



A PROTECTED PLANT RESCUE AND PROTECTION PLAN FOR THE PROPOSED DEVELOPMENT OF THE LICHTENBURG SOLAR PARK AND ASSOCIATED INFRASTRUCTUE ON PORTION 25 OF THE FARM HOUTHAAALBOOMEN 31 IP AND PORTION 10 OF THE FARM LICHTENBURG TOWN AND TOWNLANDS 27 IP, NORTHWEST PROVINCE

April 2022

Prepared for: MATRIGENIX (PTY) LTD

Compiled by Dr BJ Henning
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Dr BJ Henning



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Reviewed by:
Ms. E Grobler

LIMPOPO PROVINCE: 120 Marshall Street, Polokwane, 0699, PO Box 2526, Polokwane 0700

Tel: +27 15 291 1577 Fax: +27 15 291 1577 www.ages-group.com

*Offices: Eastern Cape Gauteng Limpopo Province Namibia North-West Province Kwazulu Natal
AGES Limpopo Directors: JH Botha HP Jannasch THG Ngoepe*

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Name	Institution
Ms. E. Grobler	AGES Limpopo (Pty) Ltd
Mr. E Jordaan	MATRIGENIX (PTY) LTD
	Department of Forestry, Fisheries and the Environment (DFFE)
	Registered Interested and Affected Parties

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1 GENERAL INFORMATION AND BACKGROUND

AGES Limpopo (Pty) Ltd was appointed by MATRIGENIX (PTY) LTD to compile a plant rescue and protection for the proposed development of a solar plant named as follows:

- Lichtenburg Solar Park.

The project site includes the proposed development of the Lichtenburg Solar Park and power line on Portion 25 of the Farm Houthaalboomen 31 IP and Portion 10 of the Farm Lichtenburg Town and Townlands 27 IP, Ditsobotla Local Municipality, Ngaka Modiri Molema District Municipality, Northwest Province.

The assignment is interpreted as follows: Compile a management plan to be implemented as guidelines by the Environmental Control Officer (ECO) for the rescue and protection of rare and endemic plant species occurring on the proposed development site. The study will be done according to guidelines stipulated by the, then called, Department of Environmental Affairs and Tourism (DEAT) and legislation pertaining to the protection of plants in the Northwest Province and forms part of the Environmental Management Programme (EMPR) for implementation.

1.1 Information Sources

The following information sources were obtained:

1. National and provincial legislation was evaluated to provide lists of any plant or animal species that have protected status. The most important legislation is the following:
 - a. National Environmental Management: Biodiversity Act (Act No 10 of 2004)
 - b. National Forest Act.
 - c. Northern Cape Nature Conservation Act, No. 9 of 2009.
 - d. CITES: Convention on the Trade in Endangered Species of Wild Fauna and Flora.
2. All relevant maps through Geographical Information Systems (GIS) mapping, and information (previous studies and environmental databases) on the rare and protected plants of the site concerned.
3. Requirements regarding the management plan as requested by DFFE.
4. Information on the micro-habitat level was obtained through obtaining a first-hand perspective from the ecological study compiled by Henning (2014) was also utilized for this study.

1.2 Regulations governing this report.

1.2.1 National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) - Regulation No. R982

This report was prepared in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) Gazette No. 38282 Government Notice R. 982 of 4 December 2014 (as amended). Appendix 6 – Specialist reports includes a list of requirements to be included in a specialist report:

1. A specialist report or a report prepared in terms of these regulations must contain:
 - a. Details of
 - i. The specialist who prepared the report; and
 - ii. The expertise of that specialist to compile a specialist report, including a curriculum vitae.
 - b. A declaration that the specialist is independent in a form as may be specified by the competent authority.
 - c. An indication of the scope of, and purpose for which, the report was prepared.
 - d. The date and season of the site investigation and the relevance of the season to the outcome of the assessment.
 - e. A description of the methodology adopted in preparing the report or carrying out the specialized process.
 - f. The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure.
 - g. An identification of any areas to be avoided, including buffers.
 - h. A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.
 - i. A description of any assumptions made and any uncertainties or gaps in knowledge.
 - j. A description of the findings and potential implications of such findings on the impact of the activity, including identified alternatives, on the environment.
 - k. any mitigation measures for inclusion in the EMPr.
 - l. any conditions for inclusion in the environmental authorisation.
 - m. any monitoring requirements for inclusion in the EMPr or environmental authorisation

- n. a reasoned opinion –
 - i. As to whether the activity or portions thereof should be authorised and
 - ii. If the opinion is that the activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr and where applicable, the closure plan.
- o. A description of any consultation process that was undertaken while preparing the specialist report.
- p. A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
- q. Any other information requested by the competent authority.

This Act also embraces all three fields of environmental concern namely: resource conservation and exploitation; pollution control and waste management; and land-use planning and development. The environmental management principles include the duty of care for wetlands / rivers and special attention is given to management and planning procedures.

1.2.2 National Environmental Management Biodiversity Act (Act 10 of 2004) (NEMBA)

The following aspects of the NEMBA (2004) are important to consider in the compilation of an ecological report. It:

- Lists ecosystems that are threatened or in need of national protection.
- Links to Integrated Environmental Management processes.
- Must be considered in EMPs and IDPs.
- The Minister may make regulations to reduce the threats to listed ecosystems.

1.2.3 The National Forest Act (Act 84 of 1998) (NFA)

In terms of section 15(1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister of Agriculture, Forestry and Fisheries.

1.3 Terms of reference

1.3.1 Objectives

1. List the plant species of conservation concern in the study area.
2. Describe the management principles and specific methodology on the plant rescue and protection on the proposed development site. It includes plant rescue methods (relocation, seed collection or taking vegetative cuttings), but primarily focuses on plant relocation procedures (root preparation and excavation, lifting and backfill requirements), and the installation of marker stakes, tree guards, weed mats and mulch around relocated plants.

1.3.2 Limitations and assumptions

- To obtain a comprehensive understanding of the dynamics of protected plant rescue and protection plan, surveys and monitoring should ideally be replicated over several seasons and over several years. However, due to project time constraints such long-term studies are not feasible.
- The large study area did not allow for the finer level of assessment that can be obtained in smaller study areas. Therefore, data collection in this study relied heavily on data from representative sections, as well as general observations, generic data and a desktop analysis.

2 INTRODUCTION

Plants are the backbone of life on Earth. Today, however, plant communities around the world are under threat. Scientists estimate that at least 100,000 plants are threatened with extinction--that's more than one-third the total known species of plants on the planet.

The main threats to plants today are habitat destruction, invasive species, and overcollection. The loss of a plant species can have devastating effects on ecosystems, as other species lose their sources of food and shelter. Additionally, plants play a crucial role in stabilising soils and help prevent erosion.

While the situation is critical, efforts are underway around the globe to halt the loss of plant diversity. International treaties such as the Convention on Biological Diversity are setting goals and targets for conservation worldwide. More specifically, the Global Strategy for Plant Conservation (GSPC) has laid out 16 outcome-oriented targets to be achieved by 2010. The GSPC recognizes the important role that education can play in conservation programmes. Target 14 of the GSPC calls for the "importance of plant diversity and the need for its conservation incorporated into communication, educational and public-awareness programmes."

There are two main ways to conserve biodiversity. These are termed *ex situ* (i.e., out of the natural habitat) and *in situ* (within the natural habitat). Populations of plant species are much easier than animals to maintain artificially. They need less care and their requirements for habitat conditions can be provided more readily. It is also much easier to breed and propagate plant species in captivity. This management plan focusses specifically on the rescue and protection of plant species on the site for the proposed development of a solar plant.

3 STUDY AREA

3.1 Location and description of activity

Matrigenix (Pty) Ltd is proposing the establishment of a renewable energy generation facility (Photovoltaic Power Plant) with associated infrastructure and structures, and power line on Portion 25 of the Farm Houthaalboomen 31 IP and Portion 10 of the Farm Lichtenburg Town and Townlands 27 IP, Ditsobotla Local Municipality, Ngaka Modiri Molema District Municipality, North-West Province (Figure 1).

The proposed renewable energy generation facility will be Photovoltaic (PV) Power Plant with a maximum generation capacity up to 120 MW, at the point of connection (Export Capacity) with the Eskom connection infrastructure. The name of the facility will be LICHTENBURG SOLAR PARK.

The developed area (footprint) required for the proposed project will be up to 240 hectares. The Lichtenburg Solar Park will deliver the electrical energy to the Eskom's Watershed substation, located on the Remainder Portion of the farm Lichtenburg Town and Townlands 27 IP.

The proposed development (the Photovoltaic (PV) Power Plants and connection infrastructure) consists of the installation of the following equipment:

- Photovoltaic modules (mono-crystalline, poly-crystalline, or bi-facial modules)
- Mounting systems for the PV arrays (single-axis horizontal trackers or fixed structures) and related foundations
- Internal cabling and string boxes
- DC/AC inverters
- Medium voltage stations, hosting LV/MV power transformers
- Medium voltage receiving station(s)
- Workshops & warehouses
- One on-site high-voltage substation with high-voltage power transformers, stepping up the voltage to 132kV and one high-voltage busbar with metering and protection devices
- One on-site switching station, with one high-voltage busbar with metering and protection devices
- One (1) 132 kV powerline, to the Eskom Watershed substation, located on the Remainder Portion of the farm Lichtenburg Town and Townlands 27 IP.
- Battery Energy Storage Systems (BESS), with a footprint up to 10 ha, next to the

on-site high-voltage substation, within the PV plant footprint / fenced areas

- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- Internal roads
- Fencing of the site and alarm and video-surveillance system
- Water access point, water supply pipelines, water treatment facilities
- Sewage system
- Interventions on the Eskom Watershed Substation.

During the construction phase, the site may be provided with additional activities which will be removed at the end of construction.

- Water access point, water supply pipelines, water treatment facilities
- Prefabricated buildings
- Workshops & warehouses

The connection may also entail interventions on the Eskom grid, according to Eskom's connection requirements/solution. The aerial map of the site is presented in Figure 2.

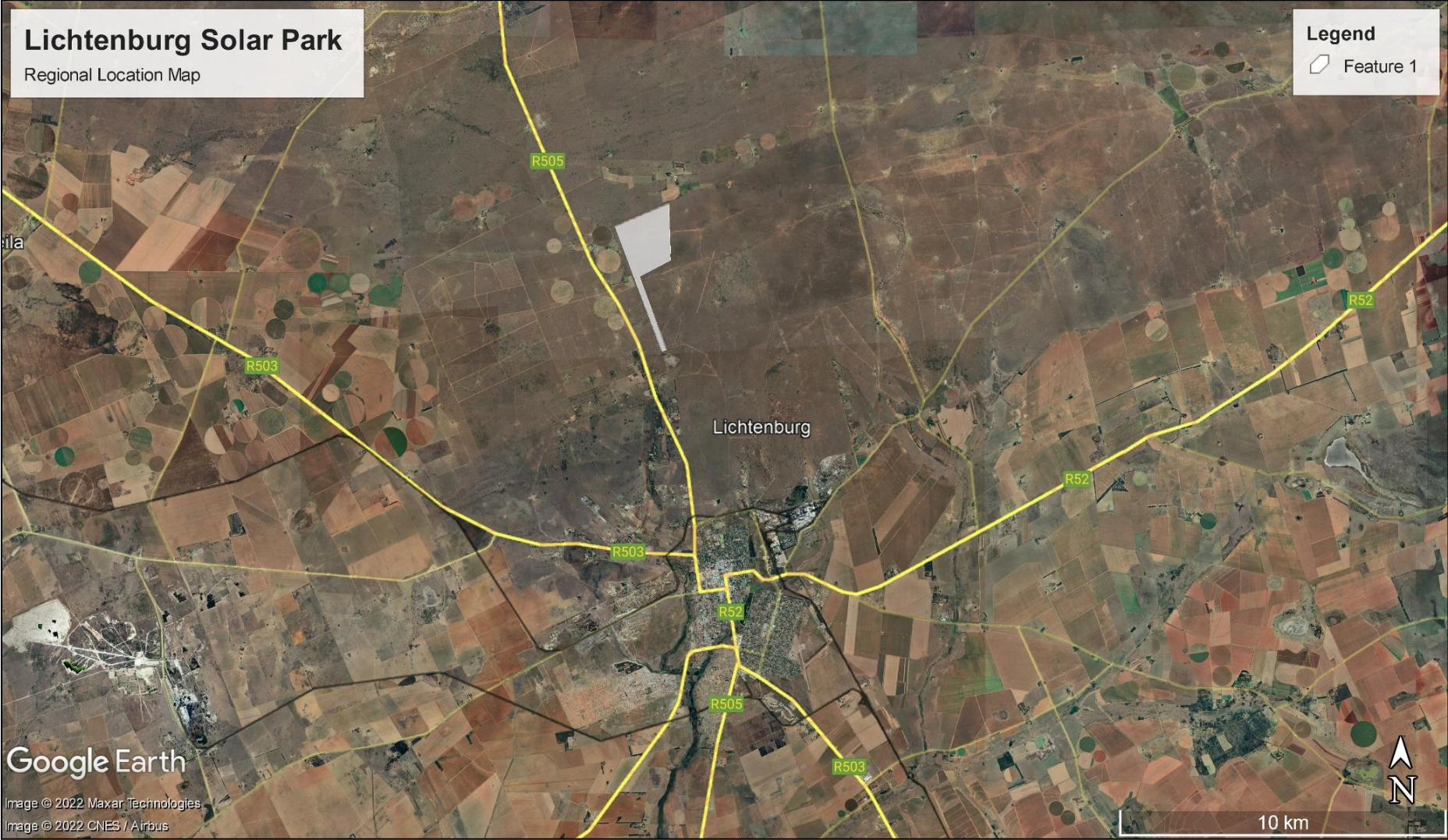


Figure 1. Regional location Map of the project area



Figure 2. Aerial Map of the project area

4 PROTECTED AND THREATENED PLANT SPECIES OF THE STUDY AREA

The following lists and recommendation regarding threatened and protected plant species on the proposed development site has been adapted from the ecological report for the EIA conducted by Henning (2021). A plant species lists previously recorded for the study area according to the SIBIS database of SANBI are included in Appendix A.

4.1 Plant species of concern

There are two types of species of concern for the site under investigation, (i) those listed by conservation authorities as being on a Red List and are therefore considered to be at risk of extinction, and (ii) those listed as protected according to National and/or Provincial legislation.

4.1.1 Red List plant species

Habitat degradation is one of the main reasons for plant species becoming extinct in a particular area. Threatened species are also seen as indicators of the overall health of an ecosystem (Hilton-Taylor, 1996).

A list of red data plant species previously recorded in the grid square in which the proposed development is planned was obtained from SANBI. The list of species is presented in table 1.

Table 1. Red data flora potentially occurring in the grid squares associated with the development.

Species Name	IUCN Status	Status
<i>Plinthus rehmanni</i>	Data deficient	Indigenous; Endemic

The potential that this species occur on the proposed development site is considered medium to low. Ecological monitoring should however still be implemented during the construction phase and specific sensitive habitats (riparian) needs to be avoided to ensure that any potential red data species potentially missed during the field surveys are preserved and not potentially impacted on. The EIA screening tool shows that the following listed plant species occur on the site:

Sensitive species 1261:

- Sensitivity: Medium.
- Status: Vulnerable.

Ecological monitoring should however still be implemented during the construction phase and specific sensitive habitats (riparian) needs to be avoided to ensure that any potential red data species potentially missed during the field surveys are preserved and not potentially impacted on.

4.1.1.1 Sensitive species 1261

A widespread (Extent of Occurrence 13 374 km²), but very rare species that has lost a large proportion of its habitat to agriculture, urban expansion and mining. It is known from fewer than 10 locations and continue to decline due to ongoing habitat loss and degradation. Occurs within Sandy loam soils in thornveld and Themeda-grassland.

This species is threatened by ongoing habitat loss to agricultural expansion, urban expansion, mining and habitat degradation due to overgrazing. In 1976 Dyer (1976) expressed concern that the species is becoming increasingly rare due to much of its habitat being ploughed. The subpopulation at the type locality is locally extinct due to habitat loss to crop fields (Hahn 2013). One subpopulation known from historical records falls within a diamond mining area, and it is not known whether it has survived the habitat destruction. One subpopulation has been cleared by collectors.

This species is known from a few, widely scattered subpopulations. It is overlooked, but more field surveys are needed to better understand the size and extent of the population. It is threatened and declining across its range.

Probability of occurrence on site: Moderate due to the presence of limited suitable habitat on the proposed development footprint.

Probability of impact during vegetation clearance: LOW, limited suitable habitat observed on site and population of the species was documented.

4.1.2 Protected trees

One tree species listed as protected under the national list of declared protected tree species as promulgated by the National Forest Act (NFA), 1998 (No. 84 of 1998) was observed in the project area. The trees species listed in National Forest Act protected tree species list (Table 7) have a wide distribution in Southern Africa, although these trees have an importance in terms of medicinal, cultural and heritage value to local communities. The following protected tree species of concern occur in the area:

Table 2. Protected tree species of concern in the project area

Species	National Conservation status	Status in project area
<i>Vachellia erioloba</i>	Protected (NFA)	Localized (dykes, bushclumps)

The listed protected tree species in terms of the National Forest Act of 1998, may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased, or sold – except under license granted by Department of Forestry. Obtaining relevant permits are therefore required prior to any impact on these individuals.

4.1.3 Other protected species

Plant species are also protected in the Northwest Province according to the Northwest Environmental Management Act. According to this ordinance, no person may pick, import, export, transport, possess, cultivate, or trade in a specimen of a specially protected or protected plant species. The Appendices to the ordinance provide an extensive list of species that are protected, comprising a significant component of the flora expected to occur on site. Communication with Provincial authorities indicates that a permit is required for all these species if they are expected to be affected by the proposed project.

After a detailed survey was conducted during April 2022, no listed protected species in the ordinance was found in the footprint areas of the project area:

5 PLANT CLEARANCE GUIDELINES AS PART OF THE RESCUE AND PROTECTION PLAN FOR THE SITE

Plant material that is to be “rescued” must be potted up into bags utilising local soil obtained from the topsoil obtained from the construction site or larger area. Adequate root systems per plant material type must be carefully excavated and retained for plant material to remain viable. Search and Rescue activities would include the removal of grass clumps, smaller transplantable shrubs and trees and endangered species such as geophytes and succulents should be placed into bags using local soil.

Should the ECO require that plants be cleared for the proposed construction of the solar facility, the following rescue and conservation strategy for the relevant plant species should apply:

- General principles:
 - Vegetation removal must be limited to the PV plant construction site.
 - Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step.
 - Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected.
 - No vegetation to be used for firewood.
 - Gathering of firewood, fruit, muthi plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO.
 - Only vegetation within the footprint area must be removed.
 - Vegetation removal must be phased to reduce impact of construction.
 - Construction site office and laydown areas must be clearly demarcated, and no encroachment must occur beyond demarcated areas.
 - All-natural areas impacted during construction must be rehabilitated with locally indigenous plant species.
 - A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas. These areas include drainage channels and rocky outcrops in the study area.
 - Construction areas must be well demarcated, and these areas strictly adhered to.
 - The use of pesticides and herbicides in the study area must be discouraged as these impacts on important pollinator species of indigenous vegetation.
 - Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.

- Harvesting of seeds from specimens to be used in the *ex-situ* nursery and future rehabilitation. The ecologist shall determine when seed is mature and ready for collecting, and shall collect, extract, clean and label the seed. Seed shall be labelled to indicate the plant species name, date of collection, weight of seed and place of collection. The seed shall be stored in air-tight containers at a constant temperature, away from direct light. Seed shall be provided to the principal of the ex-situ nursery.
- Intact removal of protected plant species under permit. Permits should be obtained from the Northern Cape Environmental authorities where red data or protected flora is to be disturbed or relocated. Plant material that is to be “rescued” must be potted up into bags utilising local soil obtained from the previously stored topsoil heap. Adequate root systems per plant material type must be carefully excavated and retained for plant material to remain viable. Search and Rescue activities would include the removal of grass clumps, smaller transplantable shrubs and trees and endangered species such as geophytes and succulents should be placed into bags using local soil.

6 REFERENCES

GERMISHUIZEN, G., MEYER, N.L., STEENKAMP, Y and KEITH, M. (eds.) (2006). A checklist of South African plants. Southern African Botanical Diversity Network Report No. 41, SABONET, Pretoria.

Henning B. 2022. A TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT (INCLUDING PLANT AND ANIMAL SPECIES ASSESSMENT) FOR THE PROPOSED DEVELOPMENT OF THE LICHTENBURG SOLAR PARK AND ASSOCIATED INFRASTRUCTURE ON PORTION 25 OF THE FARM HOUTHAAALBOOMEN 31 IP AND PORTION 10 OF THE FARM LICHTENBURG TOWN AND TOWNLANDS 27 IP, NORTHWEST PROVINCE

Harebottle, D.M., Smit-Robinson, H. and Froneman, A. 2019. National guidelines for interventions that relate to colonial breeding waterbirds causing human-wildlife conflict in South Africa. BirdLife South Africa, Johannesburg. <https://www.birdlife.org.za/what-we-do/terrestrial-bird-conservation/media-and-resources/>

IUCN (2001). IUCN Red Data List categories and criteria: Version 3.1. IUCN Species Survival Commission: Gland, Switzerland.

MUCINA, L., RUTHERFORD, M.C., PALMER, A.R., MILTON, S.J., SCOTT, L., VAN DER MERWE, B., HOARE, D.B., BEZUIDENHOUT, H., VLOK, J.H.J., EUSTON-BROWN, D.I.W., POWRIE, L.W. & DOLD, A.P. 2006. Nama-Karoo Biome. In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

MUELLER-DOMBOIS, D. AND ELLENBERG, H. 1974. Aims and methods of vegetation ecology. Wiley, New York.

RUTHERFORD, M.C. & WESTFALL, R.H. (1994). Biomes of southern Africa: an objective categorization. Memoirs of the Botanical Survey of South Africa No. 63.

APPENDIX A. PLANT SPECIES LISTS FOR SITE

Vegetation units
<p>Woody species</p> <p><i>Vachellia erioloba</i></p> <p><i>Asparagus laricinus</i></p> <p><i>Diospyros lycioides</i></p> <p><i>Ehretia rigida</i></p> <p><i>Grewia flava</i></p> <p><i>Hermbstaedtia linearis</i></p> <p><i>Ozoroa sphaerocarpa</i></p> <p><i>Searsia lancea</i></p> <p><i>Searsia pyroides</i></p>
<p>Grasses</p> <p><i>Aristida congesta</i></p> <p><i>Aristida junciformis</i></p> <p><i>Aristida scabrivalis</i></p> <p><i>Brachiaria nigropedata</i></p> <p><i>Brachiaria serrata</i></p> <p><i>Cymbopogon excavatus</i></p> <p><i>Elionorus muticus</i></p> <p><i>Eragrostis biflora</i></p> <p><i>Eragrostis chloromelas</i></p> <p><i>Hyparrhenia hirta</i></p> <p><i>Loudetia flavida</i></p> <p><i>Melinis repens</i></p> <p><i>Pogonarthria squarrosa</i></p> <p><i>Schizachyrium jeffreysii</i></p> <p><i>Sporobolus ioclodus</i></p> <p><i>Themeda triandra</i></p> <p><i>Trachypogon spicatus</i></p> <p><i>Trichoneura grandiglumis</i></p> <p><i>Triraphis andropogonoides</i></p> <p><i>Tristachys leucothrix</i></p>
<p>Dwarf shrubs, forbs & succulents</p> <p><i>Achyranthes aspera</i></p> <p><i>Athrixia elata</i></p> <p><i>Berkheya onopordifolia</i></p> <p><i>Boophane distycha</i></p> <p><i>Bulbostylis burchellii</i></p> <p><i>Chamaechrista comosa</i></p> <p><i>Cichorium intybus</i></p> <p><i>Cleome maculata</i></p> <p><i>Commelina africana</i></p> <p><i>Conyza bonariensis</i></p> <p><i>Dicerocharium eriocarpum</i></p> <p><i>Dicoma anomala</i></p> <p><i>Elephanthorhiza elephanthina</i></p>

Vegetation units

Gnidia capitata
Gomphrena celasoides
Haplocarpa scaposa
Helichrysum cerastoides
Helichrysum kraussii
Hermbstaedtia odorata
Hypoxis iridifolia
Hypoxis rigidula
Indigofera cryptantha
Ipomoea omnaeyi
Lantana rugosa
Ledebouria revoluta
Nidorella hottentotta
Oxalis depressa
Parinari capensis
Rhynchosia monophylla
Salvia runcinnata
Scabiosa columbaria
Scilla natalensis
Senecio inornatus
Solanum incanum
Solanum panduriforme
Tephrosia filipes
Triumfetta sonderi
Wahlenbergia caledonica
Walafrida densiflora
Zinnia peruviana

APPENDIX B. PLANT RELOCATION PROCEDURES

1. Timing

- If practicable plants shall be moved in autumn or winter when their growth rate is slowest, and the soil is moist.

2. Weed Control

- Refer to the Alien Invasive Management Plan compiled for the weed control requirements.
- The areas where plants are to be relocated shall be eradicated of weeds before replanting commences. Any existing vegetative growth shall be slashed to a height of 1m.

3. Root Preparation

- The ECO shall undertake root pruning in advance of relocating and must cut the roots at the margins of the root ball which will allow the plant to 'adjust' whilst *in situ*. For large plants (trees and shrubs) root cutting must occur progressively starting at least 4-8 weeks prior to the plant being dug from the ground. A section of the margin of the root ball shall be cut each week during the period leading up to the plant being relocated.

4. Preparation of Planting Holes

- Planting holes shall be prepared before the plant to be relocated is dug up. As far as practicable, topsoil and subsoil shall be kept separate when preparing planting holes. The ECO shall remove from site any unsuitable material brought to the surface during excavation.
- The hole shall be at least twice the diameter of the root ball and no deeper than the height of the proposed root ball. If the depth of the hole exceeds the root ball height, compacted soil shall be added to the hole to prevent settling after transplanting. Sides of the hole shall be sloped and roughened to create an irregular surface that will facilitate root penetration.

5. Root Excavation Technique

- Before any excavation is carried out, the ECO shall thoroughly water the plants to be relocated and shall mark the proposed root ball size on the ground. In general, the root ball diameter for larger plants (trees and shrubs) should be 10 mm for every 1 mm of trunk diameter, measured at 300 mm above the ground.
- For tussock grasses and other strap leaf plants the root ball shall generally be twice the diameter of the base of the tussock.

- Spade Dug
 - Plants shall be dug from the ground using a spade. Beyond the edge of the root ball, a sharp spade shall be driven into the ground, cutting all the way around the plant. Soil taken with the plants shall extend a minimum of 100mm beyond the root ball to minimise disturbance and/or root damage. Any exposed roots shall be pruned flush with the face of the root ball using sharp secateurs or loppers, ensuring the root ball is not loosened.
 - If necessary, the root ball shall be wrapped in natural fibre (e.g., hessian) to prevent soil being lost during relocation. Once the ball is securely wrapped and tied, the plant shall be undercut. (Small plants may not need to be wrapped, especially if the soil is moist and holds together).
 - A spade shall be used to excavate roots in situations where the use of other machinery would cause undue damage to the remaining vegetation.
 - This method is most suitable for relocating individual small plants or clumps of bulbous, grass or sedge species.
- Mini Excavator/Backhoe/Skid Steer Loader Excavated
 - Plants shall be dug from the ground using a mini excavator, backhoe or skid steer loader. Soil taken with the plants shall extend a minimum of 150 mm beyond the root ball to minimise disturbance and/or root damage. Any exposed roots shall be pruned flush with the face of the root ball using sharp secateurs or loppers, ensuring the root ball is not loosened.
 - If necessary, the root ball shall be wrapped in natural fibre (e.g., hessian) to prevent soil being lost during relocation. Once the ball is securely wrapped and tied, the plant shall be undercut. (Small plants may not need to be wrapped especially if the soil is moist and holds together).
 - This root excavation method shall only be used for sites that are sparsely vegetated and where the machinery will not cause undue damage to the remaining vegetation.

6. Lifting Technique

- Plants shall be lifted from their existing location and immediately placed in the pre-prepared planting holes.
- For small plants, the root ball shall be lifted from the hole by hand or by using a sling attached to a small machine.
- Lifting of plants shall be carried out or supervised by a qualified and/or suitably experienced horticulturist and crane/machine operator.
- Appropriate lifting equipment shall be used.
- Suitable slings shall be attached around a balance point of the plant to provide a support system around the root ball. When a sling is attached to the plant, padding and protection is required to reduce possible damage. Plants shall not be lifted by the trunk alone. A qualified crane/machine operator shall determine the support system to be used.

7. Backfill

- Once the plant has been placed in the hole it shall be backfilled with site topsoil and lightly consolidated. The plant shall be set at a height such that the surface of root ball is at the same level as the surrounding soil surface.
- Only topsoil free from perennial weeds, stones, debris, clods of subsoil or other deleterious material may be used as backfill for planting. Topsoil stockpiled from the removal site also may be used as backfill.
- Where in the opinion of the Superintendent excavated material is unsuitable for backfill, imported soil shall be used. Imported soil shall be matched as closely as practicable to the existing site soil. Organic matter shall not be added to the backfill material.

8. Soil Additives

- Water Retention Agents
 - Water retention agents (*i.e.*, AquaBoost AG, Alcosorb Water Crystals) shall be applied in accordance with the manufacturer's instructions and recommended rates. The watering regime during the maintenance period shall be closely monitored to ensure over watering does not occur.

9. Initial Watering

- Immediately following planting, each plant shall be watered with a volume of clean potable water.

10. Initial Fertiliser

- Aquasol, Thrive or Maxicrop shall be applied at the manufacturer's recommended rates once per month, for 6 months.