHE officer</td>
<td>During drilling</td>
</tr>
<tr>
<td>Limit the spatial extent of the areas in which the pre-development vegetation cover is reduced. After drilling has been completed ensure exposed soil surfaces are rehabilitated with the replacement of topsoil (if relevant), scarification of the land-surface (if relevant) and re-vegetation with an indigenous (shallow adventitious rooted, if required) vegetation cover as soon as is practically possible. (Using plant species indigenous to the specialist study area) see plan for details.</td>
<td>Sasol Mining SHE officer</td>
<td>Duration of Drilling</td>
</tr>
</tbody>
</table>

### Performance Indicator
- No accelerated erosion at a road crossing (Typical signs of accelerated erosion would be head-cut development, channel incision or scour adjacent to the structure).
- No signs of accelerated erosion adjacent to, or downslope of infrastructure.
- Minimal loss of indigenous vegetation cover during the construction phase of the project.
- No step in the channel bed at road drainage line crossings.
- No significant accelerated erosion at construction sites due to overland flow, where there has been a loss of vegetation cover.
- No evidence of water pollution or excessive sedimentation.
- No noticeable increase in the rate of sediment discharge to receiving water bodies as a result of vegetation loss.
- No fragmentation of substrate related habitat continuity at crossings.

### Monitoring
- EP from Sasol should monitor the performance indicators as needed during the establishment and prospecting phases, commencing immediately prior to the end of drilling. A photographic record of the site should be kept of conditions during each site visit.
• Immediate reporting by personnel of damaged or ineffective sediment control measures or potential water contamination to Site Manager.
• Observation of site clearing activities by Sasol Mining SHE officer throughout prospecting phases.
• Supervision of all clearing and earthworks.
• An incident reporting system will be used to record non-conformances to the EMP.

**OBJECTIVE:** No increase in runoff into drainage lines

<table>
<thead>
<tr>
<th>Project component/s</th>
<th>Drilling sites and structures.</th>
<th>Roads.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Impact</td>
<td>Increased runoff into drainage lines can potentially be associated with accelerated erosion.</td>
<td></td>
</tr>
<tr>
<td>Activity/risk source</td>
<td>Impervious surfaces of infrastructure.</td>
<td>Roadside drainage.</td>
</tr>
</tbody>
</table>

**Mitigation:**

- No increase in runoff into drainage lines as a result of construction or operational activities.
- No increase in runoff into drainage lines as a result of road construction or management.

**Mitigation: Action/control**

| Use mitre drains to deflect water from roads onto adjacent slopes. Maximise the drains off the road to ensure low velocity and low quantities of surface water is deflected on the slopes. | Responsibility | Sasol Mining EP | Timeframe | Pre-drilling (avoidance planning) and prospecting phases of the project. |

**Performance Indicator**

- No increase in runoff into drainage lines as a result of prospecting activates and related infrastructure.

**Monitoring**

- Frequent monitoring during the establishment and prospecting phases is to ensure erosion is mitigated and mitigation structures are properly implemented.

**OBJECTIVE:** No decrease in surface water quality

<table>
<thead>
<tr>
<th>Project component/s</th>
<th>Roads</th>
</tr>
</thead>
</table>

**Potential Impact**

- Accelerated discharge of sediment into surface water bodies and hence a decrease in water quality (e.g. increased turbidity).

**Activity/risk source**

- Roadside drainage.
Mitigation:
Target/Objective

- Limited accelerated erosion at crossings.
- Erosion largely limited to localized scour adjacent to mitre drains.

<table>
<thead>
<tr>
<th>Mitigation: Action/control</th>
<th>Responsibility</th>
<th>Timeframe</th>
</tr>
</thead>
</table>

Performance Indicator

- Only limited localized scour adjacent to mitres.
- No accelerated discharge of sediment into surface water bodies from roadside drains.

Monitoring

- Biweekly monitoring ensure proper management at road crossings is implemented to prevent any degradation and accommodate the above recommendations.
- During the prospecting phase the mitre drains should be inspected after heavy rains to ensure they are still functioning according to their design specifications.
### APPENDIX B: EXPECTED ALIEN INVASIVE PLANTS

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Category in NEMBA</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Ricinus communis</em> var. <em>communis</em></td>
<td>Castor oil plant</td>
<td>1b</td>
</tr>
<tr>
<td><em>Senna septemtrionalis</em></td>
<td>Arsenic bush</td>
<td>1b</td>
</tr>
<tr>
<td><em>Solanum chrysotrichum</em></td>
<td></td>
<td>1b</td>
</tr>
<tr>
<td><em>Solanum incanum</em></td>
<td></td>
<td>1b</td>
</tr>
<tr>
<td><em>Argemone ochroleuca</em></td>
<td>White flower Mexican poppy</td>
<td>1b</td>
</tr>
<tr>
<td><em>Opuntia ficus-indica</em></td>
<td>Prickly Pear</td>
<td>1b</td>
</tr>
<tr>
<td><em>Opuntia aurantiaca</em></td>
<td>Jointed cactus</td>
<td>1b</td>
</tr>
<tr>
<td><em>Echinopsis spachiana</em></td>
<td>Torch cactus</td>
<td>1b</td>
</tr>
<tr>
<td><em>Cereus jamacara</em></td>
<td>Queen of the night</td>
<td>1b</td>
</tr>
<tr>
<td><em>Melia azedarch</em></td>
<td>Syringe</td>
<td>2</td>
</tr>
<tr>
<td><em>Lantana sp</em></td>
<td>Lantana</td>
<td>1b</td>
</tr>
</tbody>
</table>

---

**Argemone mexicana**  
(Mexican Poppy – Category 1 alien species)

**Ricinus communis**  
(Castor oil – Category 2 alien species)
Senna septemtrionalis (Arsenic bush)

Solanum chrysotrichum

Opuntia ficus-indica (Prickly Pear)

Opuntia aurantiaca (Jointed Cactus)

Echinopsis spachiana (Torch Cactus)

Cereus jamacara (Queen of the Night)
*Melia azedarch* (Syringa)  

*Lantana sp* (Lantana)**
APPENDIX C: ENVIRONMENTAL ASSESSMENT PRACTITIONER CV

DEON ESTERHUIZEN
Technical Director
Environmental Discipline Group
M.Sc (Environmental Ecology)
B.Sc. Honours (Botany)
B.Sc. (Botany and Zoology)
Professional Natural Scientist (RN: 400154/09)

Deon Esterhuizen has a MSc in Environmental Management with 20 years of experience in water related projects, which include water resource management, water quality management, water use registration and licencing of water users, including project management of multi-disciplinary studies. He also has extensive experience in a wide-range of environmentally related projects, processes and applications for private, commercial and industrial clients, in addition to local, provincial and national government departments.

Key Experience:
Water Resources
Key experience gained through his involvement in a number of water resources related projects, including ensuring the protection, development, conservation, management, use and control of the water resources in the Gauteng Region’s area of responsibility in a sustainable manner as well as coordinate the management of the quality of the water resources of a specific catchment on an ongoing basis to achieve water resource objectives during his employment at the Department of Water Affairs and Forestry. Specific focus areas include:
• Catchment Management Strategies & Plans

Significant Projects:
Water Resources
• Part of the team to determine the environmental flow requirements for the Olifants River catchment. This involved the management of a number of river specialists over a three year period to ensure that a scientifically defendable environmental flow was determined and recommended for implementation
• Author of a management guide, which forms part of a series, which is intended to provide water supply agencies, water resource managers, workers in health related fields, as well as communities throughout South Africa with guidance on domestic water quality with regard to planning a new domestic water supply scheme, implementation of a domestic supply scheme, and the management of an existing domestic supply scheme.
• Preparation of the surface water specialist report for the proposed Nelspruit Ring Road
• Project Manager of a multi disciplinary team to develop a National Groundwater Strategy for the Department of Water Affairs
• Task Leader for preparing the Water Use Licence application for the Tshwane Metro Zeekoegat Waste Water Treatment Works behalf of the South African Government.
• Department of Water Affairs: Mpumalanga Region. Task Leader of a multi disciplinary team to assist the Mpumalanga Regional Office: Water Quality Management with line function work
• Gauteng Region Office Technical and Administrative Support project. Project Manager of a multi disciplinary
- Water Quality Management Plans
- Registration and Licensing of water users
- Assessing water requirements for basic human needs and riverine ecology
- Determining stream-flow assimilative capacity for pollution loads
- Water quality guidelines
- Industrial wastewater treatment and disposal

Environmental
Key experience gained through environmental related projects as a consultant at BKS (Pty) Ltd and ILISO Consulting (Pty) Ltd in the fields listed below:
- Integrated Environmental Management (IEM) in general
- Environmental Impact Assessments (EIAs)
- Environmental Management Plans (EMPs)
- Environmental monitoring and auditing

Project Coordination & Management
Key experienced gained as the project leader and coordinator on a number of large, strategically important and multi-disciplinary projects for various clients, including international (Africa) projects.

External Reviewer
Key experienced gained as external reviewer for the Department of Water Affairs and Forestry as well as other consulting firms.

<table>
<thead>
<tr>
<th>Team to assist the DWAF Gauteng Regional Office with specific technical tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gautrain Rapid Rail Link: Preparing the surface water specialist report in support of the variant alignment environmental impact assessment study</td>
</tr>
</tbody>
</table>

Environmental
- Preparation of the Environmental Baseline Survey (EBS) for the Feasibility Study for the Coastal Road (Ras Ejder to Musaad) in Libya
- Gautrain Rapid Rail Link: Part of the ISAA Joint Venture compiling the Initial Works EMP and Draft Final EMP as required by the Record of Decision issued by the Gauteng Department of Agriculture, Conservation and Environment
- Environmental specialist for a 42 month construction period of the Thune Dam in Botswana
- Preparation of an EMP for the Groot Letaba proposed storage dam. Department of Water Affairs

Project Coordination & Management
- Project coordinator for the development of a Catchment Management Strategy and determination of an intermediate Ecological Reserve for the Modder and Riet Rivers Catchment.
- Project coordinator for the development of a Water Quality Management Plan for the Waterval River catchment.
- Environmental Team Leader of the Olifants River Water Resources Development Project Phase 2 implementation.

External Reviewer
- Lower Shashe Dam Environmental Impact Assessment report and process review on behalf of the South African Government
- Requested by Knight Piesold to act as an external reviewer of their Environmental Impact Assessment and Water Use Licence Application for the Braamhoek Pump Storage Scheme