



THE TERRESTRIAL ECOLOGY COMPLIANCE STATEMENT FOR THE 3.6 MWp SOLAR PV PLANT

**Boksburg, City of Ekurhuleni, Gauteng
Province**

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CLIENT



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1 Introduction

The Biodiversity Company was appointed to conduct a terrestrial biodiversity assessment for the proposed 3.6MWp Solar Photovoltaic (PV) Plant on a 3.8 ha site at the Unilever Boksburg factory. The project area is located within Boksburg, approximately 3 km west of Actonville and 1 km north of Boksburg South, Gauteng (Figure 1-1). It is located on St Dominic's Road, across the road St Dominic's Catholic School for Girls and South of Boksburg SPCA across the railway line.

A single day wet season survey was conducted in October 2021, across the whole development footprint hereafter referred to as the "project area". The survey focused on the project footprint and the areas directly adjacent to the project area. Furthermore, identification and description of any sensitive receptors were recorded across the project area, and how these sensitive receptors may be affected by the proposed development were also investigated

The approach adopted for the assessments has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 20 March 2020: "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation". The National Web based Environmental Screening Tool has characterised the plant species is assigned a "medium sensitivity" and animal species is assigned a "medium/high sensitivity". It can be downloaded at (<https://screening.environment.gov.za/screeningtool/#/pages/welcome>).

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making with regards to the proposed project.

1.1 Terms of Reference

The Terms of Reference (ToR) included the following:

- Description of the baseline receiving environment specific to the field of expertise (general surrounding area as well as site-specific environment);
- Identification and description of any sensitive receptors in terms of relevant specialist discipline (flora) that occur in the project area, and how these sensitive receptors may be affected by the activity;
- Identify 'significant' ecological, botanical features within the proposed project areas;
- Identification of conservation significant habitats around the project area which might be impacted;
- Screening to identify any critical issues (potential fatal flaws) that may result in project delays or rejection of the application;
- Provide a map to identify sensitive receptors in the project area, based on available maps and database information; and

- Provide outcomes to be included in the Management plan.

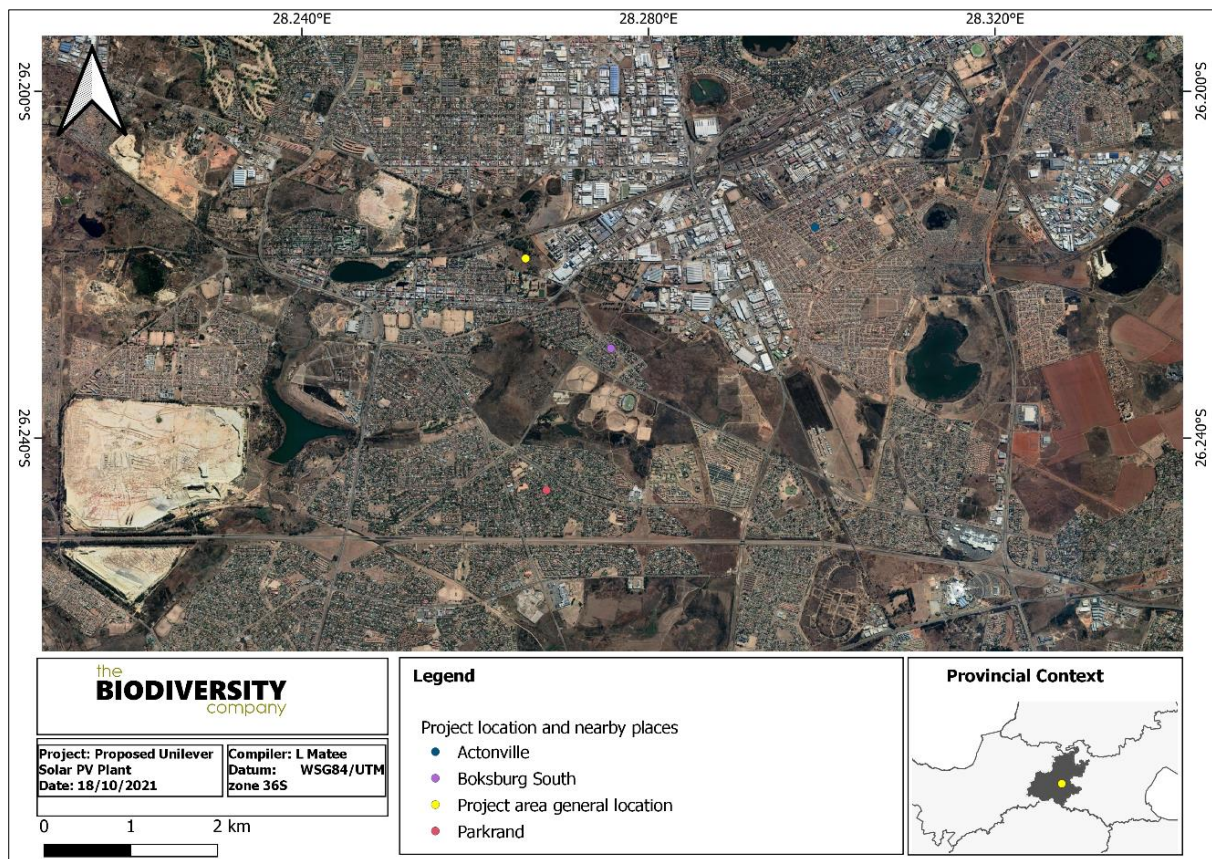





Figure 1-1 The project area

2 Specialist Details

Report Name	THE TERRESTRIAL ECOLOGY COMPLIANCE STATEMENT FOR THE 3.6 MWp SOLAR PV PLANT
Submitted to	
Report writer	<p>Lusanda Matee </p> <p>Lusanda Matee is a registered scientist (119257/2018) in the fields of Biological Science (Cand Nat.) and Ecological Science (Cand Nat.). He is a specialist terrestrial ecologist and botanist who conducts floral surveys faunal surveys which include mammals, birds, amphibians, and reptiles. He has 4 years of experience in environmental consulting. He received a Bachelor of Science, Honours, and MSc in Biological Sciences from the University of KwaZulu-Natal.</p>
Report reviewer	<p>Andrew Husted </p> <p>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.</p>
Declaration	<p>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 principles of science.</p>

3 Key Legislative Requirements

The legislation, policies and guidelines listed below apply to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (Table 3-1).

Table 3-1 A list of key legislative requirements relevant to these studies in Gauteng

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCCC, 1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 43110 (March 2020)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Environmental Management Air Quality Act (No. 39 of 2004)
National	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
Provincial	White Paper on Biodiversity
	National Water Act (NWA, 1998)
	GDARD Requirements for Biodiversity Assessments (Version 3, 2014a)
	Gauteng Department of Agriculture and Rural Development (GDARD): Checklist for Biodiversity Assessments
	GDARD Mining and Environmental Impact Guide
	Transvaal Nature Conservation Ordinance (Nature Conservation Ordinance, No 12 of 1983)

4 Methods

4.1 Desktop Assessment

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

4.1.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed development might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species, and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
 - Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
 - Ecosystem Protection Level – indicator of the extent to which ecosystems are protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
 - South Africa Protected Areas Database (SAPAD) (DEA, 2020) – The South African Protected Areas Database (SAPAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
 - National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection.

These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- The Gauteng Conservation Plan (Version 3.3) (GDARD, 2014b) classified areas within the province based on their contribution to reaching the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either 'Irreplaceable' (must be conserved), or 'Important'.
 - Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near-natural state then biodiversity targets cannot be met.
- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative, and scientifically agreed criteria; and
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.*, 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.

4.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006) was used in order to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the proposed development area and surrounding landscape. The Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

4.2 Botanical Assessment

The botanical assessment encompassed an assessment of all the vegetation units and habitat types within the project area. The focus was on an ecological assessment of habitat types as well as identification of any Red Data species within the known distribution of the project area. The South African National Biodiversity Institute (SANBI) provides an electronic database system, namely the Botanical Database of Southern Africa (BODATSA), to access distribution records on southern African plants. This is a new database that replaces the old Plants of Southern Africa (POSA) database. The POSA database provided distribution data of flora at the quarter degree square (QDS) resolution. The Red List of South African Plants website (SANBI, 2017) was utilized to provide the most current account of the national status of flora.

Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- Field Guide to the Wild Flowers of the Highveld (Van Wyk & Malan, 1997);
- A field guide to Wildflowers (Pooley, 1998);
- Guide to Grasses of Southern Africa (Van Oudtshoorn, 1999);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Mesembs of the World (Smith *et al.*, 1998);
- Medicinal Plants of South Africa (Van Wyk *et al.*, 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016); and
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish *et al.*, 2015).

Additional information regarding ecosystems, vegetation types, and Species of Conservation Concern (SCC) included the following sources:

- The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2012); and
- Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2016).

The field work methodology included the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity; and
- Identification of floral red-data species.

4.3 Floristic Analysis

A single day wet season field assessment was undertaken, and sample sites were placed within targeted areas (i.e., target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore to maximise coverage and navigate to each target site in the field to perform rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed project area.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for flora SCC were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was placed mostly on sensitive habitats overlapping with the proposed project areas.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting flora SCC and maximising floristic coverage. In addition, the method is time and cost-effective and highly suited for compiling flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff *et al.* (1982). Suitable habitats for SCC were identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes were made regarding current impacts (e.g., mining, erosion etc.), subjective recording of dominant vegetation species and any sensitive features (e.g., wetlands, outcrops etc.). In addition, opportunistic observations were made while navigating through the project area.

4.4 Limitations

The following limitations should be noted for the assessment:

- Only a single season one day survey was conducted for the respective studies, this would constitute an early wet season survey; and
- This assessment has not assessed any temporal trends for the project.

5 Results

5.1 Desktop Spatial Assessment

The following features describe the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and the SANBI. The desktop analysis and their relevance to this project are listed in Table 5-1.

Table 5-1 Desktop spatial features examined.

Desktop Information Considered	Relevant/Not relevant
Conservation Plan	Alternative 1 overlaps with an Ecological Support Area (ESA) area, whereas both alternative 2 and alternative 3 area overlap with Critical Biodiversity Area (CBA): Important and an ESA area
Terrestrial Ecosystem Threat Status	The project area falls within an ecosystem which is listed as Vulnerable (VU) ecosystem.
Terrestrial Ecosystem Protection Level	The project area falls in a "Not Protected" area.
Wetland Ecosystem Threat Status	A Critically Endangered (CR) wetland was found within the 500 m regulated area of the project area
Wetland Ecosystem Protection Level	The wetland protection level as per the National Biodiversity Assessment (NBA) shows that the wetland within the 500 m regulated area is classed as "Not Protected"
Endemic species	High numbers of endemic species are expected in the project area
Protected area	Irrelevant: No protected areas can be found in close proximity to the project area.
National Protected Areas Expansion Strategy (NPAES)	Irrelevant: The project area does not traverse any NPAES area
Biome	Located in the Grassland Biome
Gauteng Ridges	Irrelevant: The project area is more than 200m from a classified Gauteng Ridges, this is an old mine and not a true ridge
Vegetation Type	The project area occurs in the Soweto Highveld Grassland which is Endangered
Strategic Water Source Areas (SWSA)	Irrelevant: The project area does not traverse any SWSA and there is no SWSA in close proximity to the project area
City of Johannesburg wetlands	Irrelevant: Falls outside of the spatial data footprint

National Freshwater Ecosystem Priority Areas (NFEPA)	The 500 m regulated area does overlap with a Mesic Highveld Grassland Group 3 Depression
Important Bird Area (IBA) (2015)	The project area is not located within or near an IBA (within 5 km)

5.1.1 Vegetation Assessment

5.1.2 Soweto Highveld Grassland

The Soweto Highveld Grassland vegetation type is found in Mpumalanga, Gauteng and to a lesser extent in the neighbouring Free State and North-West Provinces. This vegetation type typically comprises of an undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. Scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover (Mucina & Rutherford, 2006).

5.1.2.1 Important Plant Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006). The following species are important in the Soweto Highveld Grassland.

Graminoids: *Andropogon appendiculatus*, *Brachiaria serrata*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Elionurus muticus*, *Eragrostis capensis*, *E. chloromelas*, *E. curvula*, *E. plana*, *E. planiculmis*, *E. racemosa*, *Heteropogon contortus*, *Hyparrhenia hirta*, *Setaria nigrirostris*, *S. sphacelata*, *Themeda triandra*, *Tristachya leucothrix*, *Andropogon schirensis*, *Aristida adscensionis*, *A. bipartita*, *A. congesta*, *A. junciformis* subsp. *galpinii*, *Cymbopogon caesius*, *Digitaria diagonalis*, *Diheteropogon amplexans*, *Eragrostis micrantha*, *E. superba*, *Harpachloa falx*, *Microchloa caffra*, *Paspalum dilatatum* (Mucina & Rutherford, 2006).

Herbs: *Hermannia depressa*, *Acalypha angustata*, *Berkheya setifera*, *Dicoma anomala*, *Euryops gilfillanii*, *Geigeria aspera* var. *aspera*, *Graderia subintegra*, *Haplocarpha scaposa*, *Helichrysum miconiifolium*, *H. nudifolium* var. *nudifolium*, *H. rugulosum*, *Hibiscus pusillus*, *Justicia anagalloides*, *Lippia scaberrima*, *Rhynchosia effusa*, *Schistostephium crataegifolium*, *Selago densiflora*, *Senecio coronatus*, *Vernonia oligocephala*, *Wahlenbergia undulata* (Mucina & Rutherford, 2006).

Geophytic Herbs: *Haemanthus humilis* subsp. *hirsutus*, *H. montanus*. **Herbaceous Climber:** *Rhynchosia totta* (Mucina & Rutherford, 2006).

Low Shrubs: *Anthospermum hispidulum*, *A. rigidum* subsp. *pumilum*, *Berkheya annectens*, *Felicia muricata*, *Ziziphus zeyheriana* (Mucina & Rutherford, 2006).

5.1.2.2 Conservation Status of the Vegetation Type

According to Mucina & Rutherford (2006), this vegetation type is classified as Endangered. The national target for conservation protection for both these vegetation types is 24%, but only a few patches are statutorily conserved in Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, Rolfe's Pan Nature Reserves or privately conserved in Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves, Heidelberg Natural Heritage Site.

By 2006 nearly half of the area of occupancy of this vegetation type had already been transformed by cultivation, urban sprawl, mining and building of road infrastructure. The amount of area transformed has most likely increased substantially. Some Soweto Grassland areas have been flooded by dams including Grootdraai, Leeukuil, Trichardsfontein, Vaal and Willem Brummer.

5.2 Field Assessment

The project area was found to have three primary faunal habitat units namely;

- Transformed areas;
- Degraded Grassland; and
- Freshwater habitats (Wetlands and Drainage features).

The transformed habitat unit included areas that have experienced severe anthropogenic disturbances (e.g., areas of recent and current disturbance and infrastructure development). There is rubble across the site and when one looks at the soil you can almost tell that there has been excavation and the soil used to infill the area was taken from somewhere else and is full of tar and cement. Historical aerial imagery indicates that the area was once wet and there was a dam in close proximity to the site, however, the dam is not there anymore, and the area has been completely transformed. Dominant Alien Invasive Plants (AIP) species found within the habitat subunit included *Verbena bonariensis* and *Tagetes minuta*. This Habitat subunit was located within alternative 1 and alternative 2 of the proposed PV facility areas. Small ditches appear to have been dug to impound surface stormwater run-off especially in alternative 1. This area may be levelled in required. Natural vegetation was scarce throughout the habitat unit or natural and currently has to highest level of weed infestation, including Eucalyptus trees. However, the proliferation of AIP species, such as *Eucalyptus camaldulensis*, *Verbena bonariensis*, *Datura stramonium*, *Erigeron bonariensis*, *Bidens pilosa* and *Xanthium strumarium* was evident throughout the habitat unit. Alternative 1 is almost entirely covered by Eucalyptus stand whereas alternative two is dominated by herbaceous alien and weed species.

The Grassland habitat unit is relatively geomorphically flat comprising grassland in various states of degradation. The grasses cover approximately 70-80% of the area and the forbs 5-10% (mainly alien invasive species). This habitat unit supports a moderate to moderately high species diversity with a well-developed forb and herb lay as well as occasional woody thickenings. The grassland of the study area was dry at the time of the site visit, indicating an early wet season and corresponding early growth period and flowering time for the grasses. During the field survey, no threatened plant species were observed on the proposed Solar PV alternatives, one species of conservation concern was noted within the Grassland habitat unit, namely *Hypoxis hemerocallidea* (Star flower/African potato). This species is listed as LC but is protected in Gauteng and it is thus recommended that a Search, Rescue and Relocation Plan be developed that takes into consideration SCC or a permit obtained for destruction.

The Freshwater (wetlands and drainage features) habitat unit are mainly within the alternative 1 and alternative 2 PV facility areas. This habitat unit consisted of an artificial wetland and drainage features. Refer to the wetlands and aquatic reports (add reference) for further detail on the wetlands and drainage features found on site. Species composition was similar for both wetland and the drainage features and thus it was discussed under one habitat unit. This

Habitat unit was not extensively proliferated by AIP species, although a few individuals of *Cirsium vulgare*, *Verbena* sp and *Argemone ochroleuca* were recorded.



Figure 5-1 *Habitat units recorded in the proposed project alternatives: A) Disturbed Grassland, B) Transformed area associated with the Eucalyptus stand, C) Drainage features and D) Artificial wetlands associated with alternative 1.*

5.2.1 Habitat Summary and Sensitivity

The majority of the project area was transformed/disturbed due to human influence and presence and has been assigned a low sensitivity due to the disturbed areas, whereas the disturbed grassland was assigned a medium sensitivity due to it being untransformed, although slightly disturbed.

The site for the proposed solar PV facility is identified in the screening tool report as having a medium plant species sensitivity for all three options, however after the field assessment this was disputed except for alternative 1 which was found to be of medium sensitivity. This is due to it being untransformed, although slightly degraded and the numerous colonies of African Potato (*Hypoxis hemerocallidea*) (LC but protected in Gauteng according to Gauteng Department of Agriculture and Rural Development (GDARD)) that were found throughout the site. This species is provincially important and should be rescued and relocated to similar habitat within the study area if it is to be disturbed.

The vegetation and ecology within alternative 1 and alternative 2 proposed infrastructure areas have been heavily disturbed for a long time, both currently and historically. No significant patches of intact natural vegetation remain and terrestrial botanical diversity within both sites is very low.

Alternative one (1) is almost entirely made up of transformed habitat dominated by a stand of *Eucalyptus* (gum trees). All ecological processes on this site have been significantly impacted by, illegal dumping, clearing of vegetation, AIPs and weed invasion and habitat fragmentation due to excavations that are all over the site.

Alternative two (2) is also transformed and is dominated by pioneer weedy plant and alien invasive species invasive and weed species such as *Arundo donax*, *Erigeron bonariensis*, *Tagetes minuta*, *Verbena bonariensis*, *Verbena brasiliensis*, *Xanthium strumarium* and *Datura stramonium*.

The site for the proposed Solar PV facility for all three alternatives is identified in the screening tool report as having a medium-high animal species sensitivity. The high sensitivity according to the screening tool is that *Tyto capensis* (African Grass-Owl). occurs in the area. In the actual site it is unlikely that this species occurs as there is no suitable habitat. Typically, Grass-Owls require longer (knee-high plus), and denser areas of grass or sedges and long-term roosts or nests take the form of well-established tunnels that the birds create by bending over the tops of the grasses/sedges so that the tunnel is invisible from above, as such the study area is not considered to have suitable breeding habitat for Grass-Owls. It must be however noted that they may occur outside of the project area in areas that are in close proximity to the project area.

According to the screening tool report medium sensitivity is due to the presence of sensitive species such as *Chrysospalax villosus* (Rough-haired Golden Mole) *Crocidura maquassiensis* (Maquassie Musk Shrew) (VU), *Hydrichtis maculicollis* (Spotted-necked Otter) (Near Threatened (NT)), *Aloeides dentatis dentatis* (Endangered (EN) (SABCA 2013)), *Lepidochrysops procera* (Least Concern (LC) (SABCA 2013)), and *Clonia uvarovi*. No animal species, except for yellow mongoose (*Cynictis penicillata*) and free roaming domestic dogs were observed on site. The presence of the domestic dogs likely prohibits the habitation of other wildlife within the area. As a result of the above, the medium animal species sensitivity is disputed, and the site has been identified as having a low animal species sensitivity.

Although no sensitive avifaunal and faunal species were found in the project area it is still likely that such species could occur nearby or access/forage in the project area. It is thus important that the management outcomes be adhered to mitigate an impact that might stem from the development (Figure 5-5).

Table 5-2 Summary of habitat types delineated within field assessment area of the project area

Habitat (Area)	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Low	Low	Low	Medium	Low
Degraded Grassland	Medium	High	Medium	Medium	Medium
Wetlands and Drainage features	Low	Low	Low	Medium	Low

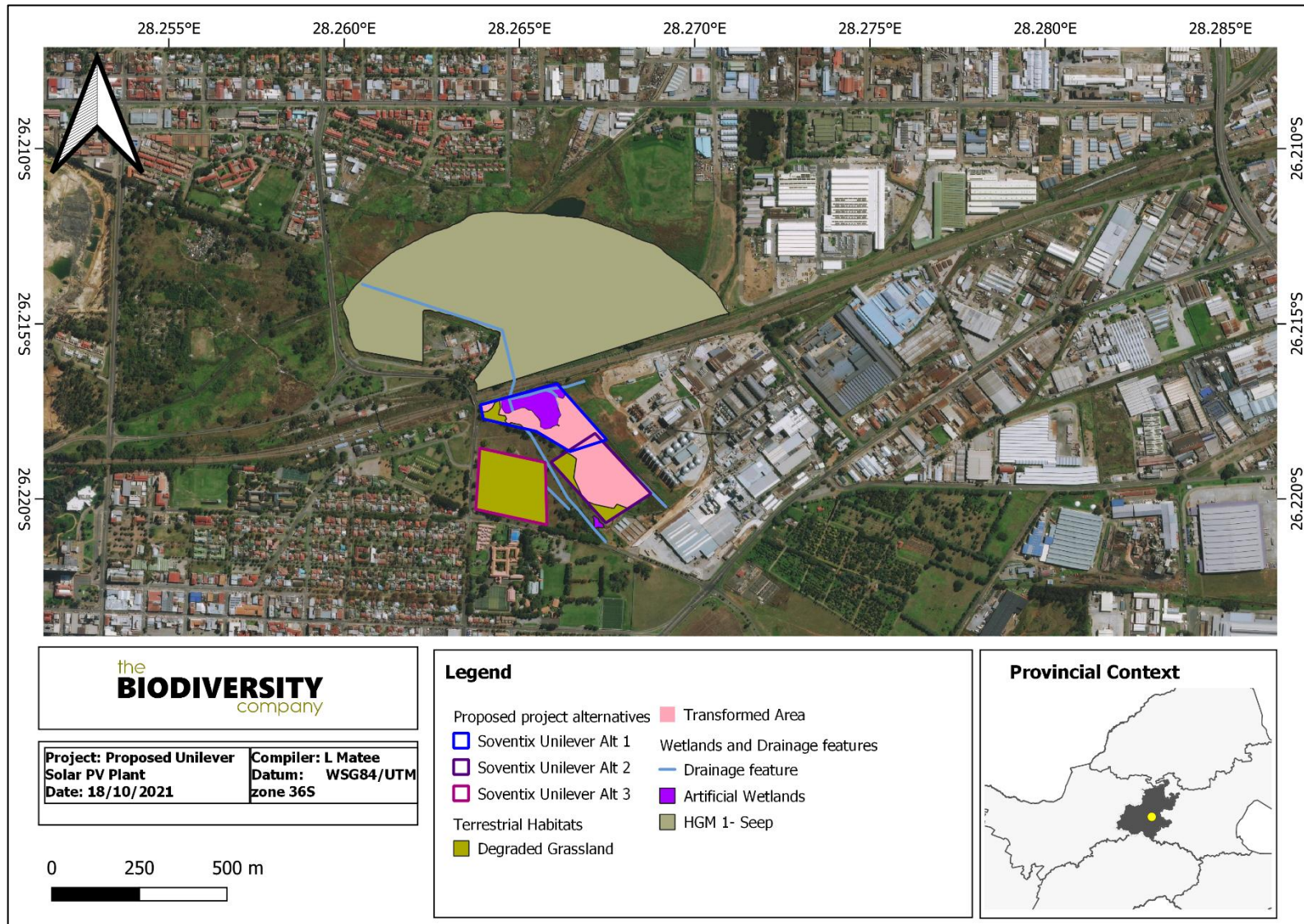


Figure 5-2 The habitat units identified in the project area

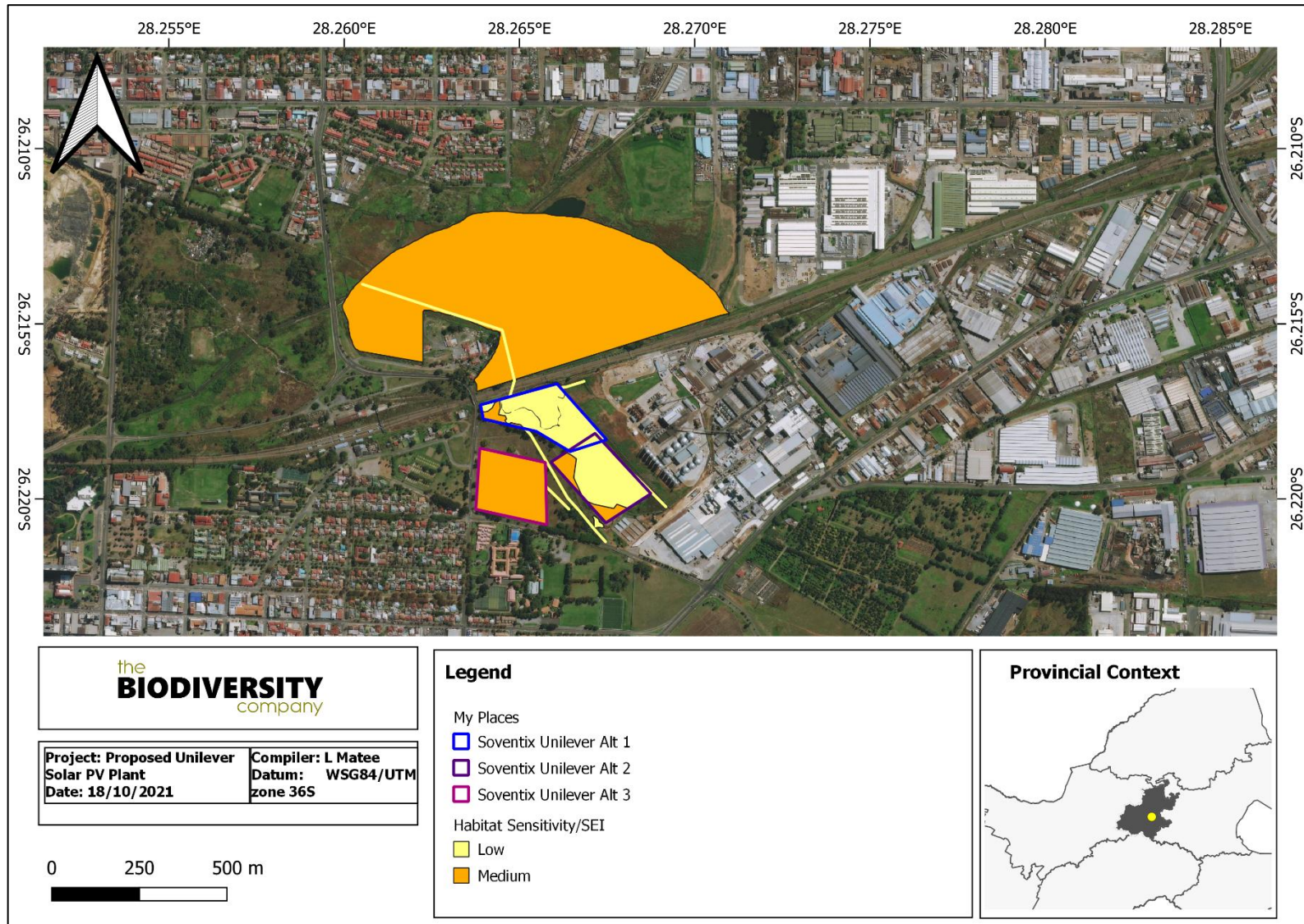


Figure 5-3 The sensitivity of the project area

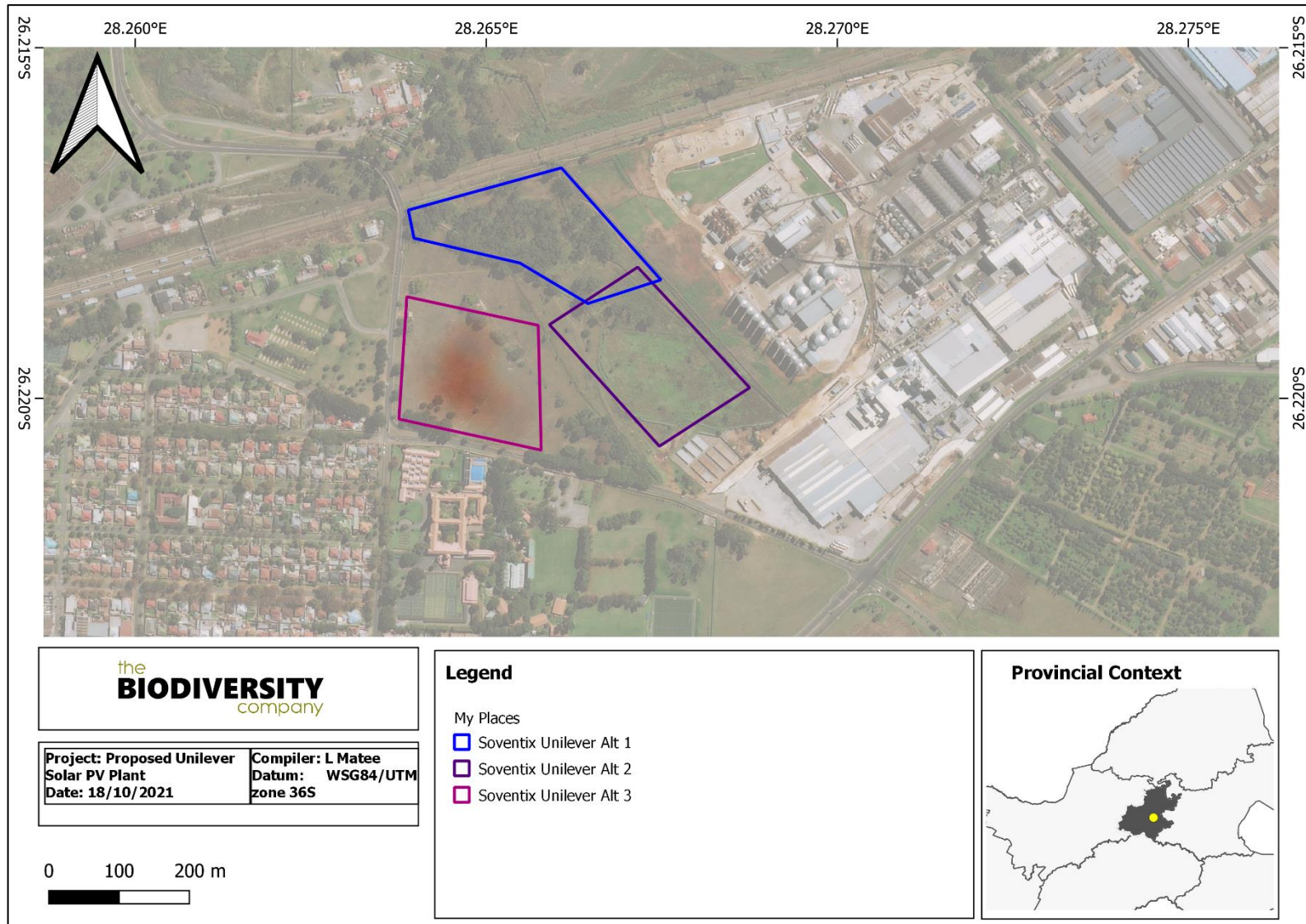


Figure 5-4 Heat map illustrating the relative location of African Potato (*Hypoxis hemerocallidea*) (LC but protected in Gauteng according to Gauteng Department of Agriculture and Rural Development (GDARD))

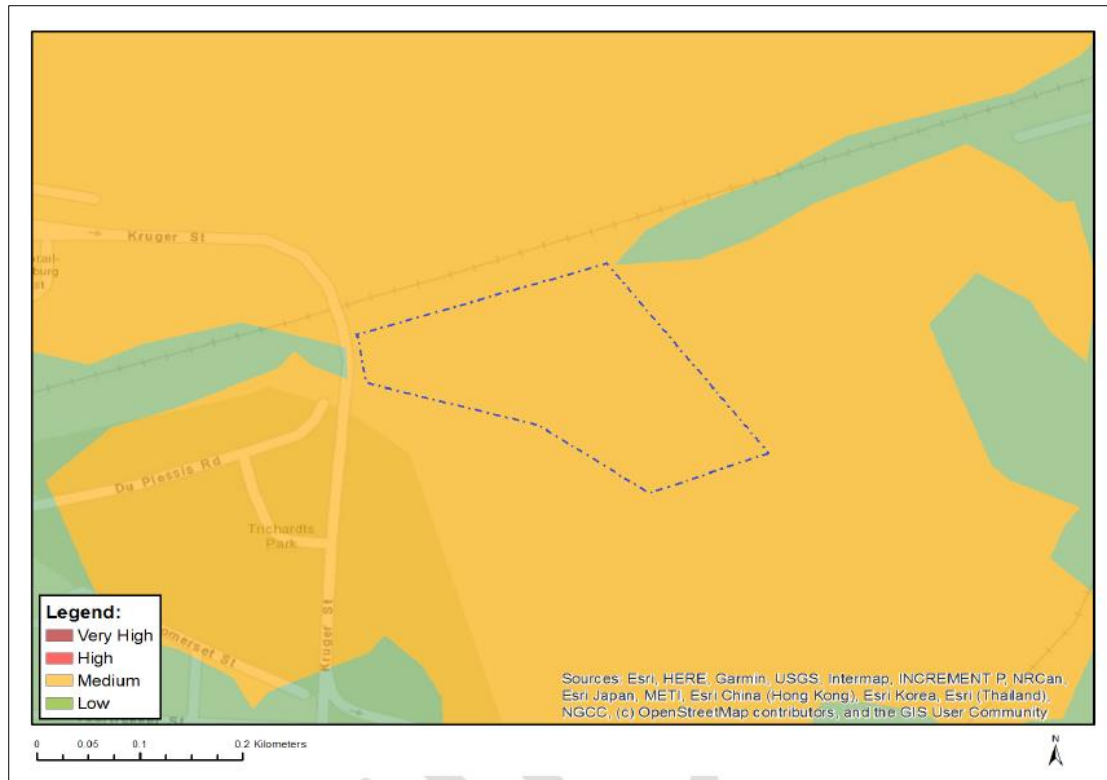


Figure 5-5 Map depicting relative plant theme sensitivity of the proposed Solar PV plant sites (National Environmental Screening Tool, 2021).

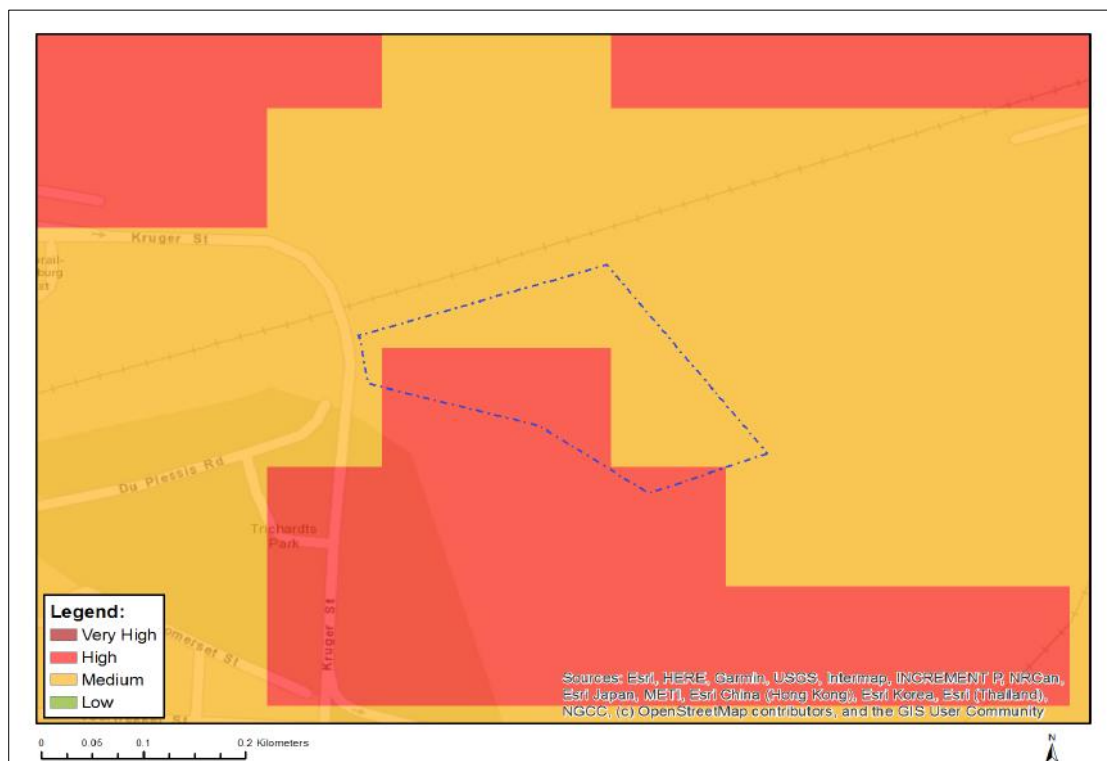


Figure 5-6 Map depicting relative animal theme sensitivity of the proposed Solar PV plant sites (National Environmental Screening Tool, 2021).

6 Proposed Impact Management Outcomes

The area has been altered from its original state, however, it can still affect species in the surrounding area by means of erosion, dust, fire, alien vegetation introduction and proliferation, poor waste management resulting in increase in pest numbers, as well as chemical spills therefore the following generic management outcomes were suggested and should be included into the Environmental Management Programme (EMPr) (Table 6-1).

Proposed Unilever Solar PV Plant

Table 6-1 Impact Management Outcomes

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Watercourses, drainage lines, streams, and wetlands outside of the project area must be avoided.	Life of operation	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Where possible, existing access routes and walking paths 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 low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. 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.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Operational and Decommissioning phase	Environmental Officer & Contractor	Woody material around footprint	During Phase
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 on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
A carefully considered surface water/drainage management plan must be developed for the site including attention to the use of environmentally friendly cleaning chemicals for cleaning of panels during the operational phase	Life of operation	Environmental Officer & Design Engineer	Water Quality and presence of erosion	Ongoing
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	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing

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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.				
A fire management plan needs to be complied with and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Rocks removed in the construction phase may not be dumped, but can be used in areas where erosion control needs to be performed	Operational phase	Environmental Officer & Contractor	Rock piles	During Phase
Any individual of the protected plants that were observed needs a relocation or destruction permit for any individual that may be removed or destroyed due to the development. Preferably, the trees/plants can be relocated within the property without a permit or otherwise left unharmed. Hi-visibility flags must be placed near any protected plants to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species need to be part of the environmental awareness program.	Life of operation	Project manager, Environmental Officer Lodge Manager	Protected Tree/Plant species	Ongoing
The Solar panel surfaces may not have reflective surfaces which can lead to veld fires	Operational phase	Environmental Officer & Contractor	Fire Management	During Phase

Management outcome: Fauna

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
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
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
Try incorporating motion detection lights as much as possible to reduce the duration of illumination. Heights of light columns to be minimised to reduce light spill. Baffles, hoods, or louvres to also be used to reduce light spill	Construction Phase	Environmental Officer & Design Engineer	Light pollution	Ongoing
Facility lighting during construction & operation should be kept to a minimum and should make use of the latest technology to ensure that light disturbance is minimised. This will also reduce the attraction of insects (and in turn insectivorous birds) to the facility	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	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 vapour lighting should be avoided, and sodium vapour (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply	Life of operation	Health and Safety Officer	Compliance with the training.	Ongoing

with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.				
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in this case.	Ongoing
All areas to be developed must be walked through before any activity to ensure no nests or fauna species are found in the area. Should any SCC not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Construction and Operational phase	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Rehabilitation
Any holes/deep excavations must be dug and planted progressively. Should the holes 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 to reduce electrocution risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Wildlife-permeable fencing with holes large enough for mongooses and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area	Planning and construction	Environmental Officer & Contractor, Engineer	Fauna movement corridor	Ongoing
Use environmentally friendly cleaning and dust suppressant products	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Fencing mitigations: <ul style="list-style-type: none"> The top 2 strands must be smooth wire Routinely retention loose wires Minimum 30cm between wires Place markers on fences	Planning, construction, and operation	Environmental Officer & Contractor, Engineer	Monitor fences for slack wires	Ongoing
Any exposed parts must be covered (insulated) to reduce electrocution risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing

Management outcome: Alien species

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
The footprint area of the construction should be kept to a minimum. The footprint area must be 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
An alien management plan must be implemented quarterly for 2 years after phase	Construction phase and Decommissioning phase	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Quarterly for 2 years after phase

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. <ul style="list-style-type: none"> No non environmentally friendly suppressants may be used as this could result in pollution of 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, chemicals, and human waste in and around the project area.	Construction/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	The 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 concerning waste management. Under no circumstances may domestic waste be burned on site	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. The 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 to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr. The avoidance and protection of the wetland areas must be included in a site induction.	Life of operation	Health and Safety Officer	Compliance with the training.	Ongoing

Contractors and employees must all undergo the induction and be made aware of the "no-go" to be avoided.				
Management outcome: Erosion				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Speed limits must be put in place to reduce erosion. <ul style="list-style-type: none"> Reducing the dust generated by the listed activities above, especially the earthmoving machinery, through wetting the soil surface and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds. Signs must be put up to enforce this. 	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	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.	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	Management plan	Before construction phase: Ongoing

7 Conclusion

The high terrestrial / biodiversity theme species sensitivity is disputed. Although the development will impact on areas classified as ESAs, CBAs and a VU ecosystem, the value of the site is not considered exceptional and the location and context of the site, suggest that these impacts are likely to be acceptable and would not significantly restrict future conservation expansion in the Gauteng.

Although the Gauteng C-Plan indicates that alternative 2 and alternative 3 areas overlap with CBA: Important, the field assessment suggests that these areas are not likely to be of high significance for broad-scale ecological processes and as the site is relatively small and already almost surrounded by other approved developments, it is not likely to be viewed as a current priority for formal conservation expansion or any other form of conservation.

It is the opinion of the ecologist that alternative 3 or alternative 2 be considered for infrastructure placement, however, although alternative 1 is the most transformed and degraded, from an avifaunal perspective it presents some issues regarding the (closest) proximity to the seepage wetland. Collisions are thought to arise when birds (particularly waterbirds) mistake the panels for waterbodies, known as the “lake effect” (Lovich & Ennen, 2011), or when migrating or dispersing birds become disorientated by the polarised light reflected by the panels. This “lake-effect” hypothesis has not been substantiated or refuted to date (Visser *et al.*, 2019).

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9 Appendices

Appendix A Specialist declarations

DECLARATION

I, Lusanda Matee, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations, and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Lusanda Matee

Terrestrial Ecologist

The Biodiversity Company

October 2021

DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

Terrestrial Ecologist

The Biodiversity Company

October 2021

Lusanda Patrick Matee

M.Sc Biological Sciences (*Cand Sci Nat*)

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Email: lusanda@thebiodiversitycompany.com

Identity Number: 8909175526080

Date of birth: 17 September 1989



Education

2012: BSc. Biological Sciences University of KwaZulu-Natal

Research Project: "Mapping the distribution of selected Southern African bat species"

2013: BSc. (Honours) Biological Sciences (Zoology) University of KwaZulu-Natal

Research Project: "Sleeping patterns in selected South African avian species: Ring-necked Parakeets (*Psittacula krameri*), and Red-winged Starling (*Onychognathus morio*)"

2016: MSc by Research Biological Sciences University of KwaZulu-Natal

Research Project: "Lichen photobiology in relation to climate change: Protection in Peltigeralean lichens against excess ultraviolet (UV) radiation using induced melanins and the effects of UV on melanin synthesizing enzymes"

Master of Science (Masters by Research in Biological Sciences (Botany) SANCOOP Project, collaboration with Norwegian University of Life Sciences Department of Ecology and Natural Resource Management

Other relevant courses and training

Advanced grassland identification

Riparian Vegetation Response Assessment Index in River EcoClassification (VEGRAI)

First Aid Level 1

Language Skills

English: 1st Language

isiXhosa: Home language

isiNdebele: Conversational and written command

isiZulu: Conversational and written command

Employment

May 2021- Present: Technical Specialist Subcontractor: Terrestrial Biodiversity (Fauna and Flora), The Biodiversity Company (TBC)

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February 2021- May 2021: Freelance Terrestrial Biodiversity (Fauna and Flora) Specialist

September 2020- January 2021: Technical Specialist (Consultant VI): Terrestrial Biodiversity (Fauna and Flora), Digby Wells

November 2017-September 2020: Assistant Ecologist (Consultant), Digby Wells

June 2017- November 2017: Digby Wells Environmental Biophysical Intern (Ecology intern: Fauna and Flora), Digby Wells

2011-2016: Laboratory demonstrator & Teaching Assistant, University of KwaZulu-Natal

2012-2013: DNA Bar-coding Research Intern, South African National Biodiversity Institute (SANBI)

Professional bodies and memberships

South African Council for Natural Scientific Professions, *Cand Natural Scientist in the field of practice Biological Sciences and Ecological Sciences*, the registration number is 119257 (Pending upgrade)

Golden Key International Honour Society, member ID number is 14254770.

Zoological Society of Southern Africa

South African Association of Botany (SAAB)

Publications

Matee, L. P., Beckett, R. P., Solhaug, K. A., & Minibayeva, F. V. (2016). Characterization and role of Tyrosinases in the lichen *Lobaria Pulmonaria* (L.) Hoffm. *The Lichenologist*, 48(4), 311-322.

Selected Project Experience

Year	Client	Project	Responsibility	Location
2017	Sibanye Gold	Long-Term Rehabilitation and Closure Strategy for the Cooke Operations	Update of Rehab and Closure Plan	South Africa
2017	Mutsho Power Company (Pty) Ltd	Proposed Mutsho Power Project Wetland Baseline Scoping Report	Wetland Scoping Report Compilation	South Africa
2017	Randgold Resources	Kibali BLMP Audit	Assisting with Report Compilation	DRC
2017	Randgold Resources	Environmental and Social Impact Assessment for the Massawa and Sofia Gold Project, Senegal	Assisting with the Baseline Report Compilation	Senegal
2017	Exxaro	Exxaro Grootegeluk Coal Mine Exploration Drilling Sites Protected Tree Assessment	Protected Tree Infield Assessment	South Africa
2018	Exxaro	Alien Invasive Vegetation Assessment and Management Plan for the Matla Colliery	Alien Invasive Vegetation Infield Assessment and Compilation of Management Plan	South Africa
2018	Sasol Mining	Alien Invasive Vegetation Assessment and Management Plan for the Sigma: Mooikraal Colliery	Alien Invasive Vegetation Infield Assessment and Compilation of Management Plan	South Africa
2018	Anker Coal and Mineral Holdings SA (Pty) Ltd.	Alien Invasive Vegetation Assessment and Management Plan for the Elandsfontein Colliery	Alien Invasive Vegetation Infield Assessment and Compilation of Management Plan	South Africa
2018	Total East Africa Midstream B. V	Social & Resettlement Services for East Africa Crude Oil Pipeline (Eacop) Project – Tanzania Section Phase 2	Database Manager	Tanzania
2018	Sasol Mining	Sasol Sigma Defunct Colliery Surface Mitigation Project: Proposed River Diversion and Flood Protection Berms	Fauna & Flora Specialist Study	South Africa
2018	Senorian 4th Investments (Pty) Ltd	Habitat Assessment for Roan Antelope	Flora specialist	South Africa
2019	Anglo American Coal South Africa (hereafter AACSA)	Vegetation assessment as part of a Land capability study	Flora specialist	South Africa
2019	Guard Risk	Technical review of financial provisions for closure (united Manganese of Kalahari)	Technical reviewer	South Africa
2019	PPC Ltd	Financial Provisions for closure update 2019	Calculated FP Estimates	South Africa

2019	Dagsoom Coal Mining (Pty) Ltd	Baseline Input in Support of Environmental Application Process for the Proposed Twyfelaar Coal Mining Project, Mpumalanga Province	Fauna & Flora Specialist Study	South Africa
2020	Debswana	Environmental Impact Assessment for the Jwaneng Post Cut 9 Underground Mine Project	Fauna & Flora Specialist	Botswana
2020	Debswana	Alien Invasive Vegetation Assessment and Management Plan for Debswana's (OLDM) Orapa Letlhakane and Damtshaa Mines	Alien Invasive Vegetation Infield Assessment and Compilation of Management Plan	Botswana
2020	MDT Environmental	Protected Flora Assessment for Exxaro Coal's (Exxaro) No. 3 pump station (existing) to Marapong's Potable Water Reservoir (existing)	Flora Specialist	South Africa
2020	Oklo Resources Limited	Baseline Fauna and Flora Assessment for the Dandoko Gold Exploration Project	Fauna & Flora Specialist	Mali
2020	Sasol Mining	Implementation of the Leeuspruit Risk Mitigation Measures Monitoring Plan and Sigma Environmental Secondment	Alien Invasive Vegetation Infield Assessment and Compilation of Management Plan	South Africa
2021	GreenScene	Vegetation assessment in support of the environmental authorisation process and to inform the development area for Ptn 4 of 14 Marburg	Flora Specialist and Compilation of Report	South Africa
2021	Isolendalo Enviro Consulting	Vegetation assessment in support of the environmental authorisation process and to inform the development area for Erf 1251 Shelley Beach	Flora Specialist and Compilation of Report	South Africa
2021	Velezinhle Consulting and Projects	Terrestrial & Freshwater Ecology Assessment Report for the Proposed Umuziwabantu Sport Field Project	Fauna & Flora Specialist and Compilation of Report	South Africa
2021	Basia Environmental	The Terrestrial Biodiversity Assessment for The Proposed in Die Kom 345JQ and Spruitfontein 341JQ Mining Permit Applications	Fauna & Flora Specialist and Compilation of Report	South Africa
2021	EnviroPro	Barberton Mine Wetland and Terrestrial Baseline and Impact Assessment for proposed Solar PV	Fauna & Flora Specialist and Compilation of Report	South Africa

2021	WSP	Mortimer Smelter Contractor Laydown Area Vegetation Assessment	Flora Specialist and Compilation of Report	South Africa
2021	WSP	Two Rivers Platinum Mine Pipeline rerouting Terrestrial Biodiversity Assessment	Fauna & Flora Specialist and Compilation of Report	South Africa

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Date of birth: 19 April 1979



Profile Summary

Working experience throughout South Africa, West and Central Africa and also Armenia.

Specialist experience with on-shore drilling, mining, engineering, hydropower and renewable energy.

Experience with project management of national and international multi-disciplinary projects. Including managing and compiling ESHIAs and EMPs

Specialist guidance, support and facilitation for the compliance with legislative processes, for in-country requirements, and international lenders.

Specialist expertise include Instream Flow and Ecological Water Requirements, aquatic

Key Experience

- Familiar with World Bank, Equator Principles and the International Finance Corporation requirements
- Environmental, Social and Health Impact Assessments (ESHIA)
- Environmental Management Programmes (EMP)
- Ecological Water Requirement determination experience
- Wetland delineations and ecological assessments
- Terrestrial Ecological Assessments
- Aquatic Ecological Assessments
- Rehabilitation Plans and Monitoring
- Aquaculture

Country Experience

Botswana, Cameroon
Democratic Republic of Congo
Ghana, Ivory Coast, Lesotho
Liberia, Mali, Mozambique
Nigeria, Republic of Armenia, Senegal
Sierra Leone, South Africa

Nationality

South African

Languages

English – Proficient
Afrikaans – Conversational
German - Basic

Qualifications

- MSc (University of Johannesburg) – Aquatic Health.
- BSc Honours (Rand Afrikaans University) – Aquatic Health
- BSc Natural Science
- Pr Sci Nat (400213/11)
- Certificate of Competence: Mondi Wetland Assessments
- Certificate of Competence: Wetland WET-Management
- SASS 5 (Expired) – Department of Water Affairs and Forestry for the River Health Programme
- EcoStatus application for rivers and streams

ecology and wetlands Swaziland, Tanzania resources.

Areas of Interest

Mining, Oil & Gas, Renewable Energy & Bulk Services Infrastructure Development, Sustainability and Conservation.

Publication of scientific journals and articles.

SELECTED PROJECT EXPERIENCE**Project Name: The Environmental and Social Impact Assessment (ESIA) the proposed Nondvo Dam**

Client: WSP

Personal position / role on project: Project Manager.

Location: Swaziland

Main project features: To conduct a dual season terrestrial and aquatic ecological baseline and impact assessment for the proposed dam. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: The environmental flow assessment for the Mara River system

Client: IHE Delft Institute for Water Education

Personal position / role on project: Project Manager / Freshwater Ecologist

Location: Tanzania

Main project features: To conduct a dual season campaign to the Lower Mara River Basin in Tanzania to collect hydrological and ecological information as part of an environmental flow assessment on the Tanzanian side of the Mara River in collaboration with GIZ and NBI-NELSAP.

Project Name: The Environmental and Social Impact Assessment (ESIA) the proposed solar photovoltaic facility and transmission in Cuamba

Client: WSP

Personal position / role on project: Project Manager.

Location: Mozambique

Main project features: To conduct a single season terrestrial and aquatic ecological baseline and impact assessment for the proposed dam. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: A biodiversity baseline assessment for the proposed Siguiri Gold Mine Project, in Kankan Province, Guinea.

Client: SRK Consulting.

Personal position / role on project: Project Manager.

Location: Siguiri, Guinea, West-Africa (2018).

Main project features: To conduct a dual season ecological baseline assessment for the expected impact footprint area. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: A biodiversity baseline and impact assessment for the proposed Lesotho Bulk Water Supply Scheme, Lesotho.

Client: WSP.

Personal position / role on project: Wetland & Aquatic Ecologist, PROBFLO and Project Manager.

Location: Mohale's Hoek, Lesotho (2018).

Main project features: To conduct a dual season terrestrial and aquatic ecological baseline and impact assessment for the pipeline route and proposed weir. The study was required to meet national and IFC requirements, including a Critical Habitat assessment. The study also contributed to prescribing Instream Flow Requirements using PROBFLO for the system.

Project Name: A biodiversity baseline and impact assessment for the proposed Pavua Hydropower Project, in Sofala Province, Central Mozambique.

Client: Mott MacDonald.

Personal position / role on project: Project Manager.

Location: Sofala Province, Mozambique (2017).

Main project features: To conduct a dual season terrestrial and aquatic ecological baseline and impact assessment for the expected impact footprint area, including Gorongosa National. The study was required to meet national and IFC requirements, including a Critical Habitat assessment. The study also contributed to prescribing Instream Flow Requirements for the system.

EMPLOYMENT EXPERIENCE

CURRENT EMPLOYMENT: The Biodiversity Company (January 2015 – Present)

I founded The Biodiversity Company in 2015, now consisting of experienced ecologists who provide technical expertise and policy advice to numerous sectors, such as mining, agriculture, construction and natural resources. The team at The Biodiversity Company have conducted stand-alone specialist studies, and provided overall guidance of studies with a pragmatic approach for the management of biodiversity that takes into account all the relevant stakeholders, most importantly the environment that is potentially affected. We manage risks to the environment to reduce impacts with practical, relevant and measurable methods.

EMPLOYMENT: Digby Wells Environmental (October 2013 – December 2014)

Digby Wells assigned me to the role of Country Manager for the United Kingdom. This was a new endeavour for the company as the company's global footprint continues to increase. The primary responsibilities for the role included the following:

- **Client liaison** to be able to interact more efficiently and personally with current mining clients, mining industry service providers, legal firms and banking institutions in order to introduce Digby Wells as a services provider with the aim of securing work.
- **Project management** for international projects which may require a presence in the United Kingdom, this was dependent on the location and needs of the client. These projects would

mostly be based on the Equator Principles (EP) and International Finance Corporation (IFC) Performance Standards.

- **Technical input** to provide specialist technical expertise for projects, this included fauna, aquatic ecology, wetlands and rehabilitation. Continued with the design and implementation of Biodiversity and Land Management Plans to assist clients with managing the natural resources. Responsibilities also included the mentorship and management (including reviewing and guiding) other expertise such as flora, fauna and pedology.

EMPLOYMENT: Digby Wells Environmental (March 2012 – September 2013)

Manager of a multi-disciplinary department of scientists providing specialist services in support of national and international requirements as well as best practice guidelines, primarily focussing on the mining sector. In addition to managing the department, I was also expected to contribute specialist services, most notably focusing on water resources. Further responsibilities also included the management of numerous projects on a national or international scale. A general overview of the required responsibilities are as follows:

- **Project management** for single as well as multi-disciplinary studies on a national and international scale. This included legislation and commitments for the respective country being operated in, as well as included the World Bank (WB), EP and IFC requirements.
- **Individual and/or team management** in order to provide mentoring and supportive structures for development and growth in support of the company's strategic objectives.
- **Scientific report writing** to ensure that the relevant standards and requirements have been attained, namely local country legislation, as well as WB, EP and IFC requirements.
- **Report reviewing** in order to ensure compliance and consideration of relevant legislation and guidelines and also quality control.
- **Specialist management** to facilitate the collaboration and integration of specialist skills for the respective projects. This also included the development of Biodiversity and Land Management Plan for clients.
- **Client Resource Manager** for numerous clients in order to establish as well as maintain working relationships.

An overview of the tenure working with the company is provided below:

- **October 2013 – December 2014: London Operations Manager** – Deployed to establish a presence for the company (remote office) in the United Kingdom by means of generating project work to support the employment of staff and operation of a business structure.
- **March 2012 – September 2013: Biophysical Department Manager** – Responsible for the development and growth of the department to consist of four specialist units. This included the development of a new specialist unit, namely Rehabilitation.
- **January 2011 - February 2012: Ecological unit Manager** – In addition to implementing aquatic and wetland specialist services, the role required the overall management of additional specialist services which included fauna & flora.
- **June 2010 - December 2010: Aquatic Services Manager** – This required the marketing and implementation of specialist programmes for the client base such as biomonitoring and wetland off-set strategies. In addition to this, this also included expanding on the existing skill set to include services such as toxicity, bioaccumulation and ecological flow assessments.
- **August 2008: Aquatic ecologist** – Employed as a specialist to establish the aquatic services within the company. In addition to this, wetland specialist services were added to the existing portfolio.

PREVIOUS EMPLOYMENT: Econ@UJ (University of Johannesburg)

- June 2007 – July 2008: Junior aquatic ecologist
 - Researcher

- Technical assistant for fieldwork
- Reporting writing
- Project management

ADDITIONAL EXPERIENCE

<i>Compliance audits</i>	Conducting site investigations in order to determine the level of compliance attained, ensuring that the client maintains an appropriate measure of compliance with environmental regulations by means of a legislative approach
<i>Control officer</i>	Acting as an independent Environmental Control Officer (ECO), acting as a quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts
<i>Screening studies</i>	Project investigations in order to determine the level of complexity for the environmental and social studies required for a project. This is a form of risk assessment to guide the advancement of the project.
<i>Public consultation</i>	The provision of specialist input in order to communicate project findings as well as assist with providing feedback if and when required.
<i>Water use licenses</i>	Consultation with the relevant authorities in order to establish the project requirements, as well as provide specialist (aquatics/wetland) input for the application in order to achieve authorisation.
<i>Closure</i>	Primarily the review of closure projects, with emphasis on the closure cost calculations. Support was also provided by assisting with the measurements of structures during fieldwork.
<i>Visual</i>	The review of visual studies as well as the collation of field data to be considered for the visual interpretation for the project.

ACADEMIC QUALIFICATIONS

University of Johannesburg, Johannesburg, South Africa (2009): MAGISTER SCIENTIAE (MSc)
- Aquatic Health:

Title: *Aspects of the biology of the Bushveld Smallscale Yellowfish (Labeobarbus polylepis): Feeding biology and metal bioaccumulation in five populations.*

Rand Afrikaans University (RAU), Johannesburg, South Africa (2004): BACCALAUREUS SCIENTIAE CUM HONORIBUS (Hons) – Zoology

Rand Afrikaans University (RAU), Johannesburg, South Africa (2001 - 2004): BACCALAUREUS SCIENTIAE IN NATURAL AND ENVIRONMENTAL SCIENCES. Majors: Zoology and Botany.

PUBLICATIONS

Mahomed D, Husted A, Fry C, Downsa CT and O'Brien GC. 2019. Spatial shifts and habitat partitioning of ichthyofauna within the middle-lower region of the Pungwe Basin, Mozambique, Journal of Freshwater Ecology, 34:1, 685-702, DOI: 10.1080/02705060.2019.1673221

Tate RB and Husted, A. 2015. Aquatic Biomonitoring in the upper reaches of the Boesmanspruit, Carolina, Mpumalanga, South Africa. African Journal of Aquatic Science.

Tate RB and Husted A. 2013. Bioaccumulation of metals in *Tilapia zillii* (Gervai, 1848) from an impoundment on the Badeni River, Cote D'Ivoire. African Journal of Aquatic Science.

O'Brien GC, Bulfin JB, Husted A. and Smit NJ. 2012. Comparative behavioural assessment of an established and new Tigerfish (*Hydrocynus vittatus*) population in two manmade lakes in the Limpopo catchment, Southern Africa. African Journal of Aquatic Science.

Tomschi, H, Husted, A, O'Brien, GC, Cloete, Y, Van Dyk C, Pieterse GM, Wepener V, Nel A and Reisinger U. 2009. Environmental study to establish the baseline biological and physical conditions of the Letsibogo Dam near Selebi Phikwe, Botswana. EC Multiple Framework Contract Beneficiaries.8 ACP BT 13 – Mining Sector (EDMS). Specific Contract N° 2008/166788. Beneficiary Country: Botswana. By: HPC HARRESS PICKEL CONSULT AG

Husted A. 2009. Aspects of the biology of the Bushveld Smallscale Yellowfish (*Labeobarbus polylophus*): Feeding biology and metal bioaccumulation in five populations. The University of Johannesburg (Thesis).
