



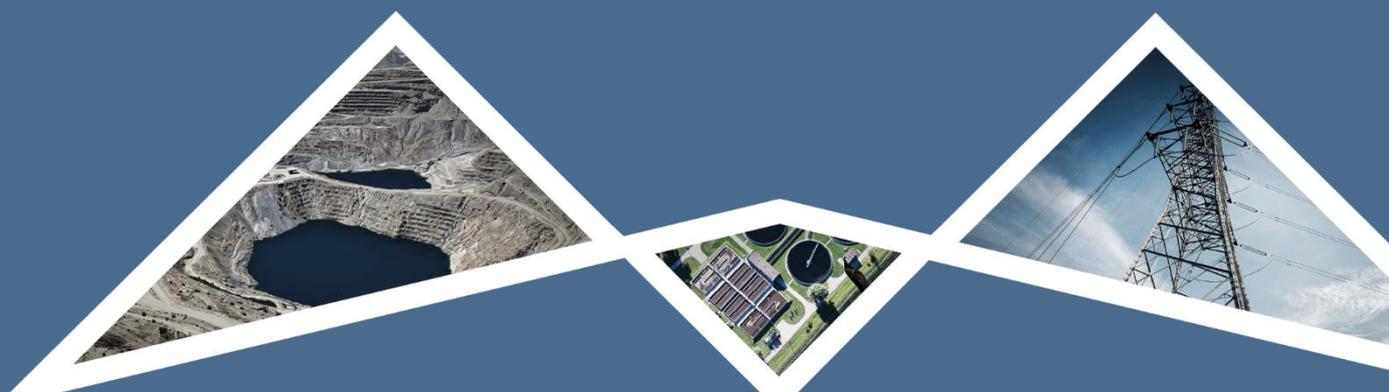
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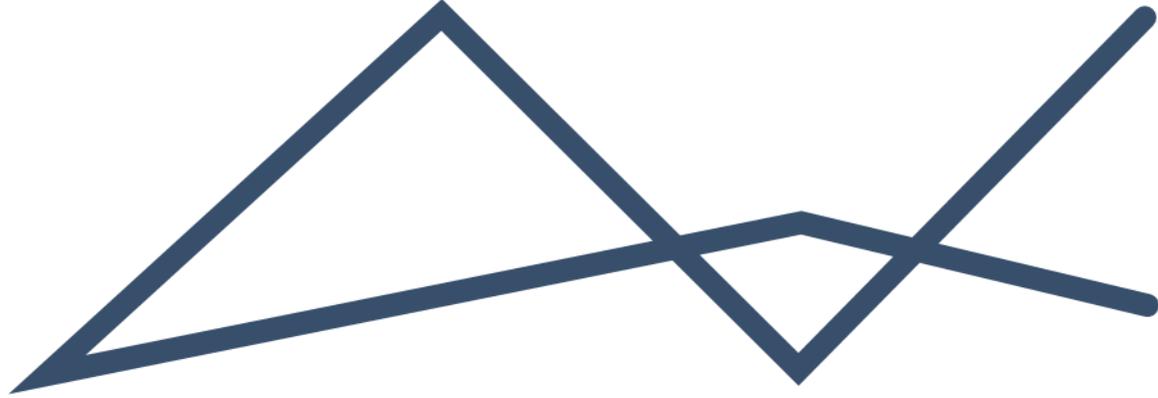
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## ALIEN INVASIVE SPECIES MANAGEMENT PLAN:

THE PROPOSED ZIBULO NORTH SHAFT OVERHEAD 132KV  
POWERLINE PROJECT, IN THE NKANGALA DISTRICT MUNICIPALITY,  
WITHIN VICTOR KHANYE AND EMALAHLENI LOCAL MUNICIPALITIES,  
MPUMALANGA PROVINCE

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This document was compiled by EIMS for the applicant (Anglo American Inyosi Coal (Pty)) as eleven (11) Exotic and Alien Invasive Species were recorded throughout the proposed project area. Five (5) of these are listed as Category 1b invasive species.

**This document must be agreed upon by the applicant and the Contractor prior the construction phases and may be undated as and when necessary.**

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## Abbreviations

CA	Competent Authority
CBA	Critical Biodiversity Area
DEFF	Department of Environment, Forestry and Fisheries
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act No. 73 of 1989
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
EO	Environmental Officer
ERAP	Emergency Response Action Plan
FPA	Fire Protection Agency
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998),
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003)
PM	Project Manager
SANBI	South African National Biodiversity Institute



# 1 INTRODUCTION

This section of the report provides the objective, project background information, locality description and ecological settings as well as the key players involved in implementing this Alien Invasive Management Plan (AIMP).

## 1.1 Purpose of this Report

The purpose of the AIMP is to implement avoidance and mitigation measures to reduce the impact of the construction of the Zibulo North Shaft Overhead 132kV Powerline Project on natural, near natural and sensitive habitats. The plan usually overlaps to some degree with Generic Erosion and Soil Management Plans and Generic Rehabilitation Management Plans, but for successful implementation, it is imperative that this plan is at all times used in conjunction with the approved Generic EMPr for development and expansion for overhead electricity transmission and distribution infrastructure. The aims of the AIMP are to provide:

- Protocols for the removal and control of alien invasive species; and
- Guidelines on implementation and post-implementation tasks.

This AIMP acts as a guideline to be applied by all contractors involved on the project. The AIMP is an evolving guideline that needs to be updated or adapted as progress is made in terms of the control of alien invasive species within the project area, and successes and failures of procedures identified. The objectives of the AIMP are:

- Actively aid the improvement of indigenous biodiversity within and around the site by removing all invasive alien plant species.
- Improving the ecosystem function of natural landscapes and their associated vegetation.

As part of the registration process, for the clearance of vegetation, an alien invasive management plan should be compiled to support the application. This document will provide the contractor, the developer, and the ECO with guidelines on how to effectively manage alien invasive species throughout the development. The exact details of the alien invasive management plan will depend on the extent of site, working area conditions, available manpower, and the desired environmental compliance state of the site as stipulated by the competent authority and in the Generic EMPr. This document was compiled by EIMS for the applicant (Anglo American Inyosi Coal (Pty)) as eleven (11) Exotic and Alien Invasive Species were recorded throughout the proposed project area. Five (5) of these are listed as Category 1b invasive species. This document must be agreed upon by the applicant and the Contractor prior the construction phases and may be undated as and when necessary.

## 1.2 Project Background

Anglo American Inyosi Coal (Pty) (the Applicant) has appointed Environmental Impact Management Services (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the necessary registration and authorisation processes, including compiling the necessary reports and undertaking the statutory consultation processes, in support of the proposed project as described herein. The proposed development is approximately 6.6 km south of Kendal Power Station and approximately 14.5 km Southwest of Ogies. The proposed project entails the establishment of a 125 m powerline corridor situated within Nkangala District Municipality, extending between Victor Khanye and Emalahleni Local Municipalities, Mpumalanga Province. The entirety of the proposed powerline project falls within the Electrical Generation Infrastructure (EGI) International Corridor as defined in the Department of Forestry, Fisheries and the Environment (DFFE), 2022 Standard for the Development and Expansion of Power Lines and Substations within identified Geographical Areas (Revision 2).

A review of the National Environmental Management Act, 1998 (Act No. 107 of 1998, NEMA), Environmental Impact Assessment (EIA) Regulations, 2014 as amended revealed that the proposed development would typically require an Environmental Authorisation (EA) through a Basic Assessment process due to the following triggered activities:



- GNR 983 (2014, as amended): Activities 11: The development of facilities or infrastructure for the transmission and distribution of electricity;
- GNR 983 (2014, as amended): Activities 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;
- GNR 985 (2014, as amended): Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan; and
- GNR 985 (2014, as amended): Activity 14: The development of - (ii) infrastructure or structures with a physical footprint of 10 square metres or more;

However, a further review of the Standard for the Development and Expansion of Power Lines and Substations within identified Geographical Areas, promulgated on 27 July 2022 ('the Standard') published under GNR 2313, 27 July 2022 found that the proposed development falls under the ambit of developments specifically excluded from the requirements of an EA. **Therefore, the proposed development is only required to undertake the registration process guided by the Standard and not an EA application process.**

The proposed development also triggers Section (c) and (i) of the National Water Act – NWA (Act 36 of 1998). As such, a Water Use Authorisation (WUA) process is required prior to commencing with construction. A pre-application meeting with the Department of Water and Sanitation to confirm the Water Use Licence (WUL) or General Authorisation (GA) registration process to be followed was held on the 21<sup>st</sup> of August 2023. The Department (DWS) confirmed that the process to be followed will be through a General Authorisation (GA) registration in terms of GN 509 of 26 August 2016.

### 1.3 Project Locality

The proposed Zibulo North Shaft entrance is located at 26°8'55.0"S, 28°57'10.32"E, approximately 6.6 km south of Kendal Power Station and approximately 14.5 km Southwest of Ogies, off the N12 national highway in the Nkangala District Municipality, Mpumalanga (**Figure 1**). The source and load substations with reference to the power lines are located at:

- Cologne -26°7'24.26"S, 28°59'46.03"E,
- Modiri SS -26°12'11.37"S, 29° 1'17.01"E and
- Zibulo North Shaft SS - 26° 8'56.88"S, 28°57'22.38"E

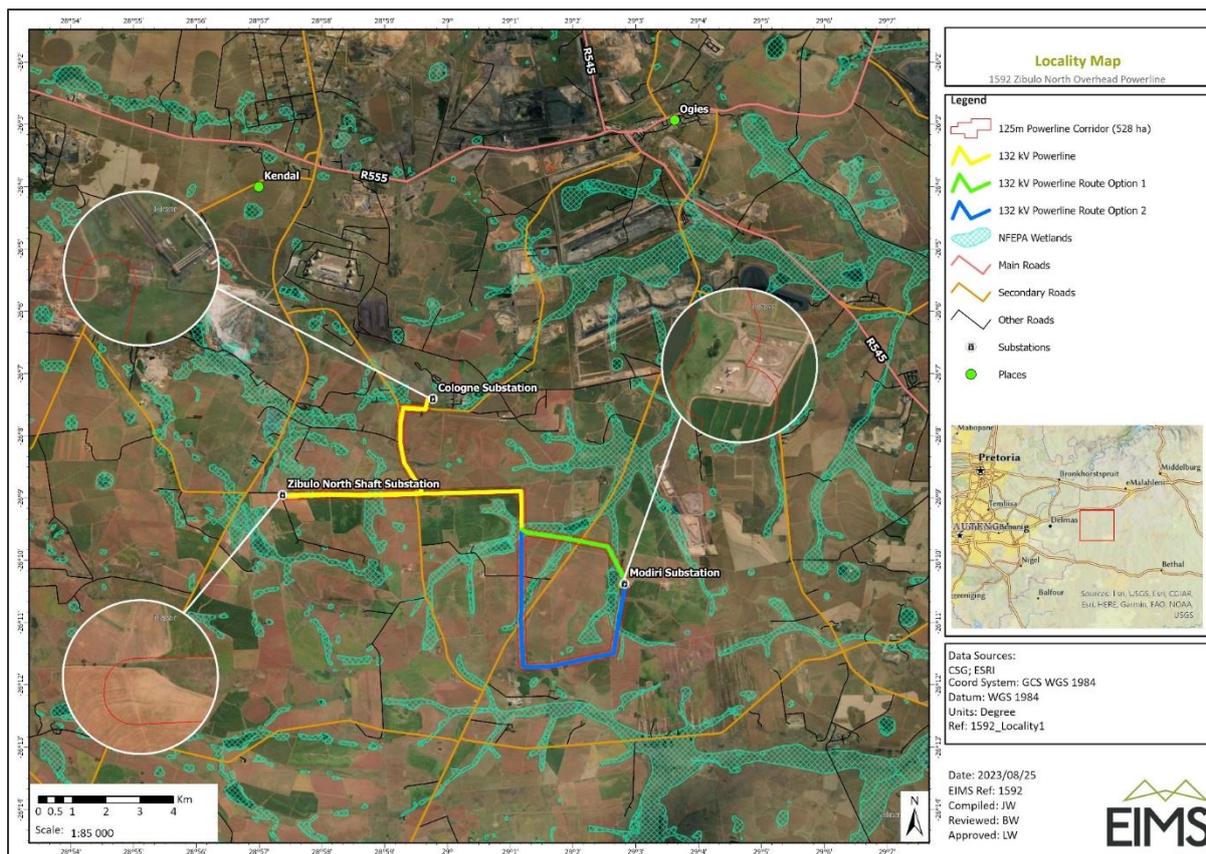


Figure 1: Site locality map

The entirety of the proposed powerline project falls within the Electrical Generation Infrastructure (EGI) International Corridor as defined in the Department of Forestry, Fisheries and the Environment (DFFE), 2022 Standard for the Development and Expansion of Power Lines and Substations within identified Geographical Areas (Revision 2). The site locality details are indicated in **Table 1** below:

Table 1: Site property details

Item	Details
Farm Portion / Name / Erf	<p>The proposed 125m powerline corridor is located on the following farms and portions:</p> <p><b>ZONDAGSFONTEIN 253 IR</b></p> <ul style="list-style-type: none"> <li>• Remaining Extent</li> <li>• Portion 3</li> <li>• Portion 5</li> <li>• Portion 6</li> <li>• Remaining Extent of Portion 7 (a portion of portion 2)</li> <li>• Remaining Extent of Portion 8 (a portion of portion 2)</li> <li>• Portion 9 (a portion of portion 2)</li> <li>• Portion 12</li> <li>• Portion 14 (a portion of portion 7)</li> <li>• Portion 16 (a portion of portion 8)</li> <li>• Portion 17 (a portion of portion 2)</li> <li>• Portion 18</li> </ul> <p><b>OLGA 35 IS</b></p>



	<ul style="list-style-type: none"> <li>• Portion 1</li> </ul> <p><b>SMITHFIELD 44 IS</b></p> <ul style="list-style-type: none"> <li>• Portion 1</li> <li>• Portion 2</li> <li>• Portion 3</li> <li>• Remaining Extent of Portion 5</li> <li>• Portion 9 (a portion of portion 5)</li> </ul> <p><b>RIETVLEI 64 IS</b></p> <ul style="list-style-type: none"> <li>• Remaining Extent</li> <li>• Remaining Extent of Portion 1</li> <li>• Remaining Extent of Portion 4</li> <li>• Portion 7 (a portion of portion 1)</li> </ul> <p><b>LEEUFONTEIN 219 IR</b></p> <ul style="list-style-type: none"> <li>• Remaining Extent</li> <li>• Portion 13</li> <li>• Portion 24</li> <li>• Portion 35</li> </ul>
Powerline Corridor characteristics	<ul style="list-style-type: none"> <li>• 125m powerline corridor</li> <li>• 7km Kingbird 132kV line from Cologne Substation to Zibulo Substation</li> <li>• 10.5km (route option 1) or 15km (route option 2) Kingbird 132kV line from Zibulo Substation to Modiri Substation</li> </ul>
Distance from closest town	14.5 km Southwest of Ogies
GPS coordinates	Start point: 26° 7'23.76"S; 28°59'45.41"E Midpoint: 26° 9'30.44"S; 29° 1'10.93"E Endpoint: 26°10'23.97"S; 29° 2'52.99"E
Local Municipality	Victor Khanye and Emalahleni Local Municipalities
District Municipality	Nkangala District Municipality

## 1.4 Project Description

Based on the information provided to EIMS, Zibulo North Shaft requires a 20MVA electricity supply for the mining operations by 2025. The following assets will be established for the supply:

- A new Zibulo North Shaft 132/11kV 2x20MVA Substation for the Zibulo North Shaft Point of Supply (POS). 2x20MVA TRFR's will be installed in phase 1 with an open TRFR bay for the installation of the third TRFR in 2032 should it be required.
- Establish 132kV Feeder Bay at the existing Cologne Substation.
- Build 7km (option 1 & 2) Kingbird 132kV line from Cologne Substation to Zibulo North Shaft Substation.
- Establish 132kV Feeder Bay at the existing Modiri Substation.
- Build 10.5km (option 1) or 15km (option 2) Kingbird 132kV line from Modiri Substation to the Zibulo North Shaft Substation. The route options will be assessed during the course of this environmental application process.



Transmission lines carry electrical energy from one point to another in an electric power system. They can carry alternating current (AC) or direct current (DC), or a system can be a combination of both. Also, electrical current can be carried by either overhead or underground lines. The main characteristics that distinguish transmission lines from distribution lines are that they are operated at relatively high voltages, they transmit large quantities of power and they transmit the power over large distances. The types of transmission lines are;

- Overhead Transmission Lines
- Subtransmission Lines
- Underground Transmission Lines

The proposed Zibulo North project is an overhead transmission line (OHL) development. The OHL share one characteristic, they carry 3-phase current. The voltages vary according to the particular grid system they belong to. Transmission voltages vary from 69kV up to 765kV. The DC voltage transmission tower has lines in pairs rather than in threes (for 3-phase current) as in AC voltage lines. One line is the positive current line and the other is the negative current line. The proposed development is an 132kV AC steel monopoles OHL. An example of the proposed infrastructure is indicated in **Figure 2**.

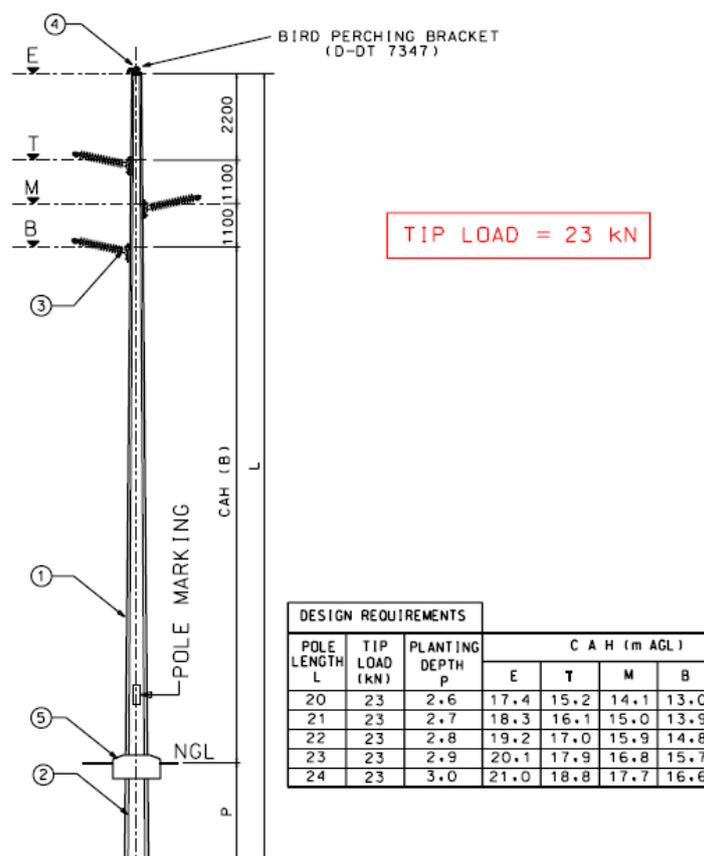


Figure 2: Structural design of some of the proposed infrastructure

Before the start of overhead transmission line (OHL) construction, the Contractor will carry out preparatory works, such as cutting of trees and construction of temporary access roads for specialized machinery. Construction of transmission tower foundations will be the next stage in constructing OHL. As a rule, metal transmission towers (angle-tension and suspension ones) are erected on reinforced concrete foundations of various types and structures (precast or monolith). The following step in the power line construction is installation of transmission towers itself. Installation of towers is rather sophisticated technological process. In most cases, the Contractor will install transmission towers by two methods: the rotation method or the build-up method. This is followed by the installation of conductors. To install conductors and ground wires, the



Contractor uses an innovative pulling method that does not require lowering the wires to the ground surface, thus preventing mechanical damage. This will reduce future electricity losses during operation of the transmission line.

## 1.5 Site Ecological setting

The following features describe the general area and habitat, this assessment is based on the Terrestrial Biodiversity Compliance Statement and Wetlands Compliance Statement Report undertaken by the Biodiversity Company (2023).

*Table 2: Spatial relevance of the Project Area to local ecologically important landscape features.*

Desktop Information Considered	Relevant/Irrelevant
Strategic Transmission Corridors (EGI)	Relevant. The project area falls within the International EGI corridor.
Provincial Conservation Plan (Terrestrial)	Relevant. The project area mostly overlaps with 'Heavily Modified' areas. Some 'Moderately modified' and 'Other Natural Areas' also occur within the project area. Several fragmented CBA: Optimal sites occur within the 2 km avifauna survey buffer.
NBA 2018: Ecosystem Threat Status	Relevant. Project area situated within a 'Vulnerable' ecosystem
NBA 2018: Ecosystem Protection Level	Relevant. Project area situated within a 'Poorly Protected' ecosystem.
2022 Red List of Ecosystems	Relevant. Project area situated within an 'Endangered' ecosystem
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Relevant. Two 'Critically Endangered' rivers and multiple extensive 'Critically Endangered' wetlands cross the project area.
Protected and Conservation Areas (SAPAD & SACAD)	Irrelevant. Areas occur within 10 km of the project area.
Important Bird and Biodiversity Areas (IBA)	Irrelevant. IBA sites occur within 10 km of the project area.
National Freshwater Ecosystem Priority Areas (NFEPA)	Irrelevant. No NFEPA systems occur within the project area.
Strategic Water Source Areas	Irrelevant. No SWSA sites occur within 10 km of the pipeline.
National Protected Areas Expansion Strategy (NPAES)	Irrelevant. NPAES priority areas exist nearby (within at least the 2 km buffer).

### 1.5.1 Mpumalanga Biodiversity Sector Plan

The Mpumalanga Biodiversity Sector Plan (MBSP) is such a spatial tool which serves to provide such information to end-users and guide decision making to ensure that the biodiversity objectives are achieved. The MBSP is based on an objective planning approach which considers national and provincial biodiversity targets while trying to avoid conflict with competing land uses. Both terrestrial and freshwater biodiversity priority areas are identified in the MBSP, either as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). According to the MBSP, the project area mostly overlaps with 'Heavily Modified' areas. Some 'Moderately modified' and 'Other Natural Areas' also occur within the project area. Several fragmented CBA: Optimal sites occur within the 2 km avifauna survey buffer (**Figure 3**).

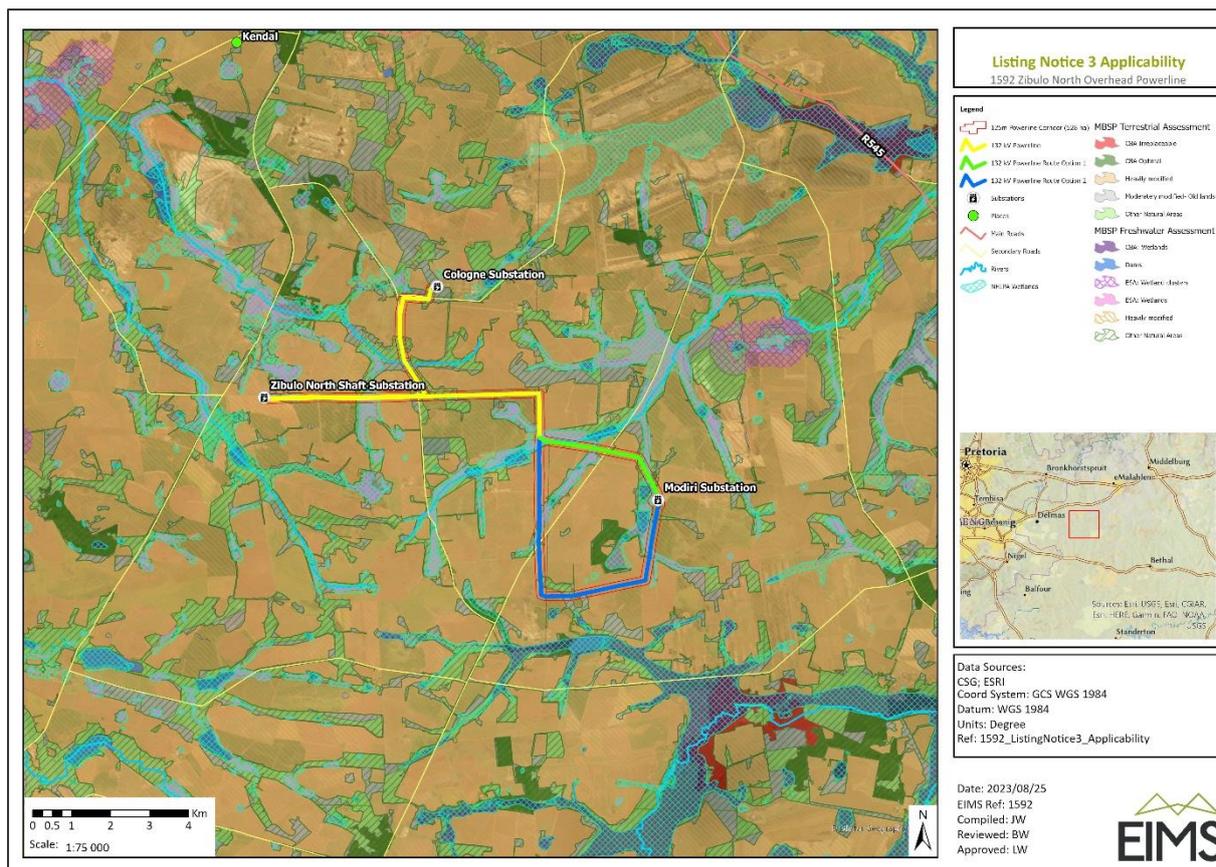


Figure 3: Site Sensitivity Map

### 1.5.2 Site Ecosystem Characteristics

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition. The proposed area overlaps within the Grassland Biome (Mucina & Rutherford, 2006). The study site overlaps with the Mesic highveld Grassland Bioregion. The vegetation type associated with the study site is the Eastern Highveld Grassland (Gm 12) vegetation.

The Eastern Highveld Grassland is recorded on the plains between Belfast in the east and the eastern side of Johannesburg in the west, extending southwards to Bethal, Ermelo and west of Piet Retief within the Mpumalanga and Gauteng Provinces of South Africa (Mucina & Rutherford, 2006). The altitude varies between 1 520m and 1 780m, but also as low as 1 300m. The Eastern Highveld Grassland is found on slightly to moderately undulating plains, including some low hills and pan depressions and consist of short, dense grassland, dominated by the usual Highveld grass composition (*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya*, etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (Mucina & Rutherford, 2006). Woody species include *Senegalia caffra*, *Celtis africana*, *Diospyros lycioides subsp. lycioides*, *Parinari capensis*, *Protea caffra* and *Searsia magalismsontana*.

According to Mucina and Rutherford (2006) and the Government Gazette 47526 (Notice No.689) on 18 November 2022 in terms of the National Environmental Management: Biodiversity Act (NEMBA), the Eastern Highveld Grassland vegetation type is classified as Endangered, with a target of 24%. A small fraction is statutorily conserved in the Nootgedcht Dam and Jericho Dam Nature Reserves. Approximately 44% of the Eastern Highveld Grassland has been transformed, primarily by cultivation, plantations, mining, urbanization and building of dams (Mucina & Rutherford, 2006). Erosion is very low, and no serious alien infestation is reported, although species such as *Acacia mearnsii* can become dominant in disturbed places.



Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected (NP), poorly protected (PP), moderately protected (MP) or well protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act. The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystem associated with the development. The proposed development area is situated within a 'Poorly Protected' ecosystem.

### 1.5.3 Site Terrestrial Habitats

Three (3) terrestrial habitat units were encountered namely, Modified Habitat (**Figure 4**), Degraded Grassland (**Figure 5**) and Wet Grassland (**Figure 6**). The vegetation was found to be dominated by pioneer graminoids and exotic and alien invasive flora species, however some of the most predominant indigenous flora species recorded in the area (21 species) is available the Terrestrial Biodiversity Compliance Statement Report. No SCC or protected flora species were observed by the specialist.



*Figure 4: View of the Modified Habitat Unit (The Biodiversity Company, 2023)*



*Figure 5: View of the Degraded Habitat Unit (The Biodiversity Company, 2023)*



Figure 6: View of the Wet Grassland Habitat Unit (The Biodiversity Company, 2023)

The three delineated habitat types were allocated a sensitivity category, or Site Ecological Importance (SEI), and this breakdown is presented in **Table 3**. It must be noted that the following guidelines should be considered when interpreting SEI in the context of any proposed development or disturbance activities (noted in conjunction with provincial guidelines for CBA/protected areas):

- Very Low: Minimisation mitigation – Development activities of medium to high impact acceptable and restoration activities may not be required.
- Low: Minimisation and restoration mitigation – Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- Medium: Minimisation and restoration mitigation – Development activities of medium impact acceptable followed by appropriate restoration activities.

Table 3: Sensitivity summary of the floral habitat types within the project area (The Biodiversity Company, 2023).

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
<b>Modified</b>	Low	Low	<b>Low</b>	High	<b>Very Low</b>
<b>Degraded Grassland</b>	Medium	Medium	<b>Medium</b>	High	<b>Low</b>
<b>Wet Grassland</b>	Medium	Medium	<b>Medium</b>	Medium	<b>Medium</b>

According to the Terrestrial Biodiversity Compliance Statement (The Biodiversity Company, 2023), eleven (11) Exotic and Alien Invasive Species were recorded throughout the project area (**Table 4**). Five (5) of these are listed as **Category 1b** invasive species and according to legislation these must be controlled according to an AIS management plan. As such, this AIS management plan for the project has been compiled. The alien invasive species management plan must be affected prior the construction phase.

Table 4: Invasive and exotic flora recorded within the local project area (The Biodiversity Company, 2023).

Family	Scientific Name	Common name	Invasive Status
Fabaceae	<i>Acacia mearnsii</i>	Black wattle	Category 2 invader
Asteraceae	<i>Cirsium vulgare</i>	Bull thistle	Category 1b invader
Poaceae	<i>Cortaderia selloana</i>	Pampas grass	Category 1b invader
Solanaceae	<i>Datura stramonium</i>	Jimsonweed	Category 1b invader



Family	Scientific Name	Common name	Invasive Status
Asteraceae	<i>Erigeron canadensis</i>	Horseweed	Naturalized invader
Myrtaceae	<i>Eucalyptus camaldulensis</i>	River red gum	Category 2 invader
Myrtaceae	<i>Eucalyptus sp.</i>		
Juncaceae	<i>Juncus tenuis</i>	Poverty rush	Naturalized exotic
Solanaceae	<i>Solanum mauritianum</i>	Bugweed	Category 1b invader
Asteraceae	<i>Tagetes minuta</i>	Southern cone marigold	Naturalized invader
Verbenaceae	<i>Verbena bonariensis</i>	Tall verbena	Category 1b invader

## 1.6 Key role players and responsibility matrix

For the Alien and Invasive Management plan (AIMP) to be successfully implemented, all the role players involved in the project need to co-operate. For this, role players must clearly understand their roles and responsibilities, they must be professional, and they must form respectful and transparent relationships and maintain open lines of communication. The key role players for the rehabilitation phase and the post rehabilitation monitoring phases are as follows:

- Developer;
- Engineer;
- Contractor; and
- Environmental Control Officer.

The functions and responsibilities of each of these role players are outlined in **Table 5**.

*Table 5: Functions and responsibilities of the project team for the implementation AIMP*

ROLE	PHASE OF INVOLVEMENT	RESPONSIBILITIES
Developer	Construction, Rehabilitation and Operational phases	<ul style="list-style-type: none"> <li>• Appointing project team; and</li> <li>• Ensuring that the AIMP, is circulated to the project team.</li> <li>• Ensuring overall compliance with the rehabilitation plan</li> </ul>
Consulting Engineer	Construction, Rehabilitation and Operational phases	<ul style="list-style-type: none"> <li>• Ensuring that the Contractor undertakes all construction, operational and maintenance activities in line with the AIMP,</li> <li>• Ensuring that all non-compliances, environmental or otherwise are actioned by the Contractor.</li> </ul>
Contractor	Construction, Rehabilitation and Operational phases	<ul style="list-style-type: none"> <li>• Implement the AIMP,</li> <li>• Addresses all areas of concern raised by the Consulting Engineer or Environmental Control Officer during construction, operational and maintenance</li> </ul>
Environmental Control Officer	Construction, Rehabilitation and Operational phases	<ul style="list-style-type: none"> <li>• Ensuring that the Contractor undertakes all co activities in line with the AIMP</li> <li>• Undertaking of Environmental Audits and circulating reports to the project team</li> </ul>



## 2 ALIEN INVASIVE SPECIES MANAGEMENT PLAN

This section provides the history of alien invasive species and management thereof, applicable legislation, as well as control strategies and monitoring requirements.

### 2.1 Alien Invasive Species

Alien Invasive Species (plants, animals and micro-organisms) are species that occur outside of their natural habitat or country of origin and due to their ability to outperform and outgrow indigenous species, they establish themselves in these non-native habitats. Alien Invasive Species (AIS) have also been called weeds, pests, encroachers, aliens, invasives, exotics or non-indigenous. They are native to a particular area or region, but have been introduced elsewhere, either by accident or on purpose. Alien Invasive Species can be animals (e.g., rats), plants (e.g., lantana) and micro-organisms (e.g., cholera). AIS can be found in households as decorative plants, pets or pests or on land as terrestrials and in water as aquatics. The most aggressive invaders can spread far from parent plants and cover large areas.

South Africa has a long history of problem plants. Alien plants were first introduced in South Africa in more than thousand years ago. These were plants mainly from central and northern African origin and were associated with human activities. Plants from other continents were introduced by colonists from 1652 onwards. Invasive alien plants (IAPs) pose a direct threat not only to South Africa's biological diversity, but also to water security, the ecological functioning of natural systems and the productive use of land. They intensify the impact of fires and floods and increase soil erosion. Of the estimated 9000 plants introduced to this country, 198 are currently classified as being invasive. It is estimated that these plants cover about 10% of the country and the problem is growing at an exponential rate.

Vehicles often transport many seeds, and some may be of invader species, which may become established along the roads inside the study area, especially where the area is disturbed. The construction phase of developments in the area will almost certainly carry the greatest risk of Alien Invasive Species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. Continued movement of personnel and vehicles on and off the development sites, as well as occasional delivery of materials required for maintenance, will result in a risk of importation of alien species throughout the life of the project. The biggest risk is that Alien Invasive Species such as the seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites.

### 2.2 Legislation Governing Alien Invasive Species

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) aims to provide for the:

- Management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998;
- The protection of species and ecosystems that warrant national protection;
- The sustainable use of indigenous biological resources;
- The fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; and
- The establishment and functions of a South African National Biodiversity Institute.

NEMBA is the most recent legislation pertaining to alien invasive plant (AIP) species. In August 2014, the list of Alien Invasive Species was published in terms of the NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24<sup>th</sup> of February 2021. The legislation calls for the removal and / or control of AIP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream,



spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEMBA:

- Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

**Note that according to the Alien and Invasive Species Regulations, a person who has under his or her control a category 1b listed invasive species must immediately:**

- Notify the competent authority in writing.
- Take steps to manage the listed invasive species in compliance with:
  - Section 75 of the NEMBA; and
  - The relevant invasive species management programme developed in terms of regulation 4.

## 2.3 Legal Obligations of Landowners with regards to Listed Alien Invasive Species Control

As per the definition clauses, an “Invasive species” means any species whose establishment and spread outside of its natural distribution range:

(a)Threaten ecosystems, habitats or other species or have demonstrated potential to threaten ecosystems, habitats or other species; and

(b)May result in economic or environmental harm or harm to human health;

The obligations contained in the Act do not however apply to all invasive species. A distinction is drawn between “invasive species” and “listed invasive species”, which means – Any invasive species listed in terms of section 70 (1)”

As far as listed invasive species are concerned, the situation is slightly different from that of alien species as the Act places some additional obligations on parties other than permit holders. A person wishing to conduct a restricted activity in relation to a listed invasive species will also require a permit and is subject to the same duty of care as is the case with alien species. However in addition to those requirements, section 75 (4) mandates the Minister to coordinate and implement programmes for the prevention, control or eradication of listed invasive species. S 75 (4) reads as follows:

*“75. Control and eradication of listed invasive species - (4) The Minister must ensure the coordination and implementation of programmes for the prevention, control or eradication of invasive species.”* These programmes, referred to in the regulations as “Invasive Species Management Programmes” must be prepared



by the governing bodies of all parastatal protected areas and all other organs of state. These programmes may also impact and be carried out on private land but it is the Department who is responsible for its implementation, not the land owner.

However, in the context of certain “listed invasive species”, specifically those categorised as 1a invasive species in terms of the regulations, the Act does place a limited obligation on the owner of land where listed invasive species occur. In this regard, section 73 (2) of the Act reads as follows:

*“73. Duty of care relating to listed invasive species - (2) A person who is the owner of land on which a listed invasive species occurs must-*

*(a) notify any relevant competent authority, in writing, of the listed invasive species occurring on the land;*

*(b) take steps to control and eradicate the listed invasive species and to prevent it from spreading; and*

*(c) take all the required steps to prevent or minimise harm to biodiversity.*

*(3) A competent authority may, in writing, direct any person who has failed to comply with subsection (1) or (2), or who has contravened section 71 (1), to take such steps-*

*(a) As may be necessary to remedy any harm to biodiversity caused by-*

*(i) The actions of that person; or*

*(ii) The occurrence of the listed invasive species on land of which that person is the owner; and*

*(b) As may be specified in the directive”*

This provision certainly does place an obligation on a land owner to report the presence of any relevant listed invasive species (As per the regulations, category 1a species) to the competent authority and to rid the property of listed invasive species as well as prevent it from spreading.

## 2.4 Principles to ensure effective management of Alien Invasive Species

Invasive alien plant species are difficult to control. Methods should be used that are appropriate for the species concerned, as well as to the ecosystem in which they occur. When performing the controlling methodology for weeds and invaders, damage to the environment must be limited to a minimum. The methodology must be performed for at least three growing seasons to ensure the seed bank is depleted. Continual monitoring will be needed for seeds that are likely to be blown in from adjacent areas. The clearing of vegetation for the development of the substation and associated infrastructure will leave bare patches of soil, thereby enhancing the colonisation by ruderal weeds (mostly annual weeds) or declared alien species that will prohibit the natural succession during rehabilitation activities. Such soil disturbances (as well as the inappropriate handling of topsoil) could enhance the establishment or spread of invasive adjacent to the development. The following must be included when addressing invasives in the area.

- Alien control programs are long-term management interventions and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area.
- Alien problems at the site should be identified during preconstruction surveys (should there be indications) of the development footprint.
- The clearing plan should then form part of the preconstruction reporting requirements for the site.
- The plan should include a map showing the alien density also indicating potential alien species in each area.
- Lighter infested areas should be cleared first to prevent the build-up of seed banks.



- Collective management and planning with neighbouring landowners may be required as seeds of alien invasive species are easily dispersed across boundaries by wind and the movement of people and livestock.
- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.
- Chemical mechanism of alien invasive plant control should be avoided unless necessary.
- Alien and invasive plant species must be cleared on site and re-vegetated by planting indigenous vegetation.
- The mitigations highlighted in the Rehabilitation report must be considered in instances where applicable.

## 2.5 Declared Weeds and Invader Plants Categories

Declared weeds and invaders have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. The National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations lists about 383 invasive plant species into four categories that must be managed, controlled or eradicated from areas where they may cause harm to the indigenous environment. These four categories of problem plants are as follows:

- Category 1 plants may not occur on any land other than a biological control reserve and must be controlled or eradicated. Therefore, no person shall establish, plant, maintain, propagate or sell/import any category 1 plant species. These plants may no longer be planted or propagated, and all trade in these species is prohibited.
- Category 1B - Invasive species which must be controlled and wherever possible, removed and destroyed. Any form of trade or planting is strictly prohibited.
- Category 2 plants are plants with commercial application and may only be cultivated in demarcated areas (such as biological control reserves) otherwise they must be controlled. These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a land user must obtain a water use license as these plants consume large quantities of water.
- Category 3 plants are ornamentally used plants and may no longer be planted, except those species already in existence at the time of the commencement of the regulations (30 March 2001), unless they occur within 30 m of a 1:50 year floodline and must be prevented from spreading. These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur, and the plants may not be sold.

Based on the findings of the Terrestrial Biodiversity Compliance Statement (The Biodiversity Company, 2023), eleven (11) Exotic and Alien Invasive Species were recorded throughout the project area (**Table 4**). Five (5) of these are listed as **Category 1b** invasive species and according to legislation these must be controlled according to an AIS management plan. In addition, the site may be invaded by additional alien invasive species during site establishment due to initial and continual disturbances caused by vegetation clearance.

In general, invasive alien plant control relies on four main methods - *manual*, *mechanical*, *chemical* and *biological* control. Long-term success of any programme is best achieved through a combination of these. This is called an integrated control approach. For the purpose of this report, a three-phase control programme presented in the section that follow must be considered in order to manage the alien invasive.



## 2.6 Alien invasive management plan (Three-phased Control Programme)

As mentioned, different species require different clearing methods such as manual, chemical or biological methods or in combination. During construction, mechanical methods should be encouraged as the main form of control, together with the judicious use of herbicides. The preferred clearing methods for most alien species can be obtained from the DWS Working for Water Website <https://www.dws.gov.za/wfw/Control/>. For any alien eradication programme to be successful, a three-phased control approach that should be followed and is briefly presented as follows:

- Initial control - Initial control requires an “aggressive” remedial approach with the aim to drastically reduce the number of alien invader vegetation to acceptable and manageable levels.
- Follow-up control - Follow-up control is vital to control any re-growth or new seedlings. Follow-up control methods may occur as soon as re-growth or seedlings are and
- Maintenance control – this approach involves the continual monitoring of the alien vegetation on a regular (preferably bi-monthly) basis to identify any re-growth or seedlings. It is expected that the infestation densities will have been reduced dramatically by this stage and that only individual specimens may appear from time to time. It is preferred that any alien re-growth be removed manually to exclude the unnecessary use of chemicals.

Such a three-phased control programme may consider the use of a combination of chemical and mechanical control options. Chemical control of alien plants is not recommended especially as the site is located within a protected environment. Chemicals control must be considered as the last option and if required should only be applied by qualified personnel. It is usually preferable to use manual clearing methods where possible, although such methods may create additional disturbance which may stimulate alien invasion and may also be ineffective for many woody alien invasive species. **Should herbicides be considered, all care must be taken to prevent contamination of any water bodies. As indicated in the Wetland and Baseline Risk Assessment (The Biodiversity Company, 2023), no herbicides may be used within delineated wetlands and associated wetland buffers.** Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by implementing some of the following measures:

- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- No spraying of herbicides should take place in windy conditions or during wet conditions.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.
- For all herbicide applications, the following guidelines should be followed: Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation (DWS, 1995).
- Only herbicide registered for use on target species may be used. It is a high priority of any eradication programme that makes use of herbicides or power equipment to implement the correct safety procedures and to prevent chemical spillages. Strictly follow the specified treatment concentrations for the relevant herbicides as specified by the product label. Always ensure that all staff members are properly trained and make them wear protective clothing when working with herbicides or other equipment (e.g., handsaws).



Regarding manual labour, hand pulling is most effective with small (30cm), immature or shallow rooted plants. This method is mostly preferred especially in sensitive areas. Mitigation to ensure maintain environmental standards that may be considered include the following:

- It is important that records in the form of site photographs be kept for all steps that are during the removal and management of aliens, should these be required by the Competent Authority during close out.
- Once the vegetation clearance and soil preparation processes commence, conduct weekly walkthrough of the proposed development area as well as a minimum 50 m perimeter around the area, in order to identify all seedlings of any alien invasive species which might start to germinate and establish.
- Physically remove all identified alien invasive species seedlings from the soil by manually pulling them out with as much as possible of their root systems still intact.
- Place all removed alien invasive species seedlings in a metal drum or any other suitable containing unit and close the drum/containing unit in order to isolate the seedlings.
- Place the closed drum/containing unit on a concrete slab or any other suitable impermeable surface in direct sunlight in order to isolate the alien invasive species seedlings from any natural vegetation and prevent spreading of materials.
- Leave the closed drum/containing unit in direct sunlight for a minimum period of one week in order for all alien invasive species seedlings and materials to adequately dry out and die.
- Once all alien invasive species seedlings and materials have adequately dried out and died, remove the material from the drum/containing unit and place the materials in a minimum 1m deep hole which is isolated from any natural vegetation for disposal at nearby registered, landfill site.

## 2.7 Integrated Alien species Control Strategies

An integrated control strategy uses a combination of control options for a number of species during a particular situation. This approach is based on ranking the study site into priority areas for control. Therefore, high priority areas should be controlled first. Generally, maintenance control should consider areas with low infestations first and then move to areas of higher infestation since control of these areas will be rapid and cost-effective. Also, the direction of control should be in a downstream direction, meaning that initial control should start upstream and terminate downstream. In addition, control measures should aim to remove alien infestation from the edge of a grove or patch to prevent any further spread.

It is known that clearing of vegetation in preparation for construction that will leave bare patches of soil, thereby enhancing the colonisation by alien species that will prohibit the natural succession during rehabilitation activities. Such soil disturbances (as well as the inappropriate handling of topsoil) could enhance the establishment or spread of *alien species* to natural systems adjacent of the development. At least one working day and at least one group is required to control alien vegetation identified from the control zone as this is not a very long linear development.

The control team members will be responsible for applying foliar spray. When appointing this method, certain precautions such using it on rain free days or dew falls must be observed. Spraying in windy weather must be avoided as the spray may encounter non target plants. As the project is a short linear development only stretching for approximately 400m, it is anticipated that initial control will take shorter hours to complete than longer linear development. Follow-up control will commence within a week or latest two weeks after initial control was completed and anticipated to be completed within a day. However, in the event of very little re-



growth, follow-up control should be postponed for at least another month. Should re-growth be vigorous, a second follow-up treatment may be necessary.

The following management actions are aimed at reducing soil disturbance during the construction phase of the development, as well as reducing the likelihood that alien species will be brought onto site or otherwise encouraged.

## 2.8 Monitoring and Auditing

The re-emergence of aliens can simply be monitored as part of the internal and external auditing requirements that may come as a condition in the Environmental Authorisation. Monitoring of alien invasives can simply be undertaken as follows:

- Undertaking follow-up inspections are required in order to establish whether follow-up operations are required.
- It is preferable to follow up on an area and remove all seedlings or treat resprouting plants, rather than treat a new area.
- Post rehabilitation monitoring plan is used to ensure that critical aspects of rehabilitation are monitored.

*Table 6: Specifications for monitoring (Construction and Post Monitoring)*

Environmental Aspect	Description	Frequency and record keeping method
<b>Planning Phase</b>		
<b>Alien removal plan</b>	The Contractor's ESO must submit a plan 45 days before site establishment for review by Developer and ECO if required	<ul style="list-style-type: none"> <li>• Once off, 45 days before site establishment</li> <li>• ECO and Contractors 's Environmental file</li> </ul>
<b>Alien removal plan approval</b>	Developer/ECO must approve Alien removal plan before site establishment	<ul style="list-style-type: none"> <li>• Once off, before site establishment</li> </ul>
<b>Site control</b>	The construction must remain demarcated with appropriate fencing or hazard tape. These areas are no-go areas (this must be explained to all staff) that must be excluded from all development activities	<ul style="list-style-type: none"> <li>• Daily, as and when necessary</li> <li>• Biweekly inspection for the first 2-3 weeks after establishment of vegetation</li> </ul>
	Alien vegetation regrowth must be controlled throughout the entire site during the construction period	<ul style="list-style-type: none"> <li>• Daily, as and when necessary</li> </ul>
<b>Approval of clearance</b>	The ECO is to approve all vegetation clearance prior to clearing commencing for the proposed development.	<ul style="list-style-type: none"> <li>• Daily, as and when necessary</li> <li>• Weekly inspection for the first 2-3 weeks after establishment of vegetation</li> </ul>
<b>Management of vegetation clearance</b>	Only vegetation within the development footprint may be cleared and must take place as construction progresses on site. Mass clearing is not allowed unless the entire cleared area is to be rehabilitated immediately.	<ul style="list-style-type: none"> <li>• Weekly inspection for the first 2-3 weeks after establishment of vegetation</li> <li>• Photographic record</li> </ul>



Environmental Aspect	Description	Frequency and record keeping method
<b>Herbicide Management</b>	Cleared areas that have become invaded with alien invasive species can be sprayed with appropriate herbicides provided that these are such that they break down on contact with the soil. Residual herbicides should not be used. Such applications must be undertaken by a qualified specialist. Herbicides may be used to control listed alien weeds and invaders only. <b>No herbicides may be used within delineated wetlands and associated wetland buffers.</b> Pesticides may not be used.	<ul style="list-style-type: none"> <li>• Weekly inspection for the first 2-3 weeks after establishment of vegetation</li> <li>• Photographic record</li> </ul>
<b>Management and Control Alien vegetation</b>	Surveys for alien species should be conducted weekly until end of construction. All aliens identified should be removed from site.	<ul style="list-style-type: none"> <li>• Weekly inspection for the first 2-3 weeks after establishment of vegetation</li> <li>• Photographic record</li> </ul>
	Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.) Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.	<ul style="list-style-type: none"> <li>• Weekly inspection for the first 2-3 weeks after establishment of vegetation</li> <li>• Photographic record</li> </ul>
	Clearing activities must be contained within the affected zones and may not spill over into demarcated No Go areas.	<ul style="list-style-type: none"> <li>• Weekly inspection for the first 2-3 weeks after establishment of vegetation</li> <li>• Photographic record</li> </ul>
<b>Access control</b>	Alien vegetation regrowth must be controlled throughout the entire site during the construction period.	<ul style="list-style-type: none"> <li>• Weekly inspection for the first 2-3 weeks after establishment of vegetation</li> <li>• Photographic record</li> </ul>
<b>Post Construction (Rehabilitation)</b>		
Rehabilitation	Revegetation with indigenous, locally occurring species should take place in areas where natural vegetation is slow to recover or where repeated invasion has taken place	Once off, post construction
	No alien species should be cultivated onsite. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally occurring species should be used.	
	Cleared sites will thus have to be constantly monitored, and as soon as a seedling can be identified as alien invasive species, these must be pulled out by hand.	Monthly, post construction



### 3 CONCLUSION

Any land management programme in South Africa will inevitably include an alien plant control program. Alien control programs are essential to protect valuable resources such as economically viable agricultural land, surface and ground water, biodiversity and the beautiful landscapes of our country. An alien control program however requires a high level of commitment, coordination between landowners and authorities, professional planning and implementation and a good dose of common sense. Competent land managers are essential for cost effective and professional implementation programmes. The guidelines provided are compiled from a wide source and will hopefully provide insight to land managers in order for financial and human resources to be effectively used in an integrated control programme.

Based on the findings of the Terrestrial Biodiversity Compliance Statement (The Biodiversity Company, 2023), eleven (11) Exotic and Alien Invasive Species were recorded throughout the project area (**Table 4**). Five (5) of these are listed as **Category 1b** invasive species and according to legislation these must be controlled according to an AIS management plan. In addition, the site may be invaded by additional alien invasive species during site establishment due to initial and continual disturbances caused by vegetation clearance. The AIS control strategies presented in this report should be considered. **Should herbicides be considered, all care must be taken to prevent contamination of any water bodies, no herbicides may be used within delineated wetlands and associated wetland buffers and no pesticides may not be used at all.** This document must be agreed upon by the applicant and the Contractor prior the construction phases and may be undated as and when necessary.



## 4 REFERENCES

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