VULINDLELA BRIDGE REPAIRS
ENVIRONMENTAL MANAGEMENT PROGRAMME

ENVIRONMENTAL MANAGEMENT PROGRAMME
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APPLICANT : **Emalahleni Local Municipality**

PSP : **MDT Environmental (Pty) Ltd**

ENVIRONMENTAL MANAGEMENT PROGRAMME

Report prepared for

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ENVIRONMENTAL MANAGEMENT PROGRAMME

TABLE OF CONTENTS

ENVIRONMENTAL MANAGEMENT PROGRAMME

1. INTRODUCTION

1.1 *DETAILS OF THE ENVIRONMENAL ASSESSMENT PRACTITIONER*

The compilation of this Environmental Management Programme (EMPr) was prepared by Mr Deon Esterhuizen of MDT Environmental (Pty) Ltd) (MDTE). For a detailed description of expertise and previous project experience of the author please refer to **Annexure A** for the curriculum vitae of the Environmental Assessment Practitioner (EAP).

1.2 *PROJECT BACKGROUND*

Vulindlela Bridge works involve the rehabilitation of two bridge crossings. The water course has been affected by increasing and uncontrolled vegetation growth, as well as siltation caused by erosion, which has led to a reduction in river capacity, as well as altered water flow patterns. Consequently, during rainy seasons the river floods, hindering smooth traffic and pedestrian movement.

Siyandiza Consulting Engineers (Pty) Ltd were appointed to undertake designs for the bridge rehabilitation works. In addition, to comply with NEMA, as amended, and its regulations, Sasol has also appointed MDT Environmental (Pty) Ltd, as Environmental Assessment Practitioners (EAPs), to conduct environmental studies and apply for environmental authorisation for any listed activities that might be triggered through the execution of this project. The environmental studies will determine the potential significant environmental impacts that will emanate from the proposed project. In addition, the study will also recommend mitigation or management measures for these significant impacts

This document is the EMPr for the Vulindlela Bridge Repairs Project and is based on legislative requirements as per the National Environmental Management Act (No 107 of 1998) and in particular the Environmental Impact Assessment Regulations of 2014, as amended.

1.3 *NEED FOR THE PROJECT*

The project is undertaken as part of the Local Economic Development contribution provided by Sasol Mining (Pty) Ltd (Sasol Mining) and is part of the projects committed to in their social and labour plan. The project beneficiaries, and as such project applicants, are Emalahleni Local Municipality. The project entails rehabilitating two bridge crossings.

The Project objectives are to:

- establish mechanisms that will minimize sedimentation and debris accumulation at the bridge openings.
- rehabilitate and clean both bridges in order to improve safety status.
- improve storm water control measures
- undertake dredging methods that are well investigated to reduce impact on the ecosystem.
- achieve functional structures, which can be maintained in association with the asset management system for the Local Municipality.

1.4 *PROJECT LOCATION*

Property description:	The property consists of Erf 1057 and Erf 1058 in Phola within eMalahleni Local Municipality in Mpumalanga
	(Farm name, portion, number and registration division or Erf number etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

Current land-use zoning:	Erf 1058 falls within a water course.
	In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Property size (m^2) of all proposed sites:	The two properties, Erf 1057 and 1058 mainly consists of an open area that is dissected by a tributary of the Saalboom Spruitfalls. The Municipality has earmarked the site as a Park and the properties are zoned as open space.
Development footprint size (m^2):	The development footprint size for Erf 1057 is 77 330 m^2 and the development footprint size for Erf 1058 is 207 613 m^2. Thus, the total development footprint size is 284 943 m^2.

Project map:	A project map must be attached to this document. The map must accurately provide an indication of the project site position as well as the positions of the alternative sites, if any, and • Road names or numbers of all major roads as well as the roads that provide access to the site(s); • A north arrow; • Any sensitive geographic features (e.g. watercourses) *A project map, Photographic map, Site Layout Plan and Mpumalanga Biodiversity Sector Plan (MBSP) Terrestrial Critical Biodiversity Area (CBA) Map are attached as Appendix 3.1-1 to 3.1-4 of the Basic Assessment Report.*

<table>
<tr><td>Site co-ordinates:</td><td>Indicate the position of the activity using the latitude and longitude of the centre point of the preferred site alternative. The co-ordinates must be in degrees, minutes and seconds using the Hartebeesthoek94 WGS84 co-ordinate system.

<table>
<tr><th>Number of corner</th><th colspan="3">Latitude (S):</th><th colspan="3">Longitude (E):</th></tr>
<tr><td>1</td><td>26°</td><td>00’</td><td>18.03”</td><td>29°</td><td>02'</td><td>18.13"</td></tr>
<tr><td>2</td><td>25°</td><td>59'</td><td>55.17"</td><td>29°</td><td>01'</td><td>56.67"</td></tr>
</table>
</td></tr>
</table>

SG 21 Digit Code(s):	The Surveyor-General 21-digit codes for the site are listed under Appendix 3.1-1 of the Basic Assessment Report.

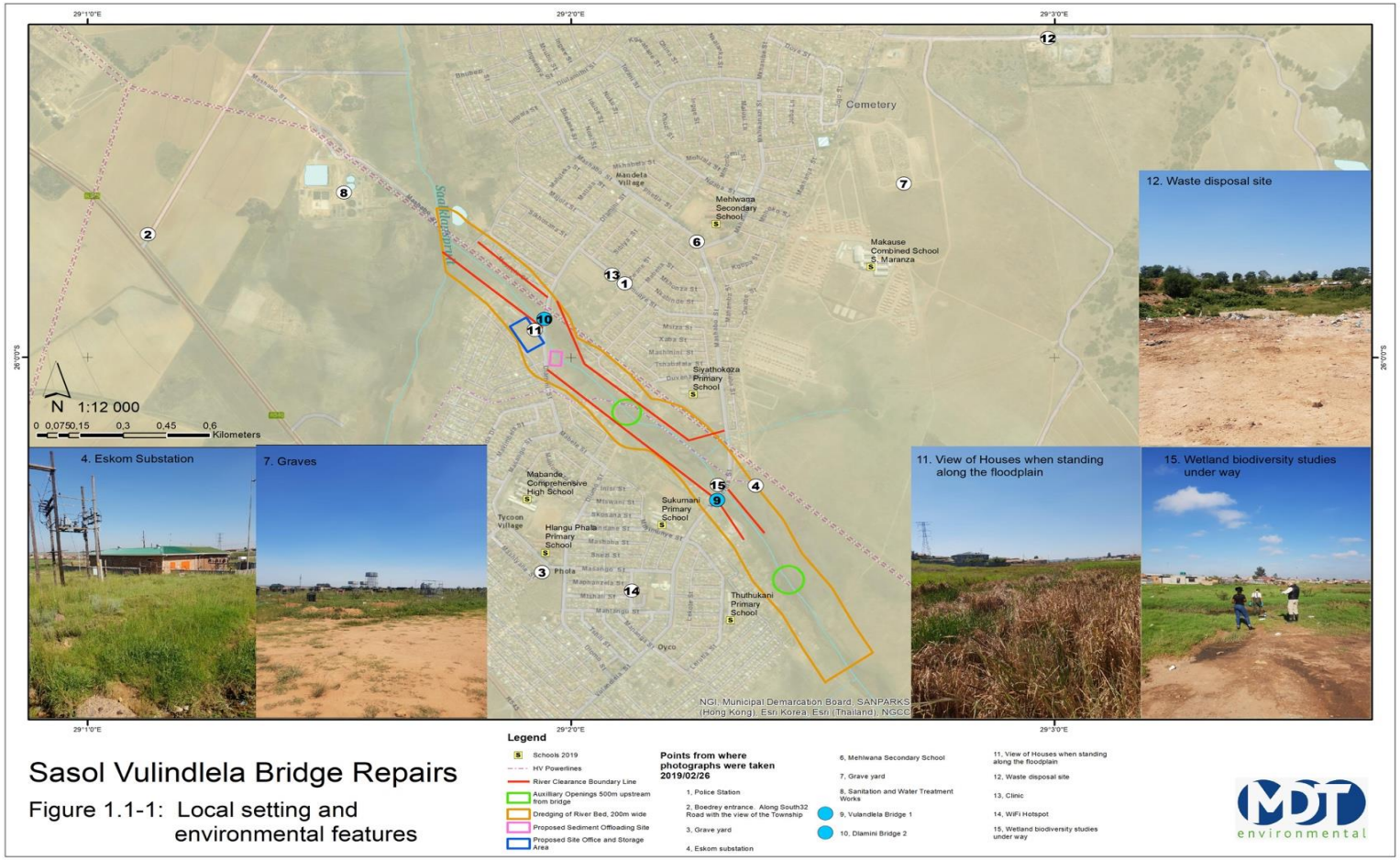

Figure 1-1: Vulindlela Bridge Repairs Locality

1.5 *SCOPE AND PURPOSE OF THE DOCUMENT*

This document is applicable to the Vulindlela Bridge Repairs Project. It is a management programme to be complied with by the developer and his contractor during the construction and rehabilitation phases of the Project and encompasses associated environmental aspects of the works.

The purpose of this document is to provide guidelines for the application of environmental best practice to Emalahleni Local Municipality and its appointed Contractor commissioned to construct the proposed project.

This document shall be seen as part of the contract with the appointed contractor. The EMPr together with appropriate enabling clauses will thus be part of the enquiry document to make recommendations and constraints, as set out in this document, enforceable under the general conditions of the contract. It must be ensured that relevant environmental management specifications as contained in the EMPr are incorporated into the tender and contract documentation. Relevant payment items must be incorporated into the bill of quantities. During the tender evaluations, the ability of the potential contractors to adequately manage the environmental issues must be assessed.

The EMPr has a long-term objective to ensure that:

- Environmental management considerations are implemented from the start of the project;
- Precautions against damage and claims arising from damage are taken timeously; and
- The completion date of the contract is not delayed due to avoidable environmental issues arising that could be mitigated through a well-structured EMPr.

2. LEGISLATIVE AND OTHER REQUIREMENTS

The management and mitigation of the environmental impacts experienced during construction is governed by environmental legislation. It is of utmost importance that this project is constructed in compliance with all relevant environmental legislation whether; National, Provincial and/or Local.

The environmental legislative framework and components for South Africa can best be unpacked and summarised as follows:

The Constitution of South Africa (Act No. 108 of 1996)

In accordance with the Constitution, the Government of South Africa has separate national, provincial and local levels that are mutually dependant and interconnected. All three areas of government have legislative and administrative functions and thus have responsibility for the management of the environment.

The Bill of Rights (Chapter 2 of the Constitution) is a fundamental cornerstone of environmental law in South Africa and makes provisions for environmental issues.

Section 24 of the Bill of Rights states that:

"Everyone has the right -

a. to an environment that is not harmful to their health or well-being; and
b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -
    i.) prevent pollution and ecological degradation;
    ii.) promote conservation; and
    iii.) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

Common Law

South Africa's common law is composed of the foundational Roman-Dutch legal principles as modified and interpreted by judicial precedent.

National Legislation pertaining to this Project:

- National Environmental Management Act (No. 107 of 1998)
- National Environmental Management: Biodiversity Act (No. 10 of 2004)
- National Environmental Management: Waste Act (No. 59 of 2008)
- National Water Act (No. 36 of 1998)
- National Heritage Resources Act (No. 25 of 1999)
- National Road Traffic Act (No. 93 of 1996)
- Occupational Health and Safety Act (No. 85 of 1993)
- Hazardous Substances Act (No. 15 of 1973)
- Explosives Act (No. 26 of 1956)
- Basic Conditions of Employment Act (No. 75 of 1997)
- Promotion of Administrative Justice Act (No. 3 of 2000)
- Extension of Tenure Act (No. 62 0f 1997)
- Prevention of Illegal Eviction and Unlawful Occupation of Land Act (No. 19 of 1998)
- Development Facilitation Act (No. 67 of 1995)
- Municipal Structures Act (No. 117 of 1998)
- Traditional Leadership and Governance Framework Amendment Act (No. 23 of 2009)
- Local Government: Municipal Systems Act (No. 32 of 2000)

Provincial Legislation pertaining to this Project:

- North West Biodiversity Management Act (No. 4 of 2016)

2.1 *NATIONAL LEGISLATION*

2.1.1 National Environmental Management Act (No. 107 of 1998)

The National Environmental Management Act (No 107 of 1998) (NEMA) objectives include co-operative environmental governance, sustainable development, environmental justice and the "polluter pays" principle. NEMA Regulations incorporate requirements for environmental impact assessments which are approved or authorised in the form of Environmental Authorisations (EAs).

2.1.2 Environmental Impact Assessment Regulations, 2014, as amended

The Environmental Impact Assessment (EIA) Regulations of 2014, as amended are also published under NEMA. Section 19 of these EIA regulations requires the applicant to submit, within 90 days after receipt of the application by the competent authority, a basic assessment and EMPr.

Appendix 4 of the Regulations stipulates the required content of an EMPr. **Table 2-1** indicates these requirements and where it can be found within this EMPr.

Table 2-1: Content of an EMPr as per the EIA Regulations

No	Requirement	Reference in EMPr
1a	Details of i) The EAP who prepared the EMPr; and ii) The expertise of the EAP to prepare an EMPr, including a curriculum vitae;	Section 1.1 and Annexure A
1b	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 6
1c	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Annexures B, C, and D
1d	A description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development, including: i) Planning and design; ii) Pre-construction activities;	Section 6 & 10

No	Requirement	Reference in EMPr
	iii) Construction activities; iv) Rehabilitation of the environment after construction and where applicable post closure; and v) Where relevant, operation activities.	
1e	A description and identification of impact management outcomes required for the aspects contemplated in 1d above.	Section 10
1f	A description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in 1d and 1e above will be achieved.	Section 10
1g	The method of monitoring the implementation of the impact management actions contemplated in 1f above.	Section 5
1h	The frequency of monitoring the implementation of the impact management actions contemplated in 1f.	Section 5 & 10
1i	An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 4
1j	The time periods within the impact management actions must be implemented.	Section 10
1k	The mechanism for monitoring compliance with the impact management actions.	Section 5
1l	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 5 & 10
1m	An environmental awareness plan describing the manner in which i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	Section 7
1n	Any specific information that may be required by the competent authority.	N/A

2.1.3 National Environmental Management: Biodiversity Act (No. 10 of 2004)

Permit applications must be made to the relevant authority for the removal of any Red Data or Protected Species found in the proposed alignment and construction areas. These permit applications must be made in conjunction with requirements of the National Forests Act (No. 84 of 1998). The identified protected species are listed later in the report.

The Biodiversity Act also holds Emalahleni Local Municipality responsible for the eradication of any alien or invasive species which establish on site as a result of the construction activities

using methods which are appropriate to the species concerned and the environment in which it occurs.

2.1.4 National Environmental Management: Waste Act (No. 59 of 2008)

All wastes, both general and hazardous, generated during the construction of the Project and associated infrastructure must be disposed of at an appropriately licensed waste disposal site. Copies of the permits or licences must be obtained and kept on site before the commencement of construction.

2.1.5 National Water Act (No. 36 of 1998)

Emalahleni Local Municipality has completed a risk assessment in terms of the General Authorisations, Notice 509.

2.1.6 National Heritage Resources Act (No. 25 of 1999)

According to the NHRA archaeological and destruction permits are required for the removal of a structure or element of cultural significance as well as for the relocation of graves on site.

2.1.7 National Road Traffic Act (No. 93 of 1996))

Relevant provisions of the Road Traffic Act must be complied with pertaining to the correct licensing for all drivers on site as well as the ensuring that all vehicle and plant is road worthy.

2.1.8 Hazardous Substances Act (No. 15 of 1973)

Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which may include the Hazardous Substances Act, the Occupation Health and Safety Act, relevant associated Regulations and applicable SANS and internal standards. The Implementer must ensure that all relevant Material Safety Data Sheets are present on site at all times.

2.1.9 Occupational Health and Safety Act (No. 85 of 1993)

All provisions of the Occupational Health and Safety Act must be complied with. The Act must not only provide for the health and safety of the persons connected to the construction but also the persons in the surrounding areas which are affected by the construction.

2.1.10 Explosives Act (No. 26 of 1956)

Blasting permits must be present on site before construction can commence. These permits must be acquired from the Department of Mineral Resources in accordance with the Explosives Act (Act No 26 of 1956).

2.1.11 Basic Conditions of Employment Act (No. 75 of 1997)

The Basic Conditions of Employment Act details employment conditions, applies to all workers and employers, and must be obeyed even if other agreements are different. It includes specifications regarding working time, leave, job information and payment, and termination of employment. The proponent and all its contractors must adhere to the requirements of this Act in the recruitment and employment of labour for construction.

3. PROJECT DESCRIPTION

3.1 *A DETAILED VIEW OF THE PROJECT WORKS*

The construction sites will be located on previously disturbed areas as all the areas identified are within a built-up environment. These areas will make provision for closed civil systems such as water tanks and conservancy tanks for sewerage containment. All waste products will be removed from the construction sites to an approved and licensed disposal site. Rehabilitation of the construction sites will be to the same level as to prior establishment. The construction site camp will be located above the 1:20 year flood line with hazard free accessibility from the main roads for delivery and access to the construction areas. Access to the respective construction sites would be possible via pre-existing roads. All additives to be used are to be non-poisonous and environmentally friendly. Batching of concrete for all purposes is to be done at the construction site camps in a regulated environmentally friendly way. No batching will be allowed to happen inside river servitude area of the 1:20 year flood line. All construction equipment and material also to be stored at the site camps and above the 1:20 year flood line where required. All material will be imported thus no quarries or borrow areas will be established in the vicinity.
The identified areas are vulnerable and the risk of failure increases with every passing rainy season.

Cleaning of the riverbed

- Removal of material from the riverbed shall be end-hauled to safe, stable and licenced disposal sites.
- Environmental considerations pertaining to riparian ecosystem will be considered and a wetland and aquatic studies were undertaken.
- Excavation of excess material in the channel will be done to the original base level of the streambed, not below it, to avoid head cuts and / or water stagnation.
- Culvert cleaning may be done using horizontal drilling or jetting.

Structural health monitoring of the bridge

Assessment of the bridge structures will take into account the corrosion of the culvert reinforcement, cracks, abrasion extents and differential settlements if any are observed. The purpose of this exercise is to determine if there are any structural safety concerns that may require rehabilitation of the bridges themselves or their replacement (Note this is not the scope of this project, at this stage, repair work has been commissioned and the designs are looking at various feasible alternatives to achieve repair and leave stable, safe and operational structures).

Storm water management and Erosion control

- To minimize donga formation due to erosion and promote stabilization storm water control measures will be implemented
- Road kerbs and channel combination, with down-chutes will be used to drain the surface water from the road walkway enlargement will be done.

Walkways and road furniture

Due to high pedestrian movements, there are considerations for the refurbishment and construction of dedicated walkways on both sides of the bridges. The walkways are to have handrails on the outer edge and a barrier on the inner road edge to protect the pedestrians from vehicular traffic.

Proposed site office and storage areas:

The envisage infrastructure on site will entail:

- Site Office;
- Storage area;
- Containers;
- Parking area for plant;
- Fuelling point;
- 3 m high boundary fence with access;
- Gate facing main road;
- Security boom;
- Sediment offloading site; and
- Collection to take to spoiling or designated waste sites.

3.2 *DESCRIPTION OF THE AFFECTED AREA*

3.2.1 Hydrology

The study site is located in quaternary catchment B20G in the Olifants Water Management Area (WMA 2).

The Nkangala District Municipality Rural Development Plan (2017) illustrates that the District falls within the Inkomati and the Upper Olifants Water Management Areas (WMAs). The Inkomati WMA consists of the Komati West, Komati North, Crocodile and Sabie sub-WMAs, whilst the Olifants WMA consists of the Upper Olifants, Middle Olifants, Steelpoort and Lower Olifants sub-WMAs (Nkangala District Municipality Rural Development Plan, 2017).

The Olifants River acts as the main drainage system within the District, flowing in a northerly direction, bending gradually in an easterly direction to join the Limpopo River and further settles into the Indian Ocean. Approximately, 57% of the water in the Olifants WMA is utilised for irrigation purposes, simultaneously, the Olifants River drains the entire Steve Tshwete and Emalahleni mining regions and the areas north of Witbank and Middleburg form part of the Strategic Water Source Area (Nkangala District Municipality Rural Development Plan, 2017).

3.2.2 Wetlands

During the desktop investigation, one (1) possible area where wetlands could occur was identified on or in close proximity to the study site that would be affected by the proposed development activities. The NFEPA wetlands were also consulted and one wetland area was identified on or in close proximity to the study site that could be affected by the proposed activities.

The field investigations were undertaken during February 2019 to assess and confirm the delineated Wetland zones present on the survey area. The field investigations concluded that two (2) natural wetland systems (three wetland units) could be affected by the activities. Same is draining into the Saalboom Spruit.

Terrain unit indicator helps identify those parts of the landscape where wetlands are most likely to occur. Wetlands occupy characteristic positions in the landscape and can occur on the following terrain units:

- Crest;
- Midslope;
- Footslope; and
- Valley bottom.

Wetland classification

The hydrogeomorphic wetland units identified were also assessed in respect to its location in the landscape. The wetland units found:

- VBR_CVB1 was found on the valley floor draining towards the North-West into the Saalboom Spruit. This system passes under both bridges.
- VBR_HSS1 was found on the North-Eastern slope associated with VBR_CVB1 draining towards the West into VBR_CVB1 east of Bridge 1.
- VBR_HSS2 was found on the North-Eastern slope North-West of Bridge 1 draining towards the West into VBR_CVB1 and then into the Saalboom Spruit.

Soil Form and Soil Wetness Indicator

Soil erodibility in hydrologically transformed environments contributes to the difficulties to precisely determining wetland boundaries. This investigation focussed on the delineation of the wetland features based on soil hydro-morphology and landscape hydrology as observed in the catchment and on the study site.

Soils were found to be of a low clay content in general. Mostly sandy soils were present especially in the top 250 mm. The wetland seasonal and permanent zones reflected clayey soils.

The soils in the region are mostly derived from the geology of the region namely, predominantly shale, sandstone conglomerate and dolerite intrusions which feature prominently in the area. The soils are generally shallow with a dark brown colour (Zithole Consulting 2010).

The regional land capability is mostly class IV soils with limitations. This is evident in the large number of grazing land as opposed to cultivated lands found in the region. This is due to the fact that the effective soil depth is too shallow or too wet to cultivate, and livestock is grazed instead.

Vegetation type

The study area falls within the Grassland Biome (Biome 06), The Highveld Level -1 Ecoregion (Ecoregion 11) (Kleynhans *et al*., 2005).

Close to 9% of the Districts ecosystems are endangered, some critically so; 9% of land is already degraded, 35.8% of land has been transformed, primarily within the grassland biome; and 33% of the river types are critically endangered (Nkangala District Municipality Rural Development Plan, 2017). The state of the environmental is mainly due to poor environmental management in the respective mining areas within the District which leads to excessive levels of water and air pollution (Emalahleni Local Municipality Spatial Development Framework, 2015; Nkangala District Municipality Rural Development Plan, 2017).

Upon the assessment of the area, the various wetland vegetation components were assessed and recorded. Dominant species were characterised as either wetland species or terrestrial species. Hydrophytic vegetation species were observed. Predominantly grass, rushes and sedge species were recorded. This unit was predominantly utilised to delineate the wetland.

3.2.3 Socio-Economic setting

The socio-economic overview of the Emalahleni Local Municipality has been compiled from the Emalahleni Local Municipality Integrated Development Plan (IDP) 2017- 2022, Emalahleni Spatial Development Framework (SDF) 2018, Nkangala District Municipality Integrated Development Plan (IDP) 2017-2022, Steve Tshwete Local Municipality Integrated Development Plan (IDP) 2017- 2022, Dr JS Moroka Local Municipality Integrated Development Plan (IDP) 2017- 2022, Thembisile Hani Local Municipality Integrated Development Plan (IDP) 2017- 2022, Victor Khanye Local Municipality Integrated Development Plan (IDP) 2017- 2022, Emakhazeni Local Municipality Integrated Development Plan (IDP) 2017- 2022. Documents from other surrounding Local Municipalities where used mainly for data comparison purposes since municipalities interact with each other. Also, data from Stats SA 2011 Census and Stats SA 2016 Community Survey Report and GIS maps for location, direction and distance purposes were consulted.

Nkangala District Municipality is the smallest, in land mass, of all the three District Municipalities in the Mpumalanga Province which also include Gert Sibande and Ehlanzeni. Nkangala District Municipality comprises of six local municipalities which are Emakhazeni, Steve Tshwete, Victor Khanye, Thembisile Hani, Dr JS Moroka and eMalahleni Local Municipality and Emalahleni Local Municipality (ELM) covers an area of approximately 2 677 km2 constituting about 16% of the total 18 812km2 of the Nkangala District Municipality. The local municipality is situated on the Western parts of the Nkangala District sitting on the Highveld region of Mpumalanga.

ELM shares a boarder with the Gauteng Province connected to the Province by N12 and N4 National transport corridors, (Spatial Development Framework, 2016). The hierarchy of roads consist of National (N4 and N12), Provincial (R555, R544, R545, R547, R104 and R580) and several local road networks. Also, the local municipality has an exceptional railway and road connection which include a rail line that connects Gauteng and Maputo running parallel to the N4 as well as roads and rail connection to the South of the municipality connecting Emalahleni to Richards Bay and Maputo Harbour. There are also road and railway networks within ELM. Thus, it is evident that when it comes to transport connections, ELM provides significant logistical opportunities.

The Emalahleni Spatial Development Framework (2016) state that ELM comprises of 34 wards. The area around town, eMalahleni Town, formerly Witbank, is divided into small wards which are so close to each other and the reminder of the area comprise of larger wards. Vulindlela bridges are located within three wards which are ward 28, 30 and 31 all situated around the watercourse.

Of the residential areas and settlement within ELM, eMalahleni town is the largest considered one of the major urban concentrations in the Nkangala District Municipality, and other medium sized towns and settlements include Phola, Ogies, Ga Nala, Thubelihe and several mining settlements in the south-eastern parts of the municipal area including Balmoral, Coalville, Kendal, Kriel, Matla, Minnaar, Rietspruit, Van Dyks Drif, Duvha, Wilge, and several rural settlements. Emalahleni Spatial Development Framework (2016) divides ELM into functional sections namely Emalahleni West, Emalahleni East, Phola, Ogies, Thubelihle, Ga-Nala and Emalahleni Rural. ELM is considered as the most industrialised municipality in Nkangala probably due to the fact that the local municipality has the largest concentration of power stations in South Africa. Vulindlela Bridge repairs will take place in the Phola–Ogies area located about 35km south west of Emalahleni town.

Figures from a census conducted in 2011 shows that ELM had a total population of 395 466 and a community survey conducted in 2016 shows that the population was 455 228 indicating a 3.2% growth rate between 2011 and 2016 (Statistics, South Africa, 2016). The Emalahleni Local Municipality Integrated Development Plan 2017/2018-2021/2022 state that in 2016, ELM had the third largest population in the Province taking 31.5% of the total population in Nkangala and making it the most populated Local Municipality within the district. Table 10.5-1 summarises the population figures in comparison to other local municipalities found within Nkangala District Municipality.

Despite being the most populated local municipality in Nkangala District Municipality, ELM had a 3.2 percentage population increase, 2011 to 2016, placing the local municipality on the second highest in the District, behind Steve Tshwete, which had the highest increase of 4.4 %. Considering the current growth rate, it is projected that by 2030 ELM will have a total population of 707 530 and this is expected to put pressure on infrastructure development, service delivery and employment opportunities.

High employment levels are an indication of a good economic environment in an area. The Emalahleni Integrated Development Plan 2017/2018-2021/2022 state that unemployment is still a challenge as is the case in many South African municipal areas. However, the local municipality has experienced a decrease in unemployment rates form 27.3% in 2011 to 23.2% in 2016 which is below the national unemployment rate of 26.6%. In Nkangala District Municipality, Emalahleni local municipality has the fourth highest unemployment rate with Dr JS Moroka Municipality having as high as 47.7% unemployment rate and Steve Tshwete with the least unemployment rate of 17.3%.

4. ROLES AND RESPONSIBILITY

Effective environmental management during the design and construction of the Vulindlela Bridge Repairs Project will be critically dependent on a number of project personnel. The purpose of this section is to define roles for personnel and to detail concomitant responsibilities in the execution of the EMPr. Before doing so it is also necessary to define the various parties that bear environmental management responsibilities for the Vulindlela Bridge Repairs Project, during design and construction.

4.1 *PROJECT OWNER – EMALAHLENI LOCAL MUNICIPALITY*

Emalahleni Local Municipality is the owner of the Vulindlela Bridge Repairs Project and is the independent decision-making authority and ultimately accountable and responsible with respect to implementation of the contract and compliance with this EMPr.

4.2 *CONTRACTOR (DESIGN AND CONSTRUCTION)*

Emalahleni Local Municipality will appoint a turnkey contractor through its normal procurement processes. The requirements of this EMPr will form part of the tender documents and Bill of Quantities to ensure that the turnkey contractor will price and fully comply with all environmental legislation and requirements.

The Environmental Manager will provide environmental management and oversight for all environmental issues that arise on a day-to-day basis. The Environmental Manager is the primary point of contact on environmental and social issues for the duration of the contract. The Environmental Manager will also assist the contractor in coordination with the Competent Authority.

4.3 *ENVIRONMENTAL MANAGEMENT STRUCTURE*

Within the above structure there will be a number of functional posts that will either directly or indirectly have an environmental management function as shown in **Figure 4-1** below and described later. Important to note, that although the functions area shown and described separately, these functions could be the responsibility of one post within the organisation, except for the Environmental Control Officer (ECO) post, which is an independent body reporting to the Competent Authority and the external auditor.

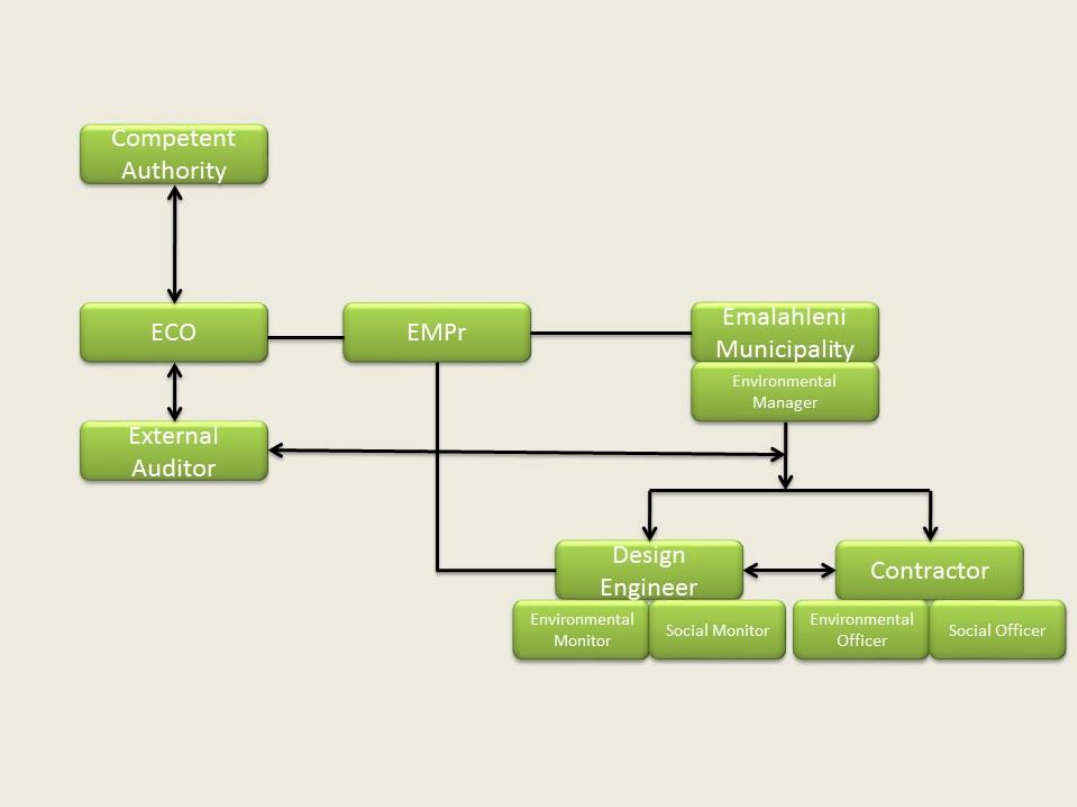

Figure 4-1: Environmental Management Structure

4.3.1 Project Owner

As the Project Owner part of Emalahleni's responsibilities is to oversee the overall implementation of the construction of the project as well as the compliance to the applicable legislation, the Environmental Authorisation and approved EMPr.

4.3.1.1 Environmental Manager

The Emalahleni Environmental Manager will focus on oversight and contractor compliance. The Environmental Manager reports to Emalahleni Local Municipality. The role of the Environmental Manager is to support the successful implementation of the EMPr through:

- Plan and direct the implementation of the EMPr.

- Ensure that the requirements of the EMPr are communicated, understood and enforced by personnel on site.
- Ensure that contractors on site develop, implement and monitor the required environmental management functions.
- Evaluate the applicability and accuracy of the EMPr and the Method Statements throughout the construction process.
- Ensure that all statutory requirements are met.
- Manage scheduled audits and inspections on contractor's performance on site.
- Manage all public and interested and affected party complaints, claims and recommendations.

4.3.1.2 External Auditor

Emalahleni Local Municipality will appoint an external auditor to undertake quarterly audits to ensure that the contractor is complying with the required construction phase management measures.

The main responsibility of the Environmental Auditor is to monitor and report on Emalahleni's compliance with the EMPr and other statutory obligations pertaining to environmental performance during construction of the project.

4.3.2 Design Engineer

The Design Engineer is responsible for the design of the chair lift and associated infrastructure. It will be the responsibility of the Engineer to ensure that the Contractor adheres to construction specifications, the Environmental Authorisation and EMPr. The Engineer has the authority to stop any construction activity which is in contravention of any of the specifications within the documents mentioned above after consultation with the ECO. All major decisions which may affect the programme or costs of the project with regards to the environmental procedure or protocols must be approved by the Employer via the Engineer.

4.3.2.1 Environmental Monitor

The Environmental Monitor (EM) is employed by the Engineer and is responsible for overseeing the daily implementation of the EMPr and relevant specifications for the duration

of the project. The EM should have a clear understanding of the project as well as all the environmental matters pertaining to the project and should have a good knowledge on the applicable environmental legislation and processes.

Responsibilities of the EM include:

- To advise and provide recommendations to the Environmental Officer (EO) on all environmental and related issues based on the requirements of the EMPr.
- To record and forward complaints received from the public to the Engineer and Employer.
- Resolve conflicts.
- Keep detailed and accurate records of the EMPr related activities on site.
- Report to the ECO on the monitoring of environmental issues.

4.3.2.2 Social Monitor

The Social Monitor will act on behalf of the Engineer in all social matters pertaining to the project. The Environmental and Social Monitor roles could be the responsibility of one individual.

Responsibilities of the Social Monitor are:

- Resolve conflicts.
- Ensure the implementation of the Social Monitoring Plan as well as social-related requirements in the EMPr.
- Monitor the progress, impact and sustainability of the project.
- Ensure that all community and land owner complaints are reported to the Engineer, recorded and dealt with in a timeous manner.

4.3.3 Contractor

In order to carry out the requirements of this EMPr, the Contractor must make sure that he has a clear understanding of all environmental matters relating to the project.

The responsibilities of the Contractor will include:

- The implementation of and adherence to the applicable environmental contract specifications in accordance with the requirements of the EMPr.

- The compliance to all national, provincial and local legislation related to the management of environmental aspects, including ensuring all applicable and required site specific permits, authorisations and licenses which are triggered by the Contractor's activities are applied for and obtained timeously. Examples of such permits include the removal of protected plant species and the storage of flammables and hazardous material.
- To ensure all Sub-contractors under his supervision adhere to the applicable environmental contract specifications in accordance with the requirements of the EMPr.
- Report any incident to the Engineer immediately and follow the initial notification with a flash report within 12 hours of the event occurring. The flash report will include details of the incident, which includes the extent, reasons, preventative actions and corrective actions taken.
- To ensure that all employees and Sub-contractors attend Environmental Awareness Training provided by the EM.
- To conduct any remedial work required in terms of this EMPr as a result of environmental negligence, mismanagement and/or non-compliance.

4.3.3.1 Environmental Officer

A suitably qualified senior employee of the Contractor shall be responsible for implementing the EMS, environmental monitoring and control. This position shall be designated the Environmental Officer (EO). The EO shall be responsible for:

- Aiding the Contractor to comply with all the project environmental requirements, objectives and targets;
- Facilitating environmental activities and environmental awareness training of all personnel on site, and
- Implementing an internal environmental management system.

4.3.3.2 Social Officer

The Social Officer (SO) functions could be included in the Environmental Officer roles and responsibilities.

The duties of the SO will include:

- Aiding of the Contractor with liaison with neighbours, land occupiers and other interested and affected parties,

- Facilitating the resolution of potential and actual challenges experienced during construction where these relate to land occupiers, staff, and guests and their special requirements, and
- Aiding the Contractor in keeping accurate records pertaining to issues, complaints and the associated corrective actions.

4.3.4 Environmental Control Officer

Emalahleni Local Municipality must appoint a suitably qualified and experienced independent Environmental Control Officer (ECO) who will be responsible for the monthly monitoring of the project compliance with the Environmental Authorisation, EMPr and applicable environmental legislation. The contract for the ECO will extend from the commencement of the Construction Phase to the handover of the site by the Contractor to Emalahleni Local Municipality.

The responsibilities of the ECO include but are not limited to:

- Undertaking a due diligence audit at least a month prior to the commencement of construction. The audit will include a site visit and a qualitative survey of the status of the area prior to construction.
- Review and analyse the monitoring data which will include but not be limited to water, dust and noise monitoring, complaints and pollution incidents and non-conformances against the limits that have been set in the environmental specifications and/or the Environmental Authorisation.
- Site inspections will be conducted in such a way that all the construction activities are covered in the month. The site inspection will include a physical visit to the construction sites. The ECO will inform Emalahleni Local Municipality of the visit and will commence the visit with an opening meeting on site to gather information regarding the level of operations and a closing meeting to provide feedback to the Design Engineer and Emalahleni Local Municipality. A report will be compiled to summarise the findings.
- Every month the ECO will also provide a monitoring report to the Competent Authority based on the data gathered by the Contractor and evaluate the information against the performance targets set out in the EMPr.
- Familiarise oneself with the formation present and its fossils.

It is expected that the ECO will maintain open communications with Emalahleni Local Municipality to ensure that non-conformances are addressed as soon as possible on site.

5. MONITORING, AUDITING, & REPORTING

5.1 *INTRODUCTION*

The purpose of monitoring, auditing and reporting is to ensure that implementation in the design, construction and operations and maintenance phases of the life-cycle of the project is accomplished in such a manner that the organisations environmental policy, objectives and targets are met as outlined in this document.

Emalahleni Local Municipality has resolved to focus on environmental issues, with emphasis on attaining a high level of environmental conscience and as a responsible business take the lead in its field. The Resort recognises that every being has the right to an environment that is not harmful to their health or wellbeing and that the nature of its activities could impact on the environment. The Emalahleni Local Municipality Environmental Policy is included in **Appendix E**.

The philosophy that will be followed is based on the Deming Cycle, namely; Plan, Do Check, Act, that allows for continual improvement of all activities on site. The objectives are:

- Identify possible impacts that may emanate from its activities;
- Implement mitigation measures to prevent, reduce and minimize the impacts;
- Create an awareness among all employees;
- Incorporate environmental issues into the company's business strategy.

5.1.1 Plan

The planning is intended to ensure that all activities of the project are carried out in a methodical fashion that allows for a concise intervention that is in concurrent with environmental management principles.

5.1.2 Do

The implementation will be through the development of Management and Mitigation Plans for each significant construction activity and its aspects that may have an impact on the environment.

5.1.3 Check

This EMPr can only be effectively implemented if it is accompanied by monitoring, auditing and reporting on compliance with the management and mitigation plans. The monitoring programme

will be designed in a manner that ensures that all the components of the Project that have the potential to impact the environment are accurately monitored.

5.1.4 Act

Without acting on non-compliances and implementing corrective measures all actions on site will be fruitless. The Project will be subject to both internal monitoring, and external auditing to ensure compliance to relevant legislation and standards (including this EMPr).

The following basic elements will be included in establishing and maintaining procedures for investigating and correcting non-conformance:

- Identifying the cause of the non-conformance
- Identifying and implementing the necessary corrective action. Implementing or modifying controls necessary to avoid repetition of the non- conformance
- Recording any changes in written procedures resulting from the corrective action.

5.2 *ENVIRONMENTAL CONTROL DOCUMENTS*

5.2.1 Health and Safety Incidents and/or near Misses Reporting

The following actions will be followed / addressed during incidents, accidents and near misses:

- All accidents, incidents and near misses will be reported to the Emalahleni Local Municipality Environmental Manager
- Accidents will be addressed in terms of the Health and Safety Plan. If injured, workers will be taken to an appropriate health care facility for treatment. The accident will be documented, including the nature and cause of the accident and the subsequent measures to prevent a similar accident from recurring.
- The corrective actions will be discussed during the next day's toolbox discussion.
- A weekly incident report will be forwarded to the Employer or his representative.

The incident report will be kept on file and will be available for review during audits.

5.2.2 Environmental Monitoring and Community Complaints Records

Records are evidence of the ongoing activities of the operation. Typical records that will be kept may include:

- Declaration of understanding of Environmental Management Programme
- Environmental Incidence Register
- Environmental Incident Report

- Hazardous Waste Disposal Register
- Method Statement Proforma
- Method Statement Register
- Hazardous Substances Register
- Community / Guests / Staff Complaints Register
- Environmental Audit Report
- Environmental File Index
- Relevant Letters of Appointment
- Quarterly Environmental Report
- Environmental Induction
- Visitors Induction and Indemnity

The environmental records will be legible, identifiable, and traceable to the activity involved. Records will be maintained to demonstrate conformance to all requirements.

5.3 *ENVIRONMENTAL MONITORING*

The main objective of the monitoring programme with respect to project activities is as follows:

- To establish trends
- To ensure compliance with regulatory authorities requirements
- To asses effectiveness of the proposed mitigation measures
- To detect environmental contamination as early as possible

In order to fulfil the above mentioned objectives the monitoring programme will cover issues related to the following environmental components:

- Public health – noise, dust and construction traffic
- Protected fauna and flora species – search and rescue and destruction
- Heritage / grave protection and / or relocation

6. DESCRIPTION OF PROJECT RELATED ACTIVITIES AND ASPECTS

In order to oversee the successful construction of the chairlift and associated infrastructure, various construction activities as well as their associated aspects have been identified and listed. From the identified aspects it is possible to determine the associated environmental impacts and therefore set the base to formulate measures to manage and mitigate these environmental impacts on site.

6.1 *PRE – CONSTRUCTION ACTIVITIES*

Pre – Construction follows on from final project planning tender phase and leads up to the establishment of the appointed Contractor on site. Emalahleni Local Municipality will be responsible for overseeing the implementation of the project requirements.

The Pre-Construction activities that are going to be conducted involve, but are not limited to:

- Finalise Design Requirements of the chair lift;
- Access to site;
- The surveying of the chair lift alignment;
- Walk down of the alignment with the specialists and ECO, specifically to undertake search and rescue activities;
- Acquiring of all relevant permits and licences;
- Identified Cultural Heritage Resources and Graves rescue and relocation;
- Rescue and relocation of identified red data flora;
- Social aspects related to the employment of local labour;
- Development of construction Method Statements where applicable;
- Environmental Awareness Training; and
- Photographic record of areas prior to site establishment and construction.

6.2 *CONSTRUCTION ACTIVITIES AND ASPECTS*

Construction refers to the phase in the project during which the actual construction of the 900 m chairlift and associated infrastructure will take place.
The Construction Phase will be divided into the following activities:

- Site Establishment and Infrastructure.
- Site Operations and Construction Works.

The activities and associated aspects which have been identified for Site Establishment and Infrastructure are listed in **Table 6-1**.

Table 6-1: Site Establishment and Infrastructure activities and associated aspects

No.	Activity	Aspect
1	Clearing and Grubbing	• Dust generation • Loss of vegetation, habitat and soil fertility. • Increased level of noise generation
2	Access to Site	• Increased traffic volumes
3	Construction and use of Temporary Access Paths / Roads	• Dust generation • Loss of vegetation, habitat and soil fertility. • Increased potential for erosion. • Increase in vehicle movement in area. • Increased level of noise generation
4	Installation of parking bays for construction plant and vehicles	• Dust generation • Loss of vegetation, habitat and soil fertility • Increased level of noise generation
5	Installation of temporary warning signage	• Decrease in aesthetic quality of the environment • Lack of visibility of signage
6	Topsoil stripping and stockpiling	• Dust generation • Loss of vegetation, habitat and soil fertility. • Increased potential for erosion • Soil contamination • Encroachment and establishment of alien vegetation • Reduced productivity of subsistence farmland
7	Provision of sanitation systems	• Dust generation • Loss of vegetation, habitat and soil fertility • Ground water contamination
8	Demarcation, fencing and gates	• Loss of vegetation and habitat • Impede faunal movement • Impeded human movement and disrupted daily activities
9	Provision of flammable material and other material stores	• Dust generation • Loss of vegetation, habitat and soil fertility • Soil contamination

The activities and associated aspects which have been identified for Site Operations and Construction Works are listed in **Table 6-2**.

Table 6-2: Site Operations and Construction Work activities and associated aspects

No.	Activity	Aspect
1	Blasting of hard material	• Increased level of noise generation • Vibration • Dust generation • Safety
2	Refuelling of construction vehicles and plant	• Soil contamination • Water contamination
3	Spoil material generation and management	• Dust generation • Loss of vegetation, habitat and soil fertility • Decline in the aesthetic quality of the environment
4	Relocation of existing services	• Disruption in the provision of services
5	Domestic and construction waste collection, storage, handling and disposal	• Unpleasant odours • Increase in Waste generation • Decline in the aesthetic quality of the environment
6	Handling, storage, disposal of hazardous waste	• Unpleasant odours • Soil contamination • Water contamination
7	Consultation with affected parties	• Insufficient consultation
8	Operation and movement of construction vehicles and plant	• Dust generation • Increase in level of noise generation • Soil contamination • Safety • Vibration • Greenhouse gas emissions
9	Road upgrades	• Dust generation • Increased level of noise generation • Soil contamination • Safety
10	Slopes and slope stabilisation	• Dust generation • Increased potential for erosion • Water contamination • Decline in the aesthetic quality of the environment • Safety
11	Maintenance of sanitation systems	• Unpleasant odours • Mismanagement of sewerage
12	Transportation of hazardous waste	• Potential spillages of hazardous waste • Safety • Greenhouse gas emission

No.	Activity	Aspect
13	Transportation and storage of pylons, pipes and associated materials at the laydown area	• Increase in vehicle movement in area • Impact on the existing road conditions • Safety • Increase in the level of noise generation • Greenhouse gas emissions
14	Use of generators	• Increase in level of noise generation • Soil contamination
15	Protection of archaeological findings	• Destruction of graves and other sites of archaeological value
16	Welding	• Safety • Emission of noxious fumes
17	Cooking of food	• Fire hazard • Illegal wood harvesting
18	Employment of local labour	• Insufficient employment of local labour • Presence of construction workforce • Influx of job – seekers • Loss of farm labour to construction work
19	Security	• Trespassing
20	Fire Control	• Loss of vegetation, habitat and soil fertility
21	Water Use and Management	• Water contamination • Misuse of available water
22	Concrete mixing	• Soil contamination • Water contamination • Misuse of available water

6.3 *REHABILITATION*

Rehabilitation will run con-currently with the actual construction of the chairlift and associated infrastructure. Rehabilitation will consist of, but is not limited to, the following rehabilitation measures:

- Removal of temporary structures and infrastructures;
- Removal of inert waste and rubble;
- Hazardous waste and pollution control;
- Final shaping of disturbed areas;
- Topsoil replacement and soil amelioration;
- Ripping and scarifying;
- Planting;
- Grassing;

- Maintenance; and
- Management of alien vegetation.

Rehabilitation measures mentioned above are dealt with in more detail later.

7. COMMUNICATIONS, CONSULTATIONS, & TRAINING

7.1 *COMMUNICATION PROCEDURES ON SITE*

To ensure effective on-site communication and maintained environmental performance, copies of all documentation described in the EMPr must be maintained on site at all times and be available to both the Environmental Manager, Design Engineer, the EM and ECO, and will be provided on request to authorities or stakeholders for inspection.

7.1.1 Site Instruction Entries

The Site Instruction journal entries will be used for the recording of instructions as they relate to implementation of the EMPr. Entries could also include stoppage of work orders for the purposes of immediately halting any particular activities of the contractor.

7.1.2 ECO Diary Entries

The purpose of these entries will be to record the comments of the EM as they relate to activities on the site. Both the Site Instruction journal and EM Diary must be available on the site at all times. These documents will be made available to all relevant authorities for inspection if requested.

7.1.3 Site Meetings

Regular site meetings will be held between the Environmental Manager, Contractor and its EO, the Design Engineer and its EM, and the ECO (optional). The purposes of the meetings shall be:

- To establish the suitability of the Contractor's methods and machinery in an effort to lower the environmental, social and health risk involved;
- To discuss and resolve non-conformance to environmental legislation / policies or the EMPr;
- To assess the general state of the environment on site and discuss any environmental problems which may have arisen;
- To act as a forum for input into the nature and environmental performance of the construction works;

- To accommodate all stakeholders in the decision-making process regarding social and environmental issues on site.

7.1.4 Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided the means to be able to submit non-conformance reports to the EO and EM. The EO and EM may also report non-conformances. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously as well as the effectiveness of the remediation measure in order for the non-conformance to be closed-out at the satisfaction of the EM and ECO.

7.2 *COMMUNITY CONSULTATION*

Key stakeholders such as the Chiefs of the neighbouring areas and the representative community councillors should be informed on the progress with the implementation of the EMPr.

The stakeholders will be provided with an opportunity during construction to provide input into the project development process. The following consultation activities will be undertaken:

- Notify the Local Chiefs and the Local Community Councillors in the project area of the proposed construction start date and request them to notify their community members.
- The Community Councillors will be provided with the name of the appropriate project contact person that will deal with queries and complaints.
- Notify the community through the councillors of monitoring programmes and environmental audit results.
- Monthly meetings with the relevant councillors will be held to obtain feedback about the project from the communities.

7.3 *COMPLAINTS MANAGEMENT AND GRIEVANCE PROCEDURE*

A protocol to address complaints includes the following aspects:

- Name of complainant;
- Contact details of complainant;
- Date of complaint;

- Nature of complaint; health or environment or safety related;
- Details of complaint; location, severity, stakeholders involved, frequency; and
- Manner in which the complaint has been resolved and a description of how this was communicated back to the communities.

7.4 *ENVIRONMENTAL TRAINING*

All site staff of all levels, as well as visitors to the site, should be made aware of the environmental management requirements for the project. This should be achieved through training as part of their induction and regular refresher courses.

An Awareness Training Plan will be prepared, that provides for the various categories of persons on site and will cover at least:

- The role and responsibility of the ECO and of other key persons on site in relation to environmental management requirements
- The construction activities that will impact both the physical and social environments
- Mitigation measures that have been put in place to avoid or minimise the anticipated impacts
- The nature and appearance of cultural heritage resource sites that may be found during construction activities and the mandatory procedures to be followed for their mitigation
- Prevention and control of waste, litter, spillages and fire, and particularly veld fires
- An outline of specific environmental management measures, such as rehabilitation of disturbed areas, fire management, prevention of water pollution and dust management
- Pre-construction training will include palaeontology and heritage resources; a palaeontologist will be involved where necessary.

Daily toolbox talks at the start of each day with all workers onsite should be held. At these sessions relevant environmental and communications requirements should be raised to alert workers to particular concerns associated with their tasks for that day or the area which they are working.

7.5 *SITE INDUCTION (SHE)*

The Contractor will provide all employees or other persons entering the site with health and safety induction training pertaining to the hazards prevalent on the site and with the necessary Personal Protective Equipment (PPE). All employees will also be informed of the relevant emergency procedures.

During the safety induction, the employees will be informed of all environmental, health and safety issues. All employees that underwent the safety induction will sign an attendance register that will be kept on file (records).

8. EMERGENCY PLANNING AND RESPONSE PROCEDURES

The Contractor shall develop plans for action to be taken in the cases of emergencies. These plans should specify the emergency procedures for fire, accidental leaks and spillages and medical emergencies and be in line with the Emalahleni Local Municipality's existing Standard Operating Procedures. An accident register should be compiled every month.

Emergency contact numbers should be displayed in prominent places which should include the Police, Fire Department and Ambulance Services.

A designated emergency meeting point should be established and all employees should be informed of the locality and procedures.

8.1 *FIRE CONTROL*

- The Engineer and relevant authorities should be advised of a fire as soon as one starts.
- It should be ensured that all employees are aware of the procedure to be followed in the event of a fire.
- 'No smoking' areas should be marked, including the workshop and fuel storage areas.
- It should be ensured that there is basic and adequate fire-fighting equipment available on site and on all plant.

8.2 *ACCIDENTAL LEAKS AND SPILLAGES*

The existing Emalahleni Local Municipality Service Provider should be used to undertake clean-up of accidental spills onsite.

The degree and nature of any spillage should be consulted and mutually agreed between the parties, to seek the best alternative clean-up method available. The MSDS should also be consulted to determine the method of clean-up and to realise optimal utilization.

The following preventative measures should be undertaken:

- All sensitive sites should be identified such as rivers and wetlands and procedures developed to ensure proper handling of oil/fuel or chemical spillages in these areas.
- It should be ensured that all employees are aware of the procedure to be followed in case of accidental spills and leaks.
- It should be ensured that the necessary materials and equipment for dealing with spills and leaks is available on site at all times.

- All employees should be trained to handle all accidental leaks and spillages onsite appropriately.

9. REHABILITATION

The landscaping and rehabilitation of disturbed areas shall occur as soon as practically possible following the completion of the work in a specific area. Therefore, the rehabilitation process will immediately be executed, per phase, upon the completion of the work within a specific area, utilising specified methods and species.

9.1 *REMOVAL OF STRUCTURES AND INFRASTRUCTURE*

- The removal of all construction facilities and materials from the construction camp will be required and rehabilitation will have to be carried out, including the removal of the following:
    - Removal of construction site and/or camp.
    - Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, fixtures, concrete and compact earth platforms, fuel storage tanks and bund areas, chemical toilets and any other temporary works.
    - Materials that will not be used again must be removed by the Contractor.
    - Ensure that all access roads utilised during construction (which are not earmarked for closure and rehabilitation) are returned to a usable state and/or a state no worse than prior to construction.
    - Ensure that all access roads earmarked for closure and rehabilitation are ripped and that all imported material is removed. Rehabilitation should follow the first out; last in principle (i.e. rehabilitation should occur as follows subsoil, topsoil, hydro seeding).

9.2 *INERT WASTE AND RUBBLE*

- Clear site of all inert waste and rubble, including surplus rock, foundations, batching plant aggregate and soil crete. After the material has been removed, the site shall be re-instated and rehabilitated.
- Load and haul excess spoil in borrow pits / dongas and inert rubble to dump sites and spoil areas as indicated / approved by the Environmental Manager.
- Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site. Proof of this must be provided by the Contractor to the Engineer.

9.3 *HAZARDOUS WASTE AND POLLUTION CONTROL*

Remove from site all pollution containment structures such as temporary sanitary infrastructure, waste water disposal systems and oil separators. Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.

A large quantity of silt has to be removed and disposed, and for this purpose the silt had to be analysed and classified. The silt from the river bed was analysed and classified according to the Waste Classification and Management Regulations, promulgated on 23 August 2013. These regulations require that waste generators classify their waste according to SANS 10234 and as stipulated in GN R634 and in cases where contaminated soil is considered the requirements from GN R331 regarding the classification of contaminated land and the quality of soil were applicable.

The classification focussed on the following criteria:

- Physical Hazard
- Explosiveness
- Flammability
- Oxidation / Corrosiveness
- Health Hazard
- Eye and skin irritation
- Mutagenicity; carcinogenicity; reproductive toxicity
- Environmental Hazards
- Toxicity to aquatic life

"The total concentration (TC) and leachable concentrations (LC) limits of the chemical substances in the waste weree compared to the threshold limits specified in Section 6 of the Norms and Standards for total concentrations (TCT limits) and leachable concentrations (LCT limits) of specific elements and chemical substances. Based on the TC and LC limits of the elements and chemical substances in the waste exceeding the corresponding TCT and LCT limits respectively, the specific type of waste for disposal to landfill was determined in terms of Section 7 of the Norms and Standards".

The classification and definitions within the legal framework were considered in terms of the following documents:

- National Environmental Management: Waste Act 59 of 2008 [Commencement Date: 1 July 2009] as amended
- National Environment Laws Amendment Act 14 of 2013 (with effect from 24 July 2013)
- National Environmental Management: Waste Amendment Act 26 of 2014 (with effect from 2 June 2014)
- Government Notice 635, National Environmental Management: Waste Act 59 of 2008: National Norms and Standards for the Assessment of Waste for Landfill Disposal
- Government Notice 636, National Environmental Management: Waste Act 59 of 2008: National Norms and Standards for Disposal of Waste to Landfill

The samples were analysed by an accredited laboratory.

An appropriate method of disposal and the type of facility to be used for the disposal of waste must be based on the results of the analysis and classification of the waste.

9.4 *FINAL SHAPING*

- Make sure all dangerous excavations are safe by backfilling and grading as required.
- In general, no slopes steeper than 1(V):3(H) are permitted, unless otherwise specified by the Environmental Manager, in consultation with the Engineer. Steeper slopes require protection.
- Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. Compact in layers for best results.
- Additional fill may only be imported from approved borrow areas as indicated by the Environmental Manager.
- Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material.
- Shape all disturbed areas to blend in with the surrounding landscape.
- Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfill is removed to a dedicated spoil area.

9.5 *TOPSOIL REPLACEMENT AND SOIL AMELIORATION*

- The principle of "progressive reinstatement" must be followed as determined by the EM and Contractor. This includes the reinstatement of disturbed areas on an on-going basis, immediately after the specified construction activities for that area are concluded.
- Execute top soiling activity prior to the rainy season or any expected wet weather conditions.
- Execute topsoil placement concurrently with construction where possible and as agreed by the Environmental Manager.
- Redistribute stockpiled topsoil. Replace herbaceous vegetation and reinstate grass in all areas cleared by the Contractor for the construction site, including temporary access routes and roads. Replace topsoil to the original depth.
- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality. Ensure that the soil brought in undergoes both physical and chemical tests and is to the satisfaction of the Landowner and Environmental Manager.
- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage.
- Topsoil suspected to be contaminated with the seed of weeds must be sprayed with specified herbicides.
- Herbicides should be for selective broad-leafed weeds as approved by the Environmental Manager.
- Ensure that storm water run-off is not channelled parallel to the prevailing contours.
- After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area.

9.6 *RIPPING AND SCARIFYING*

- Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary will be based on the site conditions immediately before these works begin.
- All soil to be rehabilitated shall be ripped with a mechanical ripper to a depth of 300mm or as agreed by the Environmental Manager. No section of ground shall remain undisturbed after ripping.
- Rip and/or scarify all disturbed (and other specified) areas of the construction site, including temporary access routes and roads, compacted during the execution of the Works.

- Rip and/or scarify along the contour to prevent the creation of down-slope channels.
- Do not rip and/or scarify areas under wet conditions, as the soil will not break up.

9.7 *PLANTING*

9.7.1 Transplanted plants

- All planting work is to be undertaken by suitably experienced personnel, making use of the appropriate equipment.
- Trees to be transplanted must be carefully removed from the soil so as to retain as large a root ball as practically possible. Use the tree's driplines as an indicator: the larger the tree the larger the root ball (and subsequently the planting hole).
- Minimise disturbance of the soil and the remaining roots in the root ball during the lifting, moving and or transportation of all species.
- Plant trees and shrubs so that their stems or trunks are at the same depth as in their original position.
- Orientate trees and shrubs in the same direction as in their original position.
- Plant aloes and bulbs in similar soil conditions and to the same depth as in their original position.
- The plant must be planted into the specified hole size with the approved soil, compost and fertiliser mix used to refill the plant hole and must cover all the roots and be well firmed down to a level equal to that of the surrounding in situ material, as per the rehabilitation specification.
- After planting, each plant must be well watered, adding more soil upon settlement if necessary.
- Place branches / brush packing on rehabilitated and seeded areas to protect new growth from grazing animals. This will also ensure the establishment of a seed bank.

9.8 *GRASSING*

- Suitably trained personnel must undertake grassing by making use of the appropriate equipment and using grass species as specified by the Environmental Manager pending availability.
- Trim areas to be grassed to the required level.
- Hydroseeding with a winter mix will only be specified where re-grassing is urgent, and cannot wait for the summer.

- Depending on soil texture and slope stability, it may be necessary to establish a temporary (annual) grass cover consisting of artificial composition to aid soil binding.

9.9 *MAINTENANCE*

- The Environmental Manager will monitor the re-growth of invasive vegetative material for one year.
- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers (or other approved method). If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- Re-vegetation must match the vegetation type, which previously existed.
- Base the new carrying capacity of rehabilitated land on the status quo rather than the regional estimate.
- Control invasive plant species and weeds by means of extraction, cutting or other approved methods before the plants flower and form seeds.
- For planted areas that have failed to establish, replace plants with the same species as originally specified.
- A minimum grass cover of 80% of the planted area sown, hydro-seeded or planted shall be covered with live plants of the specified species measured as basal cover, and that there shall not be any bare patches larger than 500 mm maximum in diameter.
- Individual plants must be strong and healthy growers at the end of the Defects Notification Period.
- The entire process of rehabilitation shall be meticulously documented so that the methods used on a specific part of the alignment can be replicated on other parts or even other future projects.

9.10 *ERADICATION OF WEEDS*

All weeds spread over the entire disturbed construction footprint must be removed prior to the plants flowering and forming seeds, irrespective of its existence prior to construction. Chemical removal shall be used in accordance with manufacturer's specification for weeds. All chemicals used must be approved by the ECO. Once the weeds have perished, they shall be removed mechanically by use of an offset disk plough thereby digging up the vegetation including the root ball.

9.11 *CONTROL OF WEEDS*

The remainder of the site including the re-vegetated areas shall be kept free of all weeds.

It is important that the entire process of rehabilitation shall be meticulously documented so that the methods used on a specific part of the alignment can be replicated (if necessary) on others parts or even other future projects.

10. MANAGEMENT AND MITIGATION PLANS

The management of environmental issues during the construction phase are dealt with through specific management and mitigation plans for each identified environmental component that requires management and mitigation.

The specific and detailed management and mitigation plans for construction follow as separate chapters.

11. ESTABLISHMENT OF CONSTRUCTION LAY DOWN AREA

11.1 *PURPOSE*

This activity includes the establishment of the site camp which includes, but is not limited to the site offices, ablutions, dedicated eating areas, material storage areas, and waste collection areas for the period that construction is to be undertaken.

During the construction phase one construction site / lay down area will be established.

The purpose of this management and mitigation plan defines the establishment and management of the construction site during the construction phase to prevent or minimise environmental impacts these might cause.

11.2 *OBJECTIVE*

The objectives are to:

- Minimise impacts associated with the establishment and operation of construction site lay down area.
- Ensure access to the construction laydown area is properly controlled.
- Ensure that the handling and disposal of contaminated water is done within the framework of applicable legislation.
- Ensure that water washing and toilet facilities are supplied complying to norms and standards.
- Ensure that the potential for communicable diseases to increase, as a result of the project, is managed and mitigated effectively.
- Ensure that hazardous materials storage is effective and compliant to norms and standards.
- Ensure that vehicle, plant and equipment refuelling is practiced in such a manner that no secondary pollution or emergency situation is created.
- Ensure that lighting pollution is controlled at construction sites ensuring that neighbours are not negatively affected.

11.3 *TARGETS*

- No complaints regarding the construction camp from residents.
- No unauthorised access to the construction laydown area.
- No discharge of polluting elements to any stormwater drain, stream or river.

- Sufficient ablution facilities supplied at all construction sites.
- Percentage of medical examinations of all construction workers by the Contractor.
- No construction workers to stay on site.
- Hazardous substances storage shall comply with regulatory requirements at all times.
- Storage of flammable material shall be done according to prescribed standards at all times.
- Refuelling of vehicles, plant and equipment shall be done according to prescribed standards at all times.
- No complaints regarding lighting impacts on neighbours, residents, visitors and staff.
- No runoff shall be allowed from any wash facility.

11.4 *MANAGEMENT AND MITIGATION PLAN*

Establishment of construction sites

- A plan showing the construction layout, including the positions of all buildings, fuel storage areas and other infrastructure should be prepared. The plan should detail all pollution control measures. The site has to be demarcated by means of a security fence.
- Access to the site should be limited to authorised persons and should be security controlled. Identification cards should be issued to all workers and visitors to site.
- The placement of buildings and equipment should be done to minimise the footprint and visual impact of the sites.
- Downlighting should be used and it should be ensured that lighting on site does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding hotel guests, staff or other users of the area.
- Vehicles, plant and equipment should be subject to prestart checks and regular maintenance to identify and remedy fuel and oil leaks.
- Workers should be instructed not to dispose of cigarette butts.

Demarcation and access control

- The construction site should be properly identified and demarcated.
- The materials and soil stockpile areas, fuels and chemical storage areas, and concrete mixing areas must be selected to ensure that they are located away from environmentally sensitive areas and protected from stormwater runoff, fire and access by unauthorised persons.
- The access roads, temporary loading and packing areas and turning circles should be clearly indicated on a drawing.

Handling and disposal of contaminated water

- No discharge of pollutants such as cement, concrete, chemicals, fuels or oils should be allowed into any water resource.
- The areas around fuel tanks should be bunded in accordance with SANS 1089:1999: Part 1.
- Only above ground temporary storage tanks should be allowed on site.
- Contaminated or potentially contaminated water should be kept separated from unpolluted stormwater.
- No wash areas should be erected.

Water washing, toilets and sewage

- Ablution facilities provided should include shelter, toilets and hand washing facilities.
- Toilets should be provided at the preferred ratio of 1 toilet per 15 workers, and should be shown on a lay down drawing.
- Sanitation facilities shall be located within 100m of any point of work, but not closer than 50m from any water body.
- All temporary/portable toilets should be secured to the ground to prevent them toppling due to wind or any other cause.
- Entrances to toilets should be adequately screened from public view.
- Ablution facilities provided should be maintained in a hygienic state and serviced regularly to ensure proper operation.
- Toilet paper should be supplied at ablutions.
- No spillage shall be allowed when the toilets are cleaned or serviced.
- The contents of chemical toilets should be removed to an approved disposal site.
- The toilets should be serviced and cleaned on the last construction day before the builder's holiday.

Communicable diseases

- No accommodation at the construction site should be allowed. Workers should not be allowed to stay overnight in the construction site.
- Access control through appropriate fences and 24 hour gate control should be enforced.
- Ongoing training should be provided regarding communicable diseases.
- No alcoholic beverages should be allowed onsite.

Hazardous materials storage

- Materials storage areas should not be allowed in close proximity to ecologically and archaeological sensitive areas.
- Materials storage areas should be sited outside the 1:50 year flood line of watercourses.
- Hazardous chemicals or potentially hazardous chemicals used during construction should be stored in secondary containers and all relevant Material Safety Data Sheets (MSDSs) should be available on site.
- The relevant emergency procedures relevant to particular chemicals used on site, as per the MSDSs and suppliers guidelines, should be followed in the event of an emergency.

Vehicle, Plant and equipment re-fuelling

- All liquid fuels and oils should be stored in suitable above ground storage tanks or in tanks with lids, which should be kept firmly shut and under lock and key at all times.
- Above ground fuel tanks should be at least 3,5 m from buildings, boundaries and any other combustible or flammable materials.
- Empty but externally dirty tanks should be sealed and stored where the ground has been protected.
- Any electrical or petrol-driven pumps should be equipped with a drip tray and positioned so as not to cause any danger of ignition of the product.
- Fuel dispensed from 210 l drums should be done with proper dispensing equipment to minimise spill potential.
- Under no circumstances should drums be tipped to dispense fuel.
- The siting of the installation should be done within the following guidelines:
    - The fall of ground in relation to residential areas and other risk areas that could be exposed in the event of accidental large scale spillages.
    - Access to facilities to and around the site.
    - Drainage systems.
    - Available water supplies.
    - Fire protection, security, and general service facilities in the area, including the fire services response time.
    - Population densities around the premises.
    - Good housekeeping e.g. the removal of flammable materials such as rubbish, dry vegetation and oil soaked soil.
- Bunding at these facilities should comply to the following guidelines:
    - A slope of at least 1:100 away from the tank is provided for at least 15m.
    - The volumetric capacity of the bunded area is a minimum of 110% of the volume of the largest tank.

- The wall of the bunded area is of concrete, and has been designed to be liquid tight and to withstand a full hydrostatic head of water.
- The wall height of the bunded area has been restricted to 1.8m.

Lighting

- Working hours should generally be restricted to daylight hours.
- If working hours are required outside of daylight hours, notification should be provided to relevant neighbours.
- Security lights are directed from the perimeter wall towards the centre of the camp with a down angle.

Materials / Goods on site

- The store man should be responsible for stacking and storage of material.
- Bricks, sandstone blocks, building sand, plaster sand and stone will be stored “open” on site but with special care that materials are not contaminated i.e. that different types of sand are not mixed.
- Cement should be stored in a lockable and water proof container and should be stacked not more than 13 bags high. Cement should be used, as far as possible, on a first-in first-out basis.
- Reinforcing bars should be stored in the open but should be placed on timber poles to avoid “contamination” by mud or soil.
- Paint will be stored in a ventilated lockable store.

11.5 *MONITORING & REPORTING*

Daily inspections should be carried out by the EO and record findings on a weekly checklist. Monthly audits will be undertaken by the ECO and a monthly audit report prepared.

12. EROSION CONTROL

12.1 *PURPOSE*

The purpose of this management and mitigation plan is to ensure that erosion is minimized that could occur as a result of construction activities.

12.2 *OBJECTIVE*

The objective is to avoid soil erosion of areas within and downstream of the construction activities.

12.3 *TARGETS*

- No formation of small erosion channels and sheet erosion.
- No flooding as a result of stormwater control measures.
- No erosion as a result of stormwater control measures.
- No silt pollution as a result of flooding and/ or stormwater control measures.

12.4 *MANAGEMENT AND MITIGATION PLAN*

Identified areas where erosion could occur should be appropriately protected by installing the necessary temporary and/or permanent drainage works as soon as possible and by taking other appropriate measures to prevent water from being concentrated in rivers/streams and from scouring slopes, banks or other areas.

Any erosion channels which develop during the construction period should be suitably backfilled, compacted and restored to a proper condition (i.e. vegetated etc.).

Where excavation takes place, the affected area should be properly stabilised and revegetated to minimise erosion risk.

Stormwater control measures should consider and provide for the following:

- Use of siltscreens.
- Use of straw bales as filters, which are placed across the flow of overland stormwater flows.
- Channelling stormwater run-off through natural grassland buffer areas.
- Silting of stormwater pipes in adjoining developments as a result of run-off from the project area will not be allowed.

- Gabions or stormwater control structures should be used to disperse stormwater flows and/or prevent and control erosion where necessary.
- All erosion protection measures should be maintained on a continual basis
- Corrective actions should be taken as and when required to stop any signs of erosion.
- Regular inspections by competent personnel should be undertaken at especially:
  - inlet and outlet points of drainage structures
  - stormwater release points, and
  - along sections where drainage structures are laid on steep slopes.
- Where possible, stormwater should be released in grassy areas which act as a natural filter and to reduce the erosion potential of the water.
- The stabilization of headcuts during the construction phase to prevent erosion and sedimentation should be undertaken through various methods to limit or eliminate erosion and sedimentation i.e. gabions, rock packing, vegetation establishment, bales and poles, and vegetation sausages.

12.5 *MONITORING & REPORTING*

Weekly visual inspections of erosion sensitive areas and daily inspections after rainfall events will be undertaken. Recording and reporting will be through inspections notes and monthly monitoring report.

13. WETLAND MANAGEMENT

13.1 *PURPOSE*

The purpose of this management and mitigation plan is to ensure that the identified sensitive wetlands are protected through the implementation of active mitigation measures.

13.2 *OBJECTIVE*

The objective is to avoid wetland degradation as a result of construction activities.

13.3 *TARGETS*

- Effective stormwater management during the construction phase.
- Effective rehabilitation of the construction footprint.
- Achieve the recommended ecological Category C, within one season after construction has been completed.

13.4 *MANAGEMENT AND MITIGATION PLAN*

The Hydrogeomorphic wetlands were identified, namely a channelled valley bottom wetland and two hill slope seepage wetlands. The overall wetland was found to be largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred, however some of the natural habitat remains intact to some extent. Therefore, the Present Ecological Status is a Category D.

The overall wetland is considered to be ecologically important and sensitive on a regional scale. The biodiversity of this wetland is low with no red data species recorded. The ecological importance and sensitivity for this system is thus considered to be moderate.

Stormwater management for the site is required specifically for the construction phase. Rehabilitation of the impacts and maintenance of the system will further mitigate the impacts and could improve the sustainability of the system. The recommended ecological category is therefore set at Category C.

13.5 *MONITORING & REPORTING*

The following monitoring and reporting requirements must be implemented:

- Water quality monitoring during the construction phase as required by the General Authorisations.
- Quarterly wetland monitoring after the completion of all construction activities by a qualified and registered professional.

14. FLORA AND FAUNA MANAGEMENT

14.1 *PURPOSE*

The purpose of this management and mitigation plan is to ensure vegetation clearing is undertaken in such a manner that protected species as detailed in this report are rescued or protected.

14.2 *OBJECTIVE*

- To ensure that the existing roads will be used to access the project area.
- To ensure that the impact to habitat is restricted only to the footprint area and that protected plant and fauna species are not affected through construction and weed invasion does not take place as a result of development.
- To successfully rescue or protect species of conservation value.
- To revegetate disturbed areas after construction, inclusive of construction areas, temporary accesses, stockpile areas, and construction camps.
- The objective of management measures is to ensure that littering does not take place and faunal disturbance is kept to a minimum.
- To ensure that no bird collisions take place.

14.3 *TARGETS*

- All protected plant species rescued.
- No evidence of erosion.
- No invasive species in areas that have been disturbed by construction activities.
- No bird collisions with pylons.

14.4 *MANAGEMENT AND MITIGATION PLAN*

- The footprint area should be kept as small as possible and therefore no additional areas will be cleared except for the immediate work areas.
- An Alien Invasive Plant Species (AIPs) Management Plan should be implemented, whereby the disturbed site is monitored quarterly for at least two years to ensure that AIPs does not take place.
- As seedlings emerge, they will be removed bi-annually as part of an AIPs Management Plan.

- Rehabilitation of the disturbed area should take place after construction, whereby a mixture of native grass species harvested from climax *Themeda* grassland and native grass species (such as *Cynodon dactylon*) are planted immediately to prevent erosion.
- Signage should be erected to indicate any expected plant and animal species, and that no disturbance of these are allowed.

14.5 *MONITORING & REPORTING*

Wherever rehabilitation is required, a detailed record will be kept of the land area that has been rehabilitated compared to the land area still to be rehabilitated. Photographic or video records should also be used to supplement this information.

The percentage rehabilitation completed will be recorded for the construction site and reported on a weekly basis.

After a slope has been vegetated it will be inspected daily for the first week. Thereafter visual inspections will be undertaken once per week until the slope is deemed to be well enough vegetated to ensure further slope stability. Specific reports on erosion or slumping and sliding will be investigated on a case by case basis, the condition of the slope recorded together with the remedial action implemented.

AIP monitoring and implementation of control/ eradication measures should take place. Monitoring, eradication and control should be initiated after constructed and should take place annually for two years to ensure that AIPs area completely removed.

Signage will be erected to indicate an expected plant and animal species, and that no disturbance of these will be allowed.

15. AIR QUALITY MANAGEMENT

15.1 *PURPOSE*

The earthworks proposed during the construction phase have the potential to create a short-term dust nuisance unless properly managed. This may impact surrounding residents, construction workers and nearby vegetation. Dust may be generated from the following activities:

- earthworks associated with the development
- spillage or storage of soil and other materials
- vehicle movements along paved and unpaved roads

The impact of dust is likely to cause problems such as unpleasant visual amenity, dust on washing and dust entering houses. A potential exists for a public health impact if elevated levels persist in residential areas, however this is unlikely due to the stage nature of the project. Potential impacts on workers health and amenity will be addressed through induction and the issue of personal protective equipment.

15.2 *OBJECTIVE*

To ensure that dust emissions from construction activities do not result in adverse health or other negative effects.

15.3 *TARGETS*

- Dust fallout values shall conform to the relevant values of levels of nuisance dust against the National Environmental Management: Air Quality Act (NEMAQA) National Dust Control Regulations (GNR 827) on the boundary of the residential areas adjacent to the construction site
- Dust from construction sites not to exceed 600mg/m^2/day
- No complaints regarding dust.

15.4 *METHOD STATEMENT*

Areas susceptible to dust generation include re-vegetated areas and areas in need of rehabilitation. Vegetation cover must preferably be maintained e.g. removal of vegetation should be avoided until such time as soil stripping is required. Excavation, handling and transport of erodible materials should be avoided during periods of excessive wind. Location and management of stockpiles is of importance.

Dust control measures from traffic and other construction activities:

- Dust generation as a result of construction activities will be minimised through all reasonable measures.
- Removal of vegetation will be avoided until actual topsoil stripping is required.
- Excavation handling and transport of erodible materials will be avoided under high wind conditions or when a visible dust plume is present.
- Soil stockpiles will as far as possible be located in sheltered areas where they will not be exposed to erosive winds.
- Appropriate dust-suppression techniques will be implemented where dust generation is unavoidable through wet suppression.
- Strict measures will apply where materials in powder form, such as cement, concrete additives, etc. are stored, handled or used, and for the proper disposal of packaging of any such materials.
- In excessive windy conditions, the dust generating activities will be stopped until wind speed drops to an acceptable level.
- All exposed surfaces will be stabilised, resurfaced or re-vegetated as soon as is practically possible.

15.5 *MONITORING & REPORTING*

Daily visual observations of dust and nuisance levels. Recording and reporting will be through inspections notes and monthly monitoring report.

16. GENERAL SOLID & HAZARDOUS WASTE MANAGEMENT

16.1 *PURPOSE*

The inappropriate handling and disposal of solid waste materials can impact on both human safety and risk contamination of the natural environment. Two waste stream categories will be generated during the construction phase. These are hazardous waste and general waste. The purpose of this method statement is to manage these waste streams such that all potential negative impacts are prevented.

General waste would typically include building rubble generated during site clearance, vegetation, waste steel, wire and electrical cable off-cuts, waste wood and waste concrete.

Hazardous wastes typically include sanitary waste and used oil, oil rags, empty oil and grease containers, paint containers, degreasers, bitumen, herbicides, resins and curing agents.

16.2 *OBJECTIVE*

The objective is to avoid or minimize negative impacts on surrounding environment (soil, surface and groundwater) resulting from inappropriate waste disposal.

16.3 *TARGETS*

- Waste recycled and or reused shall be 10% of all waste generated.
- No littering on construction sites.
- Adequate containers are supplied and are easily accessible.
- Waste bins are removed and cleaned daily by the responsible Contractor.

16.4 *METHOD STATEMENT*

- Disposal instructions will be obtained from the supplier of pollutants or hazardous substances.
- An approved waste disposal company will be contracted to remove and dispose of hazardous substances. A certificate of safe disposal will be obtained from them and kept on record.
- No maintenance of vehicles will take place onsite. If used oil accumulates onsite these will be fetched by a company who recycle the oil e.g. Oilkol. Used oil will be stored in an enclosed area. The storage area will have an impervious surface to prevent oil contamination.

- Old containers of paint, oil, thinners, acids, poisons etc., will be disposed as per clients waste disposal procedures.
- Construction workers will be trained and informed about waste minimisation. The person dealing or who may potentially be exposed to hazardous chemical substances will be provided with a well-defined list of duties.
- Where feasible, waste materials will be recycled and the following will apply:
  - Glass, papers and cardboard, metals (other than aluminium), aluminium, organic waste and plastic could be recycled and will be separated into different containers at the construction site.
  - These containers will be suitably marked and stored in a covered and enclosed area to protect it from the elements and scavengers.
  - Recycling will be done by staff wearing suitable PPE such as gloves and dust masks.
  - Clear signs and separation areas for waste material will be provided.
- Appropriate records will be kept of volumes of hazardous chemical substances generated and disposed. These will include safe disposal certificates.
- Littering will not be allowed on site or at the laydown camp.
- Adequate containers or bins for litter removal will be supplied on site.
- The containers or bins will be emptied on a regular basis as required.
- Bins or containers used at the construction areas will be waterproof.
- Waste collected from these bins and containers will then be stored on site in a larger, scavenger proof and waterproof container for later disposal - disposal will be done at least once a week at the closest appropriate waste disposal site - records of proper disposal will be kept.
- If required, chicken runs will be conducted on site and at the camps to keep it litter free. This will be done at least once a week but as often as required to ensure a litter-free site.
- Care will be taken not to dispose of hazardous materials with the domestic waste - hazardous materials will be disposed of at a hazardous waste disposal site.
- Where waste is to be transported by truck, it will be covered and labelled appropriately

16.5 *MONITORING & REPORTING*

A register will be kept of all quantities of non-aqueous waste that is generated and removed for disposal from all the construction sites. The waste will be characterized as follows:

- Domestic/general waste.
- Building rubble.
- Waste timber.
- Scrap metal.

- Hazardous chemical substances.

The disposal of these different waste types will also be recorded and tracked with waste disposal certificates.

17. TRAFFIC MANAGEMENT

17.1 *PURPOSE*

The management of traffic will be essential during the construction phase and will require specific mitigation measures as described below to ensure that the impact on residents, businesses and road users are kept to a minimum.

17.2 *OBJECTIVE*

- To ensure that traffic impacts as a result of construction activities are minimised.
- To ensure that pedestrians are accommodated safely at all times where existing pedestrian walkways are affected by the construction activities.
- To use existing road infrastructure to access construction sites.

17.3 *TARGETS*

- No construction vehicles exceeding defined speed limits.
- No fines for construction vehicles committing traffic offences.
- No construction vehicles on the roads during peak traffic times.
- No replacement walkways for pedestrians that are directly exposed to vehicle movements.
- Use of existing roads must be maximised.
- Cleaning of public roads used for construction vehicles access twice a week.

17.4 *METHOD STATEMENT*

- A speed limit of 30 km/h for heavy vehicles; and 50 km/h for other construction vehicles will be strictly enforced. On public roads the specified speed limit would be applicable.
- Where possible, construction traffic should be scheduled in off-peak traffic times.
- Appropriate traffic safety signage should be provided to warn the public of construction traffic and flagmen will be on duty where traffic merges with normal road traffic.
- Regular route monitoring on all routes utilised by construction traffic will be done by construction foreman to ensure that any material that has fallen from construction vehicles be removed immediately to prevent traffic congestion and safety hazards.
- Construction vehicles shall be limited on any road in the vicinity between 7:00 to 18:00, Monday to Friday.
- Existing sidewalks should be used as walkways as far as possible. Where existing sidewalks are affected, alternate pedestrian walkways will be provided.
- Pedestrians should not be allowed to cross construction areas.

- Construction of temporary access roads will be minimised. Roads used will be cleared regularly of any dust and mud resulting from the use by construction vehicles. Dust and noise will be minimised and accident risk reduced by strict monitoring of speed limits.
- All gravel access roads will be watered regularly to control dust pollution.

17.5 *MONITORING & REPORTING*

Random checks will be done on the routes that construction vehicles follow to ensure that these vehicles only drive on the agreed roads. This should be done by following a vehicle from the construction site to its destination and vice-versa.

The routes followed must be checked at least once a month for all construction sites. The registration plate of truck, route followed and time and day will be recorded.

APPENDIX A: CURRICULUM VITAE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Name of firm: **MDT Environmental (Pty) Ltd**

Name of Staff: **Deon Esterhuizen**

Profession: Environmental Scientist

Date of Birth: 6 June 1968

Nationality: South African

Professional Natural Scientist (RN: 400154/09)

Membership in Professional Societies:

Registered with the South African Council for Natural Scientific Professions: Professional Natural Scientist - Environmental Science (RN: 400154/09).

Member of the International Association for Impact Assessors South Africa.

Member of the Groundwater Division of South Africa.

KEY QUALIFICATIONS:

Deon has a MSc in Environmental Ecology with 27 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.

He has gained experience 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 co-ordinating 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 and Sanitation. 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 (EMPs)
- Environmental monitoring and auditing

He has been the project leader and coordinator on a number of large, strategically important and multi-disciplinary projects for various clients, including international (Africa) projects as well as fulfilling the role of an external reviewer for the Department of Water and Sanitation as well as other consulting firms.

He has gained operational knowledge and experience of applying the IFC Social and Environmental Performance Standards, specifically on the Olifants Water Resources Development Project. He developed and implemented environmental and social mitigation and management plans that have been approved by the relevant environmental authorities.

EDUCATION:

M.Sc (Environmental Ecology) University of Pretoria 2003
B.Sc (Honours), Rand Afrikaans University 1991
B.Sc (Botany & Zoology), Rand Afrikaans University 1990

ADDITONAL COURSES:

Environmental Water Quality Monitoring 2011
River hydraulics, stormwater & flood management, Stellenbosch University 2009
Environmental Risk and Impact Assessment, Rhodes University 2006
Reserve Determinations and Procedures, DWAF 2000
Project Management, Compu-Tutor 2000

EXPERIENCE RECORD:
ILISO Consulting (Pty) Ltd
August 2005 to present
Technical Director.

- Environmental and Social Lead of the Olifants River Water Resources Development Project - Sub-Phases 2C. Responsible and accountable for the management of all environmental and social related tasks performed by two Environmental Monitors, two Social Monitors, and a Land Acquisition Team. This team was responsible to ensure that the Contractor executes the project within the guidelines of legislation, the environmental authorisation, the environmental management plan, and project specifications. Trans Caledon Tunnel Authority. January 2011 - Current.

- Environmental and Social Lead of the Olifants River Water Resources Development Project - Sub-Phases 2B, C, D, E, & F. Responsible and accountable for the management of all environmental, social and land acquisition tasks and reports directly to the Project Manager / Engineer. Numerous design related activities were completed, including the development of project environmental compliance specifications, environmental management system, stakeholder relations strategy, and resettlement action plan. Trans Caledon Tunnel Authority. December 2009 - Current.
- Compilation of an application for exemption from minimum emission standards and extension of the minimum emission standard timeframes for Eskom's Power Stations, including supporting studies. Eskom (Pty) Ltd. Preparation of the surface water specialist report. 2013 - 2014.
- Application for the rectification in terms of section 24G for the unlawful construction of facilities and infrastructure for the return of service of the Eskom Komati Power Station. 2012.
- Application for the rectification in terms of section 24G for the unlawful construction of facilities and infrastructure for the Eskom Kusile Power Station. 2012.
- Application for an integrated environmental authorisation and waste management licence in terms of the National Environmental Management Act and the Waste Act for activities on the Eskom Kusile Power Station construction site. 2012 - current.
- Mafutha Environmental Impact Assessment for Sasol (Pty) Ltd. Responsible for the Surface water specialist study and water balance development. June 2010 - June 2011.
- Feasibility study for the construction of bridges linking Okahandja to Ovitoto communal area. Ministry of Works and Transport. Undertake an environmental screening in terms of the Environmental Management Act (2007) (EMA) that was promulgated in December 2007. 2010.
- Design and construction of Botsabelo Complex - Lesotho blood transfusion services centre, National Reference Laboratory, student accommodation at the National Health Training College. The Government of the Kingdom of Lesotho Millenium Challenge Account. Development of an Environmental Protection Plan for implementation during construction. The development of method statements for key environmental construction activities. 2010.
- Stormwater Audit at Namibian Custom Smelters in Tsumeb, Namibia. Namibian Custom Smelters (Pty) Ltd. 2012.
- Braamhoek Integrated Water Use Licence Application: Peer review of the draft Integrated Water Use Licence application for the proposed Braamhoek Pump Storage Scheme. 2005.
- Integrated Stormwater Management: Boepenspruit: Environmental Impact Assessment - Scoping for a record of decision application in terms of the Environmental Conservation Act. 2005.
- Gautrain Rapid Rail Link: Part of the ISAA Joint Venture compiling the Initial Works Environmental Management Plan and Draft Final Environmental Management Plan as required by the Record of Decision issued by the Gauteng Department of Agriculture, Conservation and Environment. 2005.
- Gautrain Rapid Rail Link: Preparing the surface water specialist report in support of the variant alignment environmental impact assessment study. 2006
- Department of Water Affairs & Forestry: Mpumalanga Region. Task Leader of a multi disciplinary team to assist the Mpumalanga Regional Office: Water Quality Management with line function work. 2006.
- Gauteng Region Office Technical and Administrative Support project. Project Manager of a multi disciplinary team to assist the DWAF Gauteng Regional Office with specific technical tasks. 2006 – 2009.
- Task Leader for preparing the Water Use Licence application for the Tshwane Metro Zeekoegat Waste Water Treatment Works. 2007 – 2010.
- Environmental specialist for a 42 month construction period of the Thune Dam in Botswana. 2007 –

current.

- Preparation of an Environmental Management Plan for the Groot Letaba proposed storage dam. Department of Water Affairs and Forestry. 2007 – 2009.
- Project Manager of a multi disciplinary team to develop a National Groundwater Strategy for the Department of Water Affairs and Forestry. 2007 – 2010.
- Preparation of the surface water specialist report for the proposed Nelspruit Ring Road. 2007.
- Preparation of the surface water specialist report for the proposed expansion of ArcelorMittal in New Castle. 2008.

BKS (Pty) Ltd, Pretoria
January 2000 to July 2005
Director.

- Olifants River Catchment Ecological Water Requirement Assessment (Mpumalanga): Determination of the ecological reserve of the river (Management Consultant) Responsible for project co-ordination and administration. 2000-2002.
- Olifants / Doring River Rapid Reserve Assessment (Western Cape): Conducting a rapid reserve assessment of three sites in the Olifants and Doring Rivers for the provincial Department of Agriculture in the Western Cape. 2000-2002.
- Olifants / Doring River Basin Study (Western Cape): Determination of the ecological reserve of the river (Management Consultant) Responsible for project co-ordination and administration. 2000-2002.
- Assessment of Domestic Water Supplies, Volume 5: Management Guide. Development 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 exiting domestic supply scheme. 2001-2002.
- DWAF, RDM-Office structure. Preparation of a strategy and plan to determine the Ecological Reserve for each significant resource, within the constraints of human and financial resources. Two components were developed namely, a structure / framework for the RDM-Office and the implementation of a control auditing system.
- Nylstroom Municipality Waste Water Treatment Plant. Licence application. Evaluation of the licence application in terms of the National Water Act. 2001.
- Thaba Chweu Municipality Waste Water Treatment Plant Licence application in terms of the National Water Act. 2002.
- Olifants River (Mpumalanga). Assisting the DWAF with the registration of all water uses in the catchment. 2001-2002.
- Leboeng Community Safety Centre. Registration of the waste water treatment facility in terms of the National Water Act. 2001.
- Mhlathuze Water. The completion of a licence application in terms of the National Water Act for two sea outfall pipelines into the Indian ocean. 2001-2002.
- Lower Spekboom Irrigation Board. Motivation on behalf of the Board to the DWAF requesting funds from their reserve fund for the rehabilitation of their canal system. 2002.
- Modder and Riet Rivers Catchment. Development of a Catchment Management Strategy and

determination of an intermediate ecological Reserve. 2002-current.

- Water Quality Performance Assessment System. Development and implementation of a water quality performance assessment system for the DWAF Water Quality Management Directorate and the Gauteng Regional Office: Upper Vaal Water Management Area. 2002-current.
- Rietfontein WwTW (Madibeng Local Authority) Waste Water Treatment Plant Licence application in terms of the National Water Act. 2003.
- Rietfontein WwTW (Madibeng Local Authority) Waste Water Treatment Plant Environmental Impact Assessment - Scoping for a record of decision application in terms of the Environmental Conservation Act. 2003.
- Da Gama Textiles Licence application in terms of the National Water Act. 2003.
- De Beers Kimberley Mines. The redrafting of the De Beers Kimberley Mines EMPR to consolidate all the relevant information into one document, to align the mine activities and EMPR with new anticipated legal requirements, and to align the EMPR to the Kimberley Mines Environmental Management System. 2003.
- Department of Water Affairs & Forestry. Project Manager of a project to develop a Water Quality Management Plan for the Waterval River catchment, DWAF Gauteng Regional Office. 2003.
- Department of Water Affairs & Forestry. Project Manager of a multi disciplinary team to assist the Gauteng Regional Office: Water Quality Management with line function work. 2003.
- ERPM Gold Mine Water Management Plan development and licence application in terms of the National Water Act. 2003.
- Olifants River Water Resources Development Project. Task Leader to assist the project co-ordinator on the management of the environmental and public participation tasks within this multi-disciplinary project. 2004
- Republic of Botswana. Ministry of Minerals, Energy and Water Affairs: Department of Water Affairs. EIA study in respect of detailed design of Lower Shashe Dam. Final EIA report. Review of issues identified and addressed in EIA report. 2004
- East-West highway Jamahiriya toll road feasibility study. Libya. Environmental Impact Assessment. 2005.

Department of Water Affairs and Forestry, Pretoria

1991 to 1999
Assistant Director.

- He was responsible for the management in an integrated manner all water resource related issues within the Mooi River, Taai and Leeu Spruit, Vaal Barrage and Liebenbergsvlei catchments. With his knowledge gained throughout the years he lectured all new Water Quality Managers appointed at the DWAF during the internally developed orientation course for water quality managers.

LANGUAGES:

	Speak	**Read**	**Write**
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

CERTIFICATION:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

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Deon Esterhuizen