Mulilo Struisbult Photovoltaic Energy Plant (PV2) Ecological Walkdown Report

Copperton, Northern Cape

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CLIENT

Prepared by:

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Report Name	**Mulilo Struisbult PV2 Ecological Walkdown Report**
Reference	**Mulilo Struisbult PV2 – Walkdown Report**
Submitted to/Client	EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES
Report Writer	**Michael Schrenk** 
	Michael completed his professional Civil and Environmental engineering degree at the University of the Witwatersrand in 2016. He has been working in the fields of project management, biodiversity and habitat assessment and ecological restoration for over 3 years.
Reviewer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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1 Introduction

Mulilo Prieska PV2 (Pty) Ltd were granted an Environmental Authorisation (EA) on the 2nd of January 2013 for the construction of a 100 MW photovoltaic solar energy facility (PV2) on the farm Struisbult (farm No 104 of portion 1), known as Volgelstruisbult, near Copperton in the Northern Cape province. The EA has since been amended multiple times to facilitate name changes and extensions to the period of validity of the EA such that the most recent authorisation is dated 4th of December 2020 and is granted to Struisbult PV2 (Pty) Ltd.

The Final Environmental Impact Assessment Report (EIAR) for the project was completed by Aurecon South Africa (Pty) Ltd in April 2012 (Aurecon, 2012). This report, and its associated specialist reports (particularly the Avifaunal and Botanical Impact Assessments) and the Life-cycle Environmental Management Programme (EMP), serve as key reference documents.

The Biodiversity Company was commissioned to undertake an ecological walkdown for the Mulilo Struisbult PV2 project. The authorised photovoltaic solar energy facility will cover a total area of approximately 300 ha in extent and will include the following associated project infrastructure:

- PV module arrays;
- Upgrading of existing internal farm roads and the construction of new roads to accommodate the construction vehicles and access to the site;
- Construction of a 132 kV transmission line to connect the proposed PV plant with Eskom's grid via the Cuprum substation;
- Electrical fence to prevent illegal trespassing and the possible theft of panels, and to keep livestock from roaming between the solar arrays and causing accidental damage; and
- Other infrastructure includes an office, connection centre and a guard cabin.

A requirement of the EA, and the associated EMP, is the undertaking of an ecological walkdown for the approved 100 MW PV plant area. The walkdown was undertaken from 17th January to 20th January 2022.

The purpose of the ecological walkdown was to locate and identify any sensitive ecological habitats and protected or threatened plant species, and/or fauna of conservation concern, within the development footprint areas. The presence of all listed and protected species is detailed herein, where applicable, and this information can be used to supplement the requirements of any necessary permit applications that may be required from the provincial or national authorities before construction can commence. Spatial data was provided for the walkdown which demarcated all areas of interest.

This report only presents the findings from the ecological walkdown and should be considered in conjunction with supplementary reports from other disciplines, specifically the avifaunal and botanical findings. These additional disciplines will collectively provide the demarcation of ecological constraints for the project area as a whole.

1.1 Terms of Reference

The Terms of Reference (ToR) for this assessment include the following:

- Review of existing information related to the development;
- Conduct an ecological walkdown for the planned footprint areas;
- Compilation of a report detailing the results of the walkdown:
- Detail any ecological constraints identified for the planned infrastructure;
- Present information on the presence of any Species of Conservation Concern (SCC); and
- Provide information and recommendations for the micro-siting of relevant infrastructure.
- Provide information to adequately inform any contractors, environmental officers and personnel pertaining to the ecological significance for the area.

1.2 Assumptions and Limitations

The following assumptions and limitations should be noted for the assessment:

- The project area was based on the spatial file provided by the client and any alterations to the development area presented may affect results;
- It must be noted that during the survey only a fraction of the expected geophytes were visible due to their variable emergence patterns;
- Whilst every effort is made to cover as much of the site as possible, representative sampling was completed and by its nature it is possible that some plant and animal species that are present on site were not recorded during the field investigations;
- The GPS used in the assessment had a maximum accuracy of 5 m and consequently any spatial features identified may be offset by 5 m; and
- All regional and site-specific environmental information is contained within original (submitted) documents, and this is therefore not repeated within this document. This document focuses only on the specific mandate and findings of the walkdown and its associated ecosystem evaluations.

2 Approach

2.1 Spatial Data

Project footprint and infrastructure positions were supplied by the client. A 50 m buffer width was considered for the PV solar energy plant and other key infrastructure areas and this total

area (Figure 3-1) was used as a guideline during the walkdown and ecosystem evaluation phase. GPS accuracy during the field surveys varied from 5 to 15 m.

2.2 Ecological Information and Desktop Study

Background information was sourced from previous ecological assessments, completed by Anderson (2010), Bergwind (2011), WildSkies (2011), Avisense (2012), David Hoare (2012), David Hoare (2012a), and TBC (2022). A list of protected and/or SCC plant species which are known to occur in the vicinity of the Mulilo Struisbult PV2 area as provided by Anderson (2010), David Hoare (2012a) and TBC (2022) is collated and presented in Table 2-1.

Table 2-1 Protected and SCC plant species previously recorded in the project region

Family	Taxon	Author	SANBI Red-list, 2016	Legislation
Anacampserotaceae	*Avonia albissima (Anacampseros albissima)*	(Marloth) G.D.Rowley	LC	Provincially Protected Plant, Schedule 2, NCNCA (2011)
Brassicaceae	*Boscia albitrunca*	(Burch.) Gilg & Gilg-Ben	LC	Nationally Protected Tree, Schedule A, NFA (2021)
Hyacinthaceae	*Drimia sanguinea*	(Schinz) Jessop	NT	N/A
Apocynaceae	*Hoodia officinalis* subsp. *officinalis*	(N.E.Br.) Plowes	NT	N/A

None of the past flora surveys recorded any SCC or protected plant species occurring within the project area or surrounds during the time of their respective surveys. The reports do however note restrictions and limitations experienced due to the dry conditions present during the time of the surveys.

Avisense (2012) and TBC (2022) together recorded a total of 13 avifaunal SCC species that have the potential to occur within the project area and surrounds, as presented in Table 2-2 below.

Table 2-2 SCC avifaunal species previously recorded in the project region

Scientific name	Common name	National Red-list, 2015	IUCN Red-list, 2021
Anthropoides paradiseus	Blue Crane	NT	VU
Aquila rapax	Tawny Eagle	EN	VU
Ardeotis kori	Kori Bustard	NT	NT
Calendulauda burra	Red Lark	VU	VU
Circus maurus	Black Harrier	EN	EN
Eupodotis vigorsii	Karoo Korhaan	NT	LC
Falco biarmicus	Lanner Falcon	VU	LC
Neotis ludwigii	Ludwig's Bustard	EN	EN
Phoeniconaias minor	Lesser Flamingo	NT	NT
Phoenicopterus roseus	Greater Flamingo	NT	LC
Polemaetus bellicosus	Martial Eagle	EN	EN
Sagittarius serpentarius	Secretarybird	VU	EN
Spizocorys sclateri	Sclater's Lark	NT	NT

Avisense (2012) recorded an adult Martial Eagle that was perched on the 132 kV powerline poles just outside of the development area, the presence of regularly active Martial Eagle

nests within 11 km south of the proposed development area (on tower 512 of the Hydra-Kronos 400 kV line), and within 22 km to the south-west (on tower 392 of the Aries-Kronos 400 kV line), was also noted. At least one Ludwig's Bustard collision victim has been found under a 132 kV power line in the vicinity (during 2011).

David Hoare (2012a) and TBC (2022) together recorded 2 mammal SCC species that have the potential to occur within the project area and surrounds, as presented in Table 2-3 below. No herpetofaunal (reptile and amphibian) SCC species were recorded as potentially occurring within the region.

Table 2-3 SCC mammal species previously recorded in the project region

Scientific name	Common name	National Red-list, 2016	IUCN Red-list, 2021
Cistugo seabrae	Angolan wing-gland bat	NT	LC
Felis nigripes	Black-footed Cat	VU	VU

Aurecon (2012) noted that local farmers have indicated that the Brown Hyaena (listed as NT both nationally and internationally) and Black-Footed Cat occur in the area.

3 Walkdown

The specialist ecologist traversed all sections of the planned development footprint areas searching for ecologically sensitive habitats and any SCC occurring within the project area. All notable habitat features were visited on foot and evaluated according to the potential impacts that the developments may have on the surrounding ecosystems. All road and powerline routes were also inspected and evaluated.

The project area surveyed is presented in Figure 3-1 below, along with the respective area points denoting notable features/findings. This map may be used as the location point reference when referring to the findings associated with each area, as presented and discussed in Table 3-1.

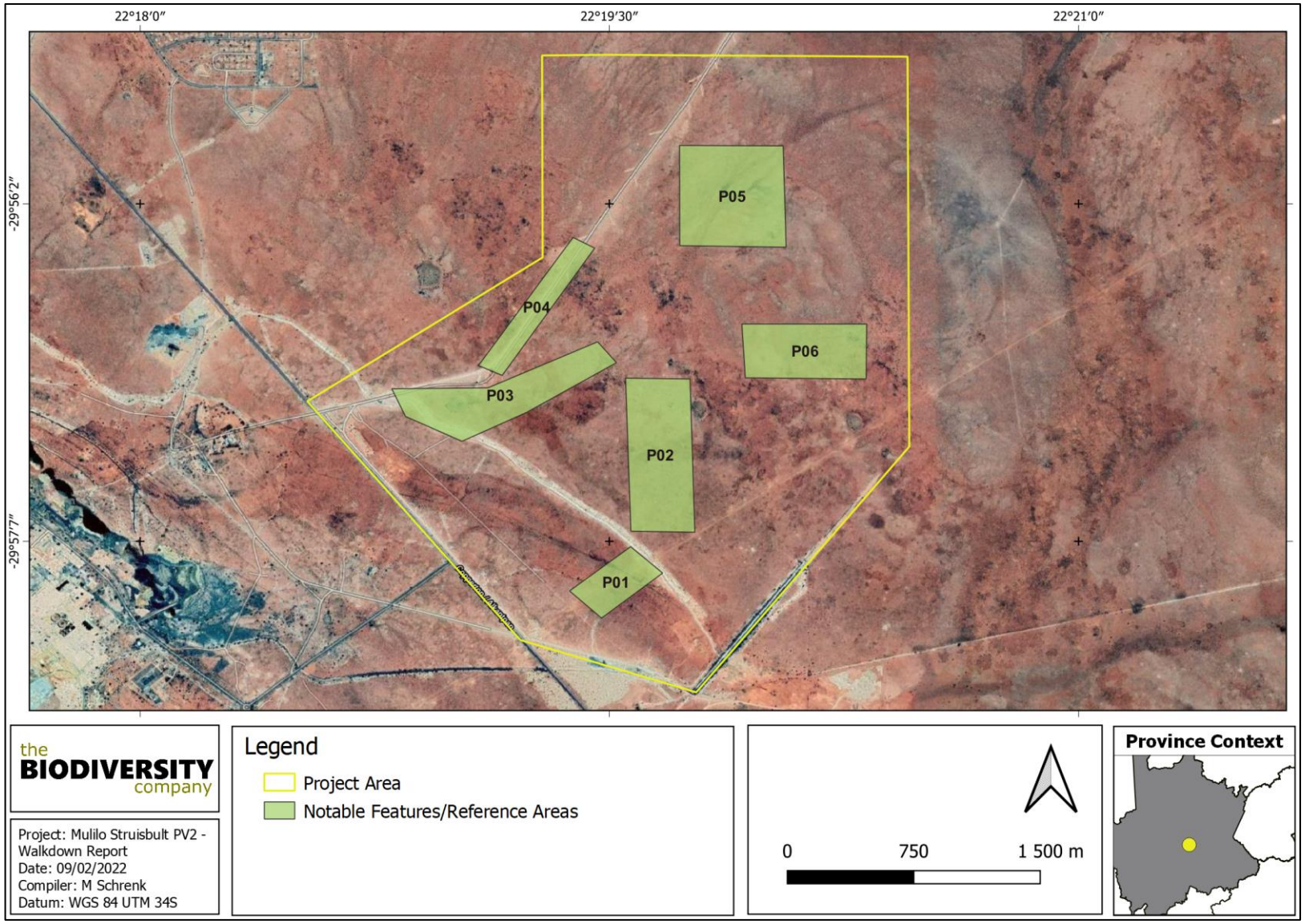

Figure 3-1 Map of the project area and all reference points of interest

Table 3-1 Summary of the location specific comments and recommendations as relevant to the project area walkdown

Reference Area	Comments and recommendations	Photographs
P01	**Findings:** Southern portions of area located over drainage line; some riparian vegetation recorded with dense grasses. Northern portions significantly disturbed through extensive clearing activities. Sapling *Prosopis glandulosa* (Honey Mesquite) trees observed, the species is a NEMBA listed Alien Invasive Plant (AIP). **Sensitivity**: Southern riparian areas classified as 'High' sensitivity; northern disturbed areas classified as 'Low' sensitivity. **Recommendations:** Avoid riparian areas due to habitat sensitivity. Remove all AIP as per AIP Management Plan (TBC, 2022a). High erosion and dust pollution potential throughout the open areas, mitigate through the appropriate rehabilitation as per the Re-vegetation and Habitat Rehabilitation Plan (TBC, 2022b).	
P02	**Findings:** No specific ecological constraints were recorded. Extensive portions of *Rhigozum trichotomum* dominated shrubland. Mature Honey Mesquite AIP observed. **Sensitivity:** Largely of a 'Medium' sensitivity, healthy populations of indigenous shrubs. **Recommendations:** Minimise habitat disturbance, rehabilitate according to Re-vegetation and Habitat Rehabilitation Plan. Remove all AIP as per AIP Management Plan. No changes to placement of infrastructure required.	

P03	**Findings:** Open water wetland depression observed, surrounded by sparse *Rhigozum trichotomum* and *Salsola tuberculata* shrubland to the north. Disturbed portions of cleared land to the south, where a large population of the red-listed *Ciconia abdimii* (Abdim's Stork) was recorded (listed as Near Threatened nationally and protected provincially). Small to large Honey Mesquite AIP trees recorded across the area. Small *Albuca* sp. observed. **Sensitivity:** 'High' sensitivity around the wetland to 'Medium' sensitivity northwards. Locally observed SSC fauna (such as the red-listed Abdim's Stork, Ludwig's Bustard, Martial Eagle) will utilise the wetland for water. **Recommendations:** Avoid sensitive wetland area. Any disturbance to the north must be followed by the appropriate rehabilitation as per the Re-vegetation and Habitat Rehabilitation Plan. Abdim's Stork populations to be avoided and must not be disturbed, any nests sighted must be immediately reported to a bird specialist. Remove all AIP as per AIP Management Plan, do not contaminate water with herbicide – remove waterborne AIP via mechanical pull-out or dig-out methods. Any *Albuca* species that will be affected by the development should be translocated as per the Plant Rescue and Protection Plan (TBC, 2022c).	
P04	**Findings:** No specific ecological constraints were recorded. Highly disturbed vegetation communities adjacent to roadways with numerous mature Honey Mesquite AIP observed. **Sensitivity:** Classified as a 'Low' sensitivity area. **Recommendations:** No changes to placement of infrastructure required. Remove all AIP as per AIP Management Plan. Recommended placement of speed bumps along these portions of roadway to minimise disturbance to foraging SCC bird species recorded in the area (as relevant to the nearby wetland depressions). High erosion and dust pollution potential, mitigate through the use of speed bumps and adequate re-vegetation as per Re-vegetation and Habitat Rehabilitation Plan.	

P05	**Findings:** No specific ecological constraints were recorded. Vast flat landscape populated by *Rhigozum trichotomum, Salsola tuberculata*, and *Pentzia incana* shrubs. Small flowering *Barleria rigida* shrublets recorded. Individual mature Honey Mesquite AIP observed. **Sensitivity:** 'Low' to 'Medium' sensitivity area due to the diversity of indigenous vegetation present across vast expanses. **Recommendations:** No changes to placement of infrastructure required. Remove all AIP as per AIP Management Plan. Disturbances should be followed by the appropriate rehabilitation as per the Re-vegetation and Habitat Rehabilitation Plan.	  
P06	**Findings:** No specific ecological constraints were recorded. Similar vegetation community to P02 and P05. Several *Ledebouria* sp. observed. **Sensitivity:** 'Low' to 'Medium' sensitivity area due to the diversity of indigenous vegetation present across vast expanses. **Recommendations:** No changes to placement of infrastructure required. Remove any AIP as per AIP Management Plan. Disturbances should be followed by the appropriate rehabilitation as per the Re-vegetation and Habitat Rehabilitation Plan. Avoid wetland depression towards the south of the area. Any *Ledebouria* sp. that will be affected by the development should be translocated in line with the Plant Rescue and Protection Plan.	  

3.1 General and Summative Observations

The following refer to the more general observations made throughout the general project area during the walkdown survey. These points also serve as both summative and notable general observations and recommendations:

- No protected plants or trees, or flora SCC, were recorded during the survey. This does not necessarily mean that none are present, and the desktop findings presented in Table 2-1 above must be noted during a pre-site clearance walkthrough by the appointed Environmental Control Officer (ECO). Any protected or SCC flora species observed must be avoided or relocated according to the Plant Rescue and Protection Plan;

- The protected and red-listed Abdim's Stork was observed in large numbers flying and resting within the project area. The species is expected to utilise the surrounding watercourses for resting and foraging habitat. Under no circumstances should this species be disturbed, and any nest sightings must be reported to a bird specialist. The Abdim's Stork is listed as Near Threatened (NT) nationally and is protected under Schedule 2 of the Northern Cape Nature Conservation Act No. 9 of 2009;

- As per the desktop findings, numerous faunal SCC are expected to occur within the project region. These species, as well as all faunal species recorded as occurring within the project area as per TBC (2022), are protected as per the Northern Cape Nature Conservation Act No. 9 of 2009. Species protected under Schedule 1 of this act may not be disturbed in any manner without the relevant permit; and

- The majority of the project area consists of common shrubland of a 'Medium' sensitivity, impacted by some extensive land clearing and AIP invasion. There are however portions of sensitive habitat within the project area that should be avoided due to their 'High' sensitivity, namely the drainage lines and wetland depressions.

3.2 Mitigation

The aim of the management outcomes outlined below is to present the mitigations in such a way that they can be incorporated into the existing Environmental Management Programme (EMPr). This should allow for a more successful implementation and auditing of the mitigations and monitoring guidelines, therefore avoiding and/or minimising all disturbances and impacts that will result from the project activities. The recommended mitigation measures are outlined in Table 3-2 below.

Table 3-2 Management objectives for the Mulilo Struisbult PV2 facility

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Sensitive area (drainage lines) must be avoided and access roads, and a no-go buffer of 20 m, must be applied around them.	Life of operation	Project manager, Environmental Officer	Development footprint	Ongoing
Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted to flat areas as far as possible. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon. All disturbed footprints to be rehabilitated and landscaped after installation is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to the project area vegetation type.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Existing servitudes, access routes, and especially roads must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to outside of the project area. No materials may not be stored within the project area, and all materials must be removed from the project area once the construction phase has been concluded. No permanent construction structures/formwork should be permitted. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. All livestock should always be kept out of the project area, especially areas that have been recently re-planted.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment to take place within the project area unless necessary. All contaminated soil/yard stone shall be treated in situ or removed and placed in containers. Appropriately contain any diesel or oil storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. Construction	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping	Ongoing

activities and vehicles could cause the spillage of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.				
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact that fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Any protected plant that may be present needs a relocation or destruction permit for any individual that may be removed or destroyed due to the development. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. All protected and red-list plants should be relocated, along with as many other geophytic species as possible (including the observed *Ledebouria* spp.). Refer to the Plant Rescue and Protection Plan in this regard.	Life of operation	Project manager, Environmental Officer	Protected Tree/Plant species	Ongoing
A pre-construction survey should be conducted in the flowering season (July-September) to ensure that a more comprehensive floral survey is compiled. For any threatened species that may not be destroyed, it is recommended that professional service providers d**eali**ng with plant search and rescue be used to remove such plants and use them either for later rehabilitation work or other conservation projects.	Planning Phase, Pre-Construction	Project manager, Environmental Officer & Contractor	Sensitive Flora Species	During Phase
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site when construction begins A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably during the wet season, and any SSC should be noted. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated. Should any large nests be observed within the project area construction should stop immediately and a qualified specialist must be contacted.	Construction Phase	Environmental Officer, Contractor	Presence of any faunal species	During phase
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments: • Signs must be put up to enforce this.	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing

The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals.	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed: • Signs must be put up to enforce this.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings, dust and erosion is limited. The speed limits should be restricted to a maximum of 30 km/h within the project area.	Life of operation	Health and Safety Officer	Compliance to the training	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons: • Driving on access roads at night should be restricted in order to reduce or prevent wildlife road mortalities which occur more frequently during this period.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day	Ongoing
Any holes/deep excavations must be dug and planted in a progressive manner and should not be left open overnight: • Should the holes remain open overnight they must be covered temporarily to ensure no small fauna species fall in.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Ensure that cables and connections are insulated successfully and adequately to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Monitoring of all overhead line routes must be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact which are to be marked with bird flappers if not already done so. Monitoring should be undertaken at least once a month for the first year of operation.	Life of project	Environmental Officer & Contractor	Monitoring of overhead line routes	Ongoing
Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency

Compilation of and implementation of an Alien Invasive Plant Management Plan for the project area.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	As per existing EMPR
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. The footprint of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests from entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the presence of faunal SCC in the area.	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation

Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces: • No non-environmentally friendly suppressants may be used as this could result in the pollution of valuable water sources.	Life of operation	Contractor	Dustfall	Dust monitoring program.

Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemical and human waste in and around the project area must be cleared and safely/appropriately stored immediately.	Construction/Operation/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility.	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste	Ongoing

Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site or stored in pits.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste	Ongoing
Refuse bins will be emptied and secured. Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days

Management outcome: Environmental awareness training				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area (watercourses) and to inform contractors and site staff of the presence of red-listed faunal species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr. The avoidance and protection of the high sensitivity areas must be included in a site induction. Contractors and employees must all undergo the induction and be made aware of the "no-go" areas to be avoided.	Life of operation	Health and Safety Officer	Compliance to the training	Ongoing

Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Speed limits of 30 km/h must be put in place to reduce erosion: • Dust generated, especially by earth moving machinery, must be minimised through wetting of the soil surface and putting up signs to enforce speed limits. Speed bumps must be built to force slow speeds; • Signs must be put up to enforce this.	Life of operation	Project manager, Environmental Officer	Erosion over and near to roads	Ongoing
Where possible, existing access routes and walking paths must be made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds. This is to be done according to the Re-vegetation and Habitat Rehabilitation Plan.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Stormwater Management plan	Before construction phase: Ongoing

4 Conclusion and Recommendations

Recommendations have been provided as per Table 3-1 and section 3.1 above for all areas that are of general or notable concern, with regards to sensitive habitat features and the presence of floral and faunal SCC and protected species. The following recommendations serve as additional points and concluding remarks:

- The mitigation measures prescribed by Aurecon (2012) and Aurecon (2012a) remain applicable for the development and must be adhered to;

- Avifaunal disturbance mitigation measures and long-term monitoring must be put in place and take action as according to Avisense (2012), specifically in line with sections 10 and 12 of the report. As per section 6.1 of Aurecon (2012a), an avifaunal specialist must be appointed to develop and undertake an avifauna monitoring programme that aligns with the requirements set in the Avisense (2012) report. This is especially critical due to the numerous SCC bird species recently and historically recorded within and nearby to the project area;

- The mitigation measures prescribed by Bergwind (2011) are now considered inadequate and must be supplemented and re-prioritised in accordance with the updated measures presented in the current report (Table 3-2);

- All watercourses and any rocky outcrops must be avoided as much as possible. Avoid fragmenting any sensitive habitats; and

- AIP removal and control, plant rescue and protection, and re-vegetation and habitat rehabilitation must all take place in accordance with the updated plans for this project as developed during February 2022.

5 References

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