

**APPENDIX C**

**ALIEN INVASIVE  
MANAGEMENT PLAN**

**FOR THE PROPOSED**

**ISUNDU 765/400 KV SUB-STATION AND  
TURN-IN TRANSMISSION LINES**

**DEA EIA REF: 14/12/16/3/3/2/745**

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August 2016

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## 1. PURPOSE

The purpose of the Alien Invasive Management Plan (AIMP) is to implement avoidance and mitigation measures to reduce the impact of the development of the Isundu Sub Station on listed and protected plant species and their habitats. The plan overlaps to some degree with the Erosion and Soil Management Plan and the Re-vegetation and Rehabilitation Management Plan, but for successful implementation, it is imperative that this plan is at all times used in conjunction with the other plans mentioned.

The aims of the AIMP are to provide:

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

## 2. SCOPE

This AIMP acts as a guideline to be applied by all contractors on the Isundu Sub Station. This plan is a legal document that must be implemented to fulfil the requirements of the authorisation. However, this management plan is an evolving guideline that needs to be updated or adapted as progress is made in terms of plant rescue and 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.

## 3. IDENTIFICATION OF SPECIES OF CONSERVATION CONCERN

A vegetation assessment was conducted by a vegetation specialist in May/June 2015. A comprehensive list of the species of flora found on the site during the assessment is provided in Appendix 1 (\* denotes an alien invasive species).

### 3.1 Mitigation and Avoidance Options

Ideally, the development should strive to avoid impacts to protected plant species. Due to various constraints, this may not always be possible and some impact on protected plant species may be inevitable. Where protected plant species fall within the development footprint and avoidance is not possible, then it may be possible to translocate the affected individuals outside of the development footprint (depending on the size of the specimen). Not all species are suitable for translocation as only certain types of plants are able to survive the disturbances associated with translocation. Suitable candidates for translocation include most geophytes and succulents. Although there are exceptions, the majority of woody species do not survive translocation well. In these cases, propagules must be collected for reinstatement purposes.

## **4. ALIEN INVASIVE PLANT MANAGEMENT PLAN**

### **4.1 Overall Aim**

To manage alien and invasive plant species during the construction and operation of the Isundu Sub Station and associated infrastructure, through the implementation of an alien invasive species management and control programme.

### **4.2 Alien Invasive Species**

An alien invasive species can be defined as “*a species not native to the region or country, often with the potential for out-competing native species*” (<http://www.eiatoolkit.ewt.org.za/glossary.html>). As such, alien invasive plant species often replace indigenous vegetation leading to severe loss of biodiversity and change in landscape function. Potential consequences associated with the presence of alien invasive plant species include:

- Loss of biodiversity.
- Loss of grazing resources.
- Increased fire risks.
- Increased erosion.
- Loss of wetland function.
- Impacts on drainage lines.
- Increased water use.

The Conservation of Agricultural Resources Act (Act 43 of 1983), as amended in 2001, requires that land users clear Declared Weeds from their properties and prevent the spread of Declared Invader Plants on their properties.

### **4.3 Vulnerable Habitats**

The susceptibility of the site to alien invasion is not homogenous and specific environments and habitats can be singled out as being more vulnerable to invasion. These include:

- Disturbed areas which receive runoff.
- Construction camps experiencing prolonged use.
- Lay down areas experiencing prolonged use.
- Areas cleared of natural vegetation.

These areas are likely to require specific attention and repeated alien clearing may be required to keep these areas clear of invasives.

#### 4.4 Specific Management Objectives

The following management objectives must be implemented by the contractor and project proponent:

- ❑ The alien plant management plan should be inclusive and cover the entire site of the proposed development.
- ❑ Ensure alien plants do not become dominant in parts or the whole landscape.
- ❑ Initiate and implement a monitoring and eradication programme for alien and invasive species.
- ❑ Control alien and invasive species dispersal and encroachment.
- ❑ Promote the planting of indigenous species.

#### 4.5 General Clearing and Guiding Principles

- ❑ 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 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 dominant 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 neighbours may be required as seeds of aliens 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.

#### 4.6 Clearing Methods

- ❑ Different species require different clearing methods such as manual, chemical or biological methods or in combination.
- ❑ The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the DWA Working for Water Website.

#### 4.7 Identification of Alien Species

Table 3 of CARA (the Conservation of Agricultural Resources Act) lists all declared weeds and invader plants. Alien plants are divided into three categories based on their risk as an invader:

- ❑ Category 1. These plants must be removed and controlled by all land users. They may no longer be planted or propagated, and all trade in these species is prohibited.
- ❑ Category 2. 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 licence as these plants consume large quantities of water.
- ❑ Category 3. 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.

#### 4.8 Use of Herbicides for Alien Control

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody alien invasive species. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by implementing the following:

- ❑ Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve the desired control.
- ❑ All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- ❑ 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.*

#### 4.9 Management Activities - Construction Phase

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.

ACTION	FREQUENCY
The ECO is to approve all vegetation clearance prior to clearing commencing for the proposed development	Daily
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	Weekly
Should revegetation not be possible immediately, the cleared areas must be protected with suitable measures (brush packing, sediment fences etc)	Weekly
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	Weekly
Although organic matter is frequently used to encourage regrowth of vegetation on cleared areas, no foreign material for this purpose should be brought onto site. Material from cleared areas should be used as much as possible	Weekly
Clearing of vegetation is not allowed within 32 m of any wetland, 80 m of any wooded area, within 1:100 year flood lines, in conservation servitude areas or on slopes steeper than 1:3, unless permission is granted by the ECO for specifically allowed construction activities in these areas	Weekly
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	Weekly

Alien vegetation regrowth must be controlled throughout the entire site during the construction period	Monthly
The alien plant removal and control method guidelines should adhere to best-practice for the species involved. Such information can be obtained from the DWA Working for Water website, as well as herbicide guidelines	Monthly
Clearing activities must be contained within the affected zones and may not spill over into demarcated No Go areas	Daily
Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only.	Monthly
Wetlands (existing), forest edges, riverine fringe vegetation and potentially unstable areas 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	Daily

### ***Monitoring Activities – Construction Phase***

The following monitoring actions should be implemented during the construction phase of the development.

<b>MONITORING ACTION</b>	<b>INDICTOR</b>	<b>TIMEFRAME</b>
Document alien species present at the site	List of alien species	Preconstruction
Document alien plant distribution	Alien plant distribution map	Biannually
Document and record alien control measures implemented	Record of clearing activities	Biannually
Review and evaluation of control success rate	Decline in documented alien abundance over time	Biannually

#### 4.10 Management Activities - Operational Phase

The following management actions are aimed at reducing the abundance of alien species within the site and maintaining non-invaded areas clear of aliens.

ACTION	FREQUENCY
Surveys for alien species should be conducted regularly (every three months for the first year after construction and biannually thereafter). All aliens identified should be removed from site	Every three months for one year and biannually thereafter
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	When necessary.  Revegetation should take place at the start of the rainy season. Areas of natural vegetation that need to be maintained or managed to reduce plant height or biomass, should be controlled using methods that leave the soil protected, such as using a weed-eater to mow above the soil level
No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used	When necessary

#### Monitoring Activities – Operational Phase

The following monitoring and evaluation actions should take place during the operational phase of the development.

MONITORING ACTION	INDICATOR	TIMEFRAME
Document alien species distribution and abundance over time at the site	Alien plant distribution map	Biannually
Document alien plant control measures implemented and success rate achieved	Records of control measures and their success rate  A decline in alien distribution and cover over time at the site	Biannually
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually

**APPENDIX 1**  
**PLANT SPECIES FOUND ONSITE**

SPECIES NAME	GROWTH FORM
<i>Acacia mearnsii</i> *	Woody Species
<i>Acacia nilotica</i>	Woody Species
<i>Acacia robusta</i>	Woody Species
<i>Acacia sieberiana</i>	Woody Species
<i>Achyranthes aspera</i> *	Forb Species
<i>Ageratum conyzoides</i> *	Forb Species
<i>Alectra sessiliflora</i>	Forb Species
<i>Aloe ferox</i>	Woody Species
<i>Aloe maculata</i>	Forb Species
<i>Androcymbium longipes</i>	Forb Species
<i>Apodytes dimidiata</i>	Woody Species
<i>Aristida congesta</i> subsp. <i>barbicollis</i>	Grass Species
<i>Aristida junciformis</i>	Grass Species
<i>Asparagus cf. africanus</i>	Forb Species
<i>Asparagus virgatus</i>	Forb Species
<i>Athrixia phyllicoides</i>	Forb Species
<i>Berkheya sp.</i>	Forb Species
<i>Bidens pilosa</i> *	Forb Species
<i>Boophone disticha</i>	Forb Species
<i>Brachiaria arrecta</i>	Grass Species
<i>Brachylaena elliptica</i>	Woody Species
<i>Buddleia saligna</i>	Woody Species
<i>Canna indica</i> *	Forb Species
<i>Canthium ciliatum</i>	Woody Species
<i>Centella asiatica</i> *	Forb Species
<i>cf. Pachycarpus sp.</i>	Forb Species
<i>Clerodendrum glabrum</i>	Woody Species
<i>Cheilanthes viridis</i>	Forb Species
<i>Chloris gayana</i>	Grass Species
<i>Cirsium vulgare</i> *	Forb Species
<i>Nymphaea nouchali</i>	Forb Species
<i>Conyza sp.</i>	Forb Species
<i>Crabbea hirsuta</i>	Forb Species
<i>Cucumis zeyheri</i>	Forb Species
<i>Cymbopogon caesius</i>	Grass Species
<i>Cymbopogon nardus</i>	Grass Species
<i>Cynodon dactylon</i>	Grass Species
<i>Cyperus platycaulis</i>	Sedges/Rushes
<i>Cyperus pulcher</i>	Sedges/Rushes
<i>Cyperus sexangularis</i>	Sedges/Rushes
<i>Dalbergia obovata</i>	Woody Species
<i>Dichrostachys cinerea</i>	Woody Species
<i>Dicoma argyrophylla</i>	Forb Species

<i>Digitaria eriantha</i>	Grass Species
<i>Dalbergia obovata</i>	Woody Species
<i>Ehretia obtusifolia</i>	Woody Species
<i>Ehretia rigida</i>	Woody Species
<i>Eleocharis dregeana</i>	Sedges/Rushes
<i>Eragrostis capensis</i>	Grass Species
<i>Eragrostis curvula</i>	Grass Species
<i>Eragrostis plana</i>	Grass Species
<i>Euphorbia ingens</i>	Woody Species
<i>Ficus sur</i>	Woody Species
<i>Gomphocarpus physocarpus</i>	Forb Species
<i>Ground orchid</i>	Forb Species
<i>Grewia occidentalis</i>	Woody Species
<i>Gymnosporia glaucophylla</i>	Woody Species
<i>Gymnosporia maranguensis</i>	Woody Species
<i>Helichrysum nudifolium</i>	Forb Species
<i>Helichrysum sp.</i>	Forb Species
<i>Hibiscus cannabinus</i>	Forb Species
<i>Hibiscus pusillus</i>	Forb Species
<i>Hippobromus pauciflorus</i>	Woody Species
<i>Hyparrhenia cf. hirta</i>	Grass Species
<i>Hypoxis hemerocallidea</i>	Forb Species
<i>Imperata cylindrica</i>	Grass Species
<i>Indigofera cf. hiliaris</i>	Forb Species
<i>Jasminum multipartitum</i>	Woody Species
<i>Juncus effusus</i>	Sedges/Rushes
<i>Kalanchoe rotundifolia</i>	Forb Species
<i>Laggera crispata</i>	Forb Species
<i>Lantana camara*</i>	Woody Species
<i>Leucas cf. lavandulifolia</i>	Forb Species
<i>Lippia javanica</i>	Woody Species
<i>Litsea sebifera*</i>	Woody Species
<i>Lycium acutifolium</i>	Woody Species
<i>Maytenus undata</i>	Woody Species
<i>Melia azedarach*</i>	Woody Species
<i>Myriophyllum aquaticum*</i>	Forb Species
<i>Nidorella sp.</i>	Forb Species
<i>Nymphaea nouchali</i>	Forb Species
<i>Ochna sp.</i>	Woody Species
<i>Panicum coloratum</i>	Grass Species
<i>Panicum maximum</i>	Grass Species
<i>Paspalum distichum</i>	Grass Species
<i>Paspalum urvillei*</i>	Grass Species
<i>Passiflora suberosa*</i>	Woody Species
<i>Pelargonium luridum</i>	Forb Species
<i>Peristrophe cernua</i>	Forb Species
<i>Persicaria senegalensis</i>	Forb Species
<i>Phoenix reclinata</i>	Woody Species

<i>Physalis viscosa</i> *	Forb Species
<i>Psidium guajava</i> *	Woody Species
<i>Pupalia lappacea</i>	Forb Species
<i>Pycneus polystachyos</i>	Sedges/Rushes
<i>Sacciolepis curvata</i>	Grass Species
<i>Sansevieria hyacinthoides</i>	Forb Species
<i>Schinus terebinthifolius</i> *	Woody Species
<i>Scutia myrtina</i>	Woody Species
<i>Searsia chirindensis</i>	Woody Species
<i>Searsia rehmanniana</i>	Woody Species
<i>Senecio coronatus</i>	Forb Species
<i>Senecio polyanthemoides</i>	Forb Species
<i>Setaria sphacelata</i>	Grass Species
<i>Sida rhombifolia</i>	Forb Species
<i>Sida sp.</i>	Forb Species
<i>Solanum mauritianum</i> *	Woody Species
<i>Solanum panduriforme</i>	Woody Species
<i>Sporobolus africanus</i>	Grass Species
<i>Sporobolus pyramidalis</i>	Grass Species
<i>Tagetes minuta</i> *	Forb Species
<i>Tecoma stans</i> *	Woody Species
<i>Tephrosia sp.</i>	Forb Species
<i>Trimeria grandifolia</i> subsp. <i>grandifolia</i>	Woody Species
<i>Utricularia stellaris</i>	Forb Species
<i>Verbena aristigera</i> *	Forb Species
<i>Verbena bonariensis</i> *	Forb Species
<i>Vigna vexillata</i>	Forb Species
<i>Zanthoxylum capense</i>	Woody Species
<i>Ziziphus mucronata</i>	Woody Species

\* denotes alien invasive species