ERGO SOLAR PHASE 2:
Up to 40MW PV facility on the farm Witpoortjie 117, Withok 131 and Withok Estates, Ekurhuleni Municipality, Gauteng

Terrestrial Biodiversity (Vegetation) Scoping Report

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Indemnity

This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information at the time of study. Therefore, the author reserves the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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The Environmental Impact Assessment Regulations (Government Notice No. R982 of 4 December 2014), requires that certain information is included in specialist reports. The terms of reference, purpose of the report, methodologies, assumptions and limitations, impact assessment and mitigation (where relevant to the scope of work) and summaries of consultations (where applicable) are included within the main report. Other relevant information is set out below:

Expertise of author:

- Working in the field of ecology, and in specific vegetation related assessments, since 2007;
- Is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions in the field of ecology (Reg. No. 400019/11); and
- Has been working with plants indigenous to South Africa since 1997.

Declaration of independence:

Dimela Eco Consulting in an independent consultant and hereby declare that it does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by Dimela Eco Consulting is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

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Based on information provided to Dimela Eco Consulting by the client, and in addition to information obtained during the course of this study, Dimela Eco Consulting present the results and conclusion within the associated document to the best of the authors professional judgement and in accordance with best practise.

_____ ____2021._____

Antoinette Eyssell-Knox Date

SACNASP Reg. No. 400019/11

EXECUTIVE SUMMARY

The applicant, Tshedza 3 Investments (Pty) Ltdtshedza, wants to establish a 40MW PV facility on portions of the farms Witpoortjie 117, Withok 131 and several holdings of the Withok Estates, Gauteng. Most of the land proposed for the development was historically cultivated or impacted on by mining activities.

The proposed site falls in an area that is listed by the National Screening Tool as being of 'High' terrestrial biodiversity. Furthermore, the Screening Tool lists a 'Medium' sensitivity for plant species, indicating that there is a likelihood of plant species of conservation concern being present on or in proximity to the sites. The final terrestrial vegetation report will thus comprise a terrestrial (vegetation) assessment, with reference to the occurrence or possible occurrence of plant species of conservation concern on the site. This report entails the preliminary scoping phase report, based on desktop assessment and prior work undertaken in the area for the Phase 1[1] of the proposed project.

The proposed PV facility will be in the Ekurhuleni Municipality of Gauteng. The site is within the quarter degree square 2628AD. The following areas form part of the proposed site:

- Remaining Extent of Portion 183 of the Farm Witpoortjie 117 I.R.
- Portion 283 (A Portion of Portion 19) of The Farm Witpoortjie 117 I.R.
- Portion 272 of the Farm Witpoortjie 117 I.R.
- Portion 9 of the Farm Withok 131 I.R.
- Holding 203-208, 204-245, 296-303 and 348-351Withok Estates I.R.

The terms of reference were to complete a desktop assessment for terrestrial plants in line with the terrestrial biodiversity protocols, including:

- Supply background information on the site relating to conservation plans, historic vegetation overview and threatened ecosystems;
- An indication on whether plant species of conservation concern could be present and the likely areas of occurrence; and
- A preliminary vegetation sensitivity map to inform the project layout.

No site visit was undertaken, and the result of this report is based on a desktop assessment.

Baseline information:

The landscape of the study area is characterised by moderately undulating plains. However, portions of the Farm Witpoortjie 183 and Withok 131 (historical slimes dams) are relatively flat, with an average elevation of about 1620m, and was relandscaped after being remined in the year 2000. An artificial dam is present on

[1] Phase 1, a 19.9MW PV facility with a 22kV Overhead power line and 100MWh Battery Energy Storage System (BESS) has previously assessed through a Basic Assessment Process).

this portion of the site. A tributary of the Withokspruit flows along much of the western boundaries of the larger area. Another tributary joins from the south. The southern slimes dam area falls within a wetland buffer. Most of the proposed sites are situated within the historical extent of the Tsakane Clay Grassland, which is classified as Endangered. The most eastern extent of the proposed sites falls within the Soweto Highveld Grassland. This vegetation type is also greatly transformed and classified as being Endangered. Most of the proposed sites fall within the Critically Endangered Klipriver Highveld Grassland ecosystem, whereas the eastern extent thereof falls partly within Soweto Highveld Grassland (Vulnerable), and the Tsakane Clay Grassland (Endangered) listed ecosystems. Google Earth satellite imagery show that much of the development footprint traverse areas that have already been modified from the natural state.

Large portions of the proposed site are not classified as being of conservation concern. However, Critical Biodiversity Areas (CBAs) classified as Important to reach the conservation targets in the Province are present. The CBAs indicate areas that likely comprise primary vegetation and could be suitable habitat for plant species of conservation concern. The ESAs present on the site are associated with the Withokspruit tributaries and drainage lines on and around the site.

Results:

Much of the vegetation on the proposed sites were historically disturbed by either cultivation, paddocks surrounding slimes dams, or the presence and maintenance of the slurry pipes. Parts of the proposed site comprise historic slimes dams, that was remined and left to naturally revegetate. Most of the eastern section is modified or built-up. The *likely* vegetation present, based on aerial imagery and an extrapolation of data recorded during the Phase 1 assessment of the proposed solar facility in the same area, are as follows:

1. Degraded rocky grassland;
2. Secondary grassland;
3. Moist grassland; and
4. Modified vegetation.

The preliminary Site Ecological Importance is described below:

Preliminary broad vegetation community	***Preliminary*** **Site Ecological Importance (SEI) – mitigation**
Secondary grasslands	**Very-low (Minimise & Restore)**
Modified vegetation	**Very-low (Minimise & Restore)**
Degraded Rocky grassland	**High (Avoid & Minimise)**

Preliminary broad vegetation community	*Preliminary* Site Ecological Importance (SEI) – mitigation
Moist grassland	**Medium (Minimise & Restore)**

Most of the proposed site comprise secondary grassland that was either historically cultivated or contained slimes dams and other mining infrastructure. Some ecological functions are restored in the secondary grasslands, although the species diversity is likely low with limited potential to support plant species of conservation concern. The secondary grasslands are likely developable provided that no sensitive plant species are present and edge effects to moist grasslands be limited. Secondary grasslands that correspond to CBAs should be considered with caution for any development, or not at all. Modified land comprises areas where the natural vegetation was destroyed or degraded beyond a threshold of recovery, or replaced by lawns, invasive species, or ongoing activities. Most of the eastern extent of the proposed site as well as large soil heaps or remnant slimes dams were classified as modified land. These areas are developable and of little to no conservation concern.

However, some rocky outcrops are noted and could be suitable habitat to plant species of conservation concern and include CBA areas. The state of the rocky grassland vegetation, as well as moist grasslands needs to be verified to determine its sensitivity to the proposed development. In addition, the vegetation needs to be scanned for suitable habitat and / or the occurrence of plant species of conservation concern. The final layout should thus take cognisance that rocky grassland and moist grassland may be undevelopable, depending on the findings.

For ease of reference, the following table summarises results of the assessment as per the main requirements of the Protocols for Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial (Vegetation) Biodiversity as published on 20 March 2020.

Biodiversity (vegetation) aspect	Result
Conservation Plan Category: **CBA**	**Reason for the CBA** The CBAs within and around the proposed site are classified based on the potential habitat for plant species of conservation concern and the potential presence of primary vegetation **Can CBA be maintained?** Depends on final layout. *Secondary grasslands that correspond to CBAs should be considered with caution for any development, or not at all.* **Impact on species composition and structure of vegetation** Areas that will be developed are proposed to be contained within the existing secondary and modified vegetation. If mitigation is implemented no natural to semi-natural grasslands will be affected, if present.

Biodiversity (vegetation) aspect	Result
	Impact on ecosystem threat status Limited natural vegetation remain and therefore the proposed site has limited potential to conserve threatened ecosystems **Impact on explicit subtypes in the vegetation; and the impact on overall species and ecosystem diversity of the site;** See above
Protected Areas	• Not applicable
Strategic Water Source Areas (SWSA):	**Impact(s) on the terrestrial habitat of a SWSA** The site is not situated within a SWSA, however clearing of vegetation can have an impact on water infiltration and flow dynamics to the moist grassland and downstream watercourses. **Impacts of the proposed development on the SWSA water quality and quantity** Erosion, sedimentation and pollution caused by clearing of vegetation for the development, could impact on the downstream water quality temporarily (e.g. during construction). Once indigenous vegetation has re-established or recovered, the impact will be negligible, provided that impermeable surfaces are limited, and no runoff water are directed towards the moist grassland
National Freshwater Ecosystems Priority Areas (NFEPA):	See wetland assessment
Indigenous forest	Not applicable
Sensitive Areas	• As per the GDARD Requirements for Biodiversity Assessments Version 2 (2012): "All good condition natural vegetation must be designated as ecologically sensitive". The rocky grassland may be in a good ecological condition and falls within a CBA that forms part of a Critically Endangered Ecosystem. However, the extent of the rocky grassland is limited, and it has likely been degraded by surrounding impacts. This will be the focus of the summer survey. • The buffer area to the moist grasslands, as delineated by the wetland specialist must be avoided.
No go areas	Avoid direct impacts to moist grasslands and rocky grassland.
Plant species of conservation concern	• To be confirmed during site survey in summer.
Main impacts:	The main impacts expected are as follows: • Destruction of natural vegetation of high and medium sensitivity (rocky- and moist grassland) • Destruction of modified vegetation of low sensitivity • Exposure to erosion and subsequent sedimentation or pollution of proximate moist grassland (watercourse) • Removal / Destruction of protected plants and plants of conservation concern

Biodiversity (vegetation) aspect	Result
	• Potential increase in invasive vegetation • Compaction and destruction of soils
Cumulative impacts:	• If mitigation measures are adequately implemented, no cumulative impacts are expected.
Residual impacts:	• Trampling and edge effects; and • Impacts to the watercourse such as runoff from roads.

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1. INTRODUCTION

1.1 Background

The applicant, Tshedza 3 Investments (Pty) Ltd, wants to establish a 40MW PV facility on portions of the farms Witpoortjie 117, Withok 131 and several holdings of the Withok Estates, Gauteng. Most of the land proposed for the development was historically cultivated or impacted on by mining activities.

The proposed site falls in an area that is listed by the National Screening Tool as being of 'High' terrestrial biodiversity. Furthermore, the Screening Tool lists a 'Medium' sensitivity for plant species, indicating that there is a likelihood of plant species of conservation concern being present on or in proximity to the sites. The final terrestrial vegetation report will thus comprise a terrestrial (vegetation) assessment, with reference to the occurrence or possible occurrence of plant species of conservation concern on the site. This report entails the preliminary scoping phase report, based on desktop assessment and prior work undertaken in the area for the Phase 1[2] of the proposed project.

1.2 Locality

The proposed PV facility will be in the Ekurhuleni Municipality of Gauteng (Figure 1). The site is within the quarter degree square 2628AD. The following areas form part of the proposed site:

- Remaining Extent of Portion 183 of the Farm Witpoortjie 117 I.R.
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- Portion 272 of the Farm Witpoortjie 117 I.R.
- Portion 9 of the Farm Withok 131 I.R.
- Holding 203-208, 204-245, 296-303 and 348-351Withok Estates I.R.

1.1 Terms of reference

Complete a desktop assessment for terrestrial plants in line with the terrestrial biodiversity protocols, including:

- Supply background information on the site relating to conservation plans, historic vegetation overview and threatened ecosystems;
- An indication on whether plant species of conservation concern could be present and the likely areas of occurrence; and
- A preliminary vegetation sensitivity map to inform the project layout.

1.2 Assumptions and Limitations

The following limitations are applicable; however, none is considered a fatal flaw:

- No site visit was undertaken, and the result of this report is based on a desktop assessment.

[2] Phase 1, a 19.9MW PV facility with a 22kV Overhead power line and 100MWh Battery Energy Storage System (BESS) has previously assessed through a Basic Assessment Process).

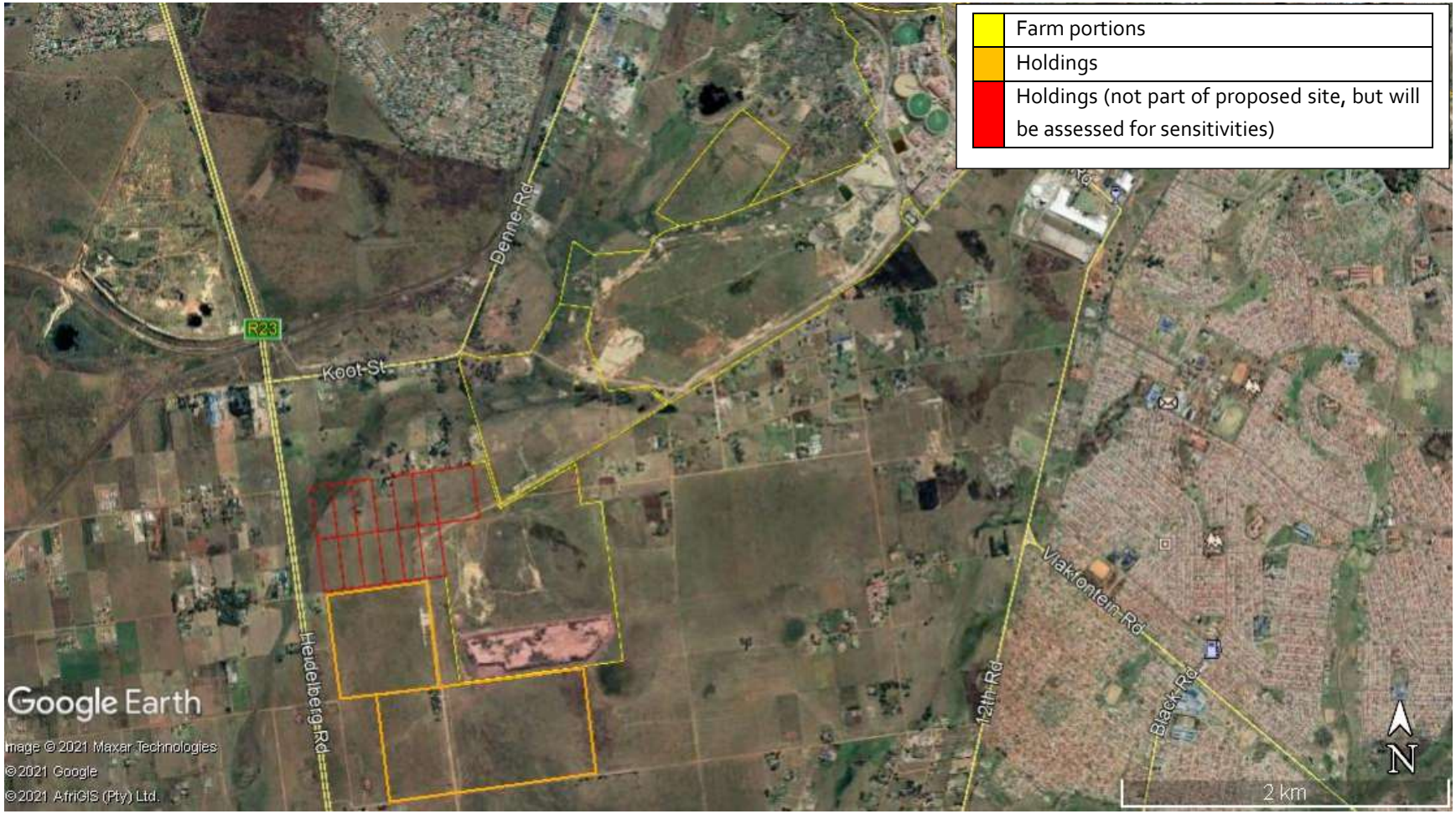


Figure 1: Locality map

2. METHODOLOGY

The assessment entailed a literature review of available literature and reporting. The methodology used is shortly summarised below.

2.1 Literature and data review

The description of the regional vegetation relied on literature from Mucina & Rutherford (2006). Several field guides were used to identify plant species, including Van Wyk & Van Wyk (1997), Van Wyk & Malan (1997), Pooley (1998), Henderson (2001), Van Oudtshoorn (2002) and Bromilow (2010).

Dimela Eco Consulting undertook a site visit for the vegetation assessment for Phase 1 of this project in February 2021 (Dimela Eco Consulting, 2021). The findings were also used as background information for this scoping report.

Data and literature consulted:

- The Gauteng Conservation Plan version 3.3 (2011)
- Information on plant species recorded for the Quarter Degree Square (QDS) that the site is situated in was extracted from the Botanical Database of Southern Africa hosted by SANBI on the new Plants of Southern Africa website (https://posa.sanbi.org). Additional info was sourced from the Gauteng Department of Agriculture and Rural Development (GDARD)
- The IUCN conservation status for plant species of conservation concern was verified on the website for the Threatened Species Programme, Red List of South African Plants (Red List of South African plants version 2020(http://redlist.sanbi.org/)).
- Threatened Ecosystem data was extracted from the NEM:BA listed ecosystems layer (SANBI 2008).
- Relevant literature, including historic vegetation reports undertaken for this area.
- An assessment of Portion 183 of the Farm Witpoortjie 117 I.R, undertaken on the 8th of February 2021, forms part of the desktop assessment (Dimela Eco Consulting, 2021)

2.2 Project Area of Influence (PAOI)

The Project Area of Influence (PAOI) was defined as per the Species Environmental Assessment Guideline (SANBI, 2020) and is based on the development footprint and the potential extent of the impacts (e.g., edge effects) of the project activities.

No layout was available at the time of this scoping report. The results of the scoping report will be used to inform the layout. The proposed sites for the PV facility were regarded as the primary PAOI. A preliminary buffer of 50m around the proposed sites was assessed at desktop level to include potential secondary and tertiary areas of impact.

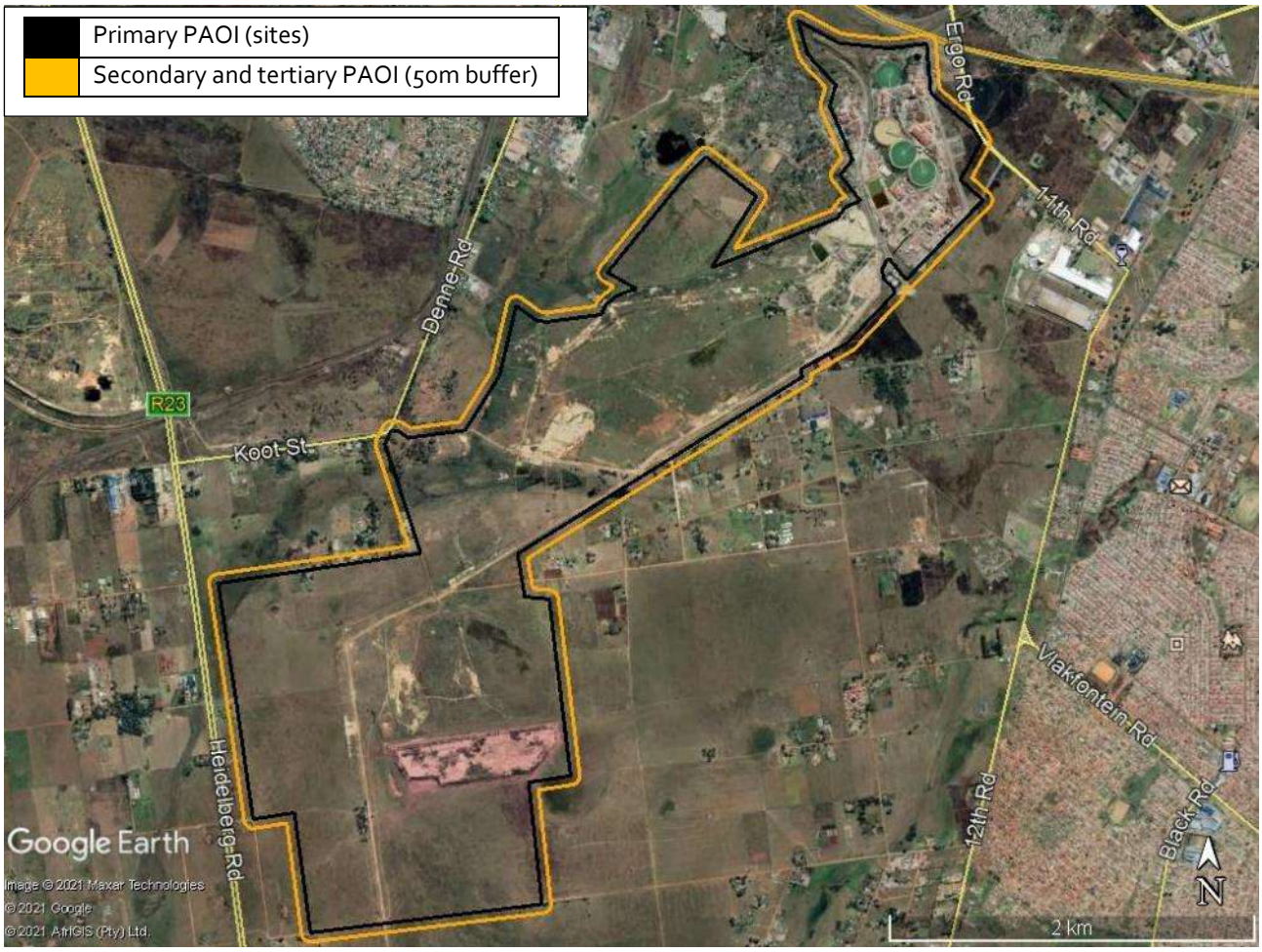


Figure 2: Project Area of Influence

2.3 Field survey

No site visit was undertaken for this scoping phase report. A field survey was undertaken in the same area in February 2021 for Phase 1 of this project. This information was used as background information.

2.4 Site Ecological Importance (sensitivity)

The Preliminary Site Ecological Importance (SEI) in terms of vegetation is discussed and mapped as per the requirements of the Species Environmental Assessment Guideline (SANBI, 2020). The assessment criteria and matrices are detailed in Table 1, Table 2, and Table 3.

SEI is considered to be a function of the Biodiversity Importance (BI) of the receptor (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site and its resilience to impacts (Receptor Resilience) as follows:

SEI = BI + RR

BI in turn is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows:

BI = CI + FI

Conservation Importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN (2016)).

Table 1: Criteria for assessing CI, FI and RR

Classification	Conservation Importance	Functional Integrity	Receptor Resilience
Very high	• Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global Extent of Occurrence of < 10 km² • Any area of natural habitat of a CR ecosystem type or large area (> 0.1 % of the total ecosystem type extent) of natural habitat of an EN ecosystem type	• Very large (>100 ha) intact area for any conservation status of ecosystem type or >5 ha for CR ecosystem types • High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing)	• Habitat can recover rapidly (<5 years for >70% of the original species composition and functionality). • Species very highly likely to remain at a site during impact. • Species very highly likely to return once the impact ceases.
High	• Confirmed or highly likely CR, EN, VU species. IUCN threatened species must be listed under any criterion other than A, include if there are less than 10 locations or < 10 000 mature individuals remaining. • Small area (>0.01% but < 0.1 % of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1 %) of natural habitat of VU ecosystem type. • Presence of Rare species.	• Large (>20 ha but <100 ha) intact area for any conservation status of ecosystem type or >10 ha for EN ecosystem types Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential	• Habitat can recover relatively quickly (5-10 years for >70% of the original species composition and functionality. • Species highly likely to remain at a site during impact. • Species highly likely to return to site once impact ceases.
Medium	• Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under A criterion only and which have more than 10 locations or more than 10 000 mature individuals.	• Medium (>5 ha but <20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types • Only narrow corridors of good habitat connectivity or larger areas of poor	• Recovers slowly (>10 years for >70 % of the original species composition and functionality • Species moderately likely to remain at site during impact.

Classification	Conservation Importance	Functional Integrity	Receptor Resilience
	• Any area of natural habitat of threatened ecosystem type with status of VU • Presence of range-restricted species • More than 50 % of receptor contains natural habitat with potential to support SCC	habitat connectivity and a busy used road network between intact habitat patches • Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance; moderate rehabilitation potential	• Species moderately likely to return to site once impact ceases.
Low	• No confirmed or highly likely SCC. • No confirmed or highly likely range-restricted species. • Less than 50 % contains natural habitat with limited potential to support SCC.	• Small (1 – 5ha) area. • Almost no connectivity but migration still possible across transformed / degraded habitat; very busy surrounds. Low rehabilitation potential. • Several minor and major ecological impacts.	• Unlikely to recover fully (<50% restored) after >15 years. • Species have low likelihood of remaining at site during the impact. • Species have low likelihood of returning to site once impact ceases.
Very low	• No confirmed and highly unlikely populations of SCC. • No confirmed and highly unlikely populations of range-restricted species. • No natural habitat remaining.	• Very small (<1 ha) area. • No connectivity except for flying species. • Several major current ecological impacts.	• Unable to recover from major impacts. • Species unlikely to remain at site during the impact. • Species unlikely to return once impact ceases.

Table 2: Matrix for determining BI

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very High	High	Medium	Low	Very Low
Functional Integrity (FI)	Very High	**Very High**	**High**	**High**	**Medium**	**Low**
	High	**Very High**	**High**	**Medium**	**Medium**	**Low**
	Medium	**High**	**Medium**	**Medium**	**Low**	**Very Low**
	Low	**Medium**	**Medium**	**Low**	**Low**	**Very Low**
	Very Low	**Medium**	**Low**	**Very Low**	**Very Low**	**Very Low**

Table 3: Matrix for determining SEI

Site Ecological Importance (SEI) (Mitigation)		Biodiversity Importance (BI)				
		Very High	High	Medium	Low	Very Low
Receptor Resilience (RR)	Very Low	**Very High (Avoid)**	**Very High (Avoid)**	**High (Avoid & Minimise)**	**Medium (Minimise & Restore**	**Low (Minimise & Restore**
	Low	**Very High (Avoid)**	**Very High (Avoid)**	**High (Avoid & Minimise)**	**Medium (Minimise & Restore**	**Very Low (Minimise)**
	Medium	**Very High (Avoid)**	**High (Avoid & Minimise)**	**Medium (Minimise & Restore**	**Low (Minimise & Restore**	**Very Low (Minimise)**
	High	**High (Avoid & Minimise)**	**Medium (Minimise & Restore**	**Low (Minimise & Restore**	**Very Low (Minimise)**	**Very Low (Minimise)**
	Very High	**Medium (Minimise & Restore**	**Low (Minimise & Restore**	**Very Low (Minimise)**	**Very Low (Minimise)**	**Very Low (Minimise)**

The interpretation of the SEI ranks are described in Table 4 below. This table is a supplemented version of that which appears in the Draft Species Environmental Assessment Guideline (SANBI, 2020). The SEI rating was utilised to generate the vegetation sensitivity map. This plan must be considered along with the fauna sensitivity map and wetland map to obtain an overall sensitivity map.

Table 4: Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities.

SEI	Interpretation in relation to proposed development activities (SANBI, 2020), with *mitigation added by the specialist*
Very High	Avoidance mitigation - No destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages. Destructive impacts for species/ecosystems where persistence target remains. • *Development within these areas is not supported.* • *Impacts are difficult to mitigate, if at all* • *Such features usually protected by legislation or guiding policies*
High	Avoidance mitigation wherever possible. Minimization mitigation – Changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities. • *Development within these areas is undesirable and impacts are difficult to mitigate, if at all.* • *Impacts must be avoided or managed by an ecological management plan*
Medium	Minimization & restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities • *Development within these areas could proceed, limiting impact to sensitive vegetation, provided that appropriate mitigation measures are taken.*

SEI	Interpretation in relation to proposed development activities (SANBI, 2020), with *mitigation added by the specialist*
	• *High impact developments should be considered with caution, if at all. Development must be restricted in footprint and impacts managed and mitigated by an approved management plan. Edge effects to higher sensitivity classes in its proximity must be mitigated / prevented.*
Low	Minimization & restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities • *Developable areas that are connected to sensitive features.* • *Edge effects must be prevented.*
Very Low	Minimization mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required • *Most types of development can proceed within these areas with little to no impact on conservation worthy vegetation.* • *Edge effects to other proximate sensitivity classes must be mitigated / prevented.*

3. BASELINE DESCRIPTION OF THE SITE

3.1 Climate

The study area is situated in the Highveld with summer rainfall and dry winters. Summer temperatures can reach an average of about 30°C while frost is common in winter. Annual rainfall is about 630 and 720mm (Mucina and Rutherford, 2006).

3.2 Topography and Hydrology

The landscape of the study area is characterised by moderately undulating plains. Portions of the Farm Witpoortjie 117 and Withok 131 (historical slimes dams) are relatively flat, with an average elevation of about 1620m. these areas were relandscaped after being remined in the year 2000. An artificial dam is present on Portion 183 of the Farm Witpoortjie 117. A tributary of the Withokspruit flows along much of the western boundaries of the larger area (Figure 3). Another tributary joins from the south. The most southern extent of the site falls within a wetland buffer.

3.3 Geology and Soils

The most dominant rock in the area is Balsatic lava of the Klipriviersberg Group (Mucina & Rutherford, 2006). Soils are typical of the Ba and Bb land types. The soils include GsA soils, which are shallow (<500 mm) and medium sand to loam in texture. In general, they are associated with moderately deep (500 - 1000 mm), yellow-brown, apedal, mesotrophic, loam soils of the Avalon form. dHu27 is also prominent, comprising of deep (1200mm +mm), red apedal sandy loam / clay loam. The soils along the Withokspruit tributary comrpise dRg20, which is deep (1200+mm), black swelling hydromorphic clay, likely to support wetland conditions. mAv27 soil form is described as a potential seasonal to temporary wetland soil (Figure 4). WA indicate the presence of slimes dams.

3.4 Historical Vegetation Type Overview

The study site is situated within the Grassland Biome of South Africa. This biome is dominated by grasslands wherein high summer rainfall, combined with dry winters, night frost and marked diurnal temperature variations are unfavourable to tree growth. Most plant species in grasslands are non-grassy herbs (forbs), most of which are perennial plants with large underground storage structures. Furthermore, many Rare and Threatened plant species in the summer rainfall regions of South Africa are restricted to high-rainfall grasslands, making the Grassland Biome in most urgent need of conservation.

The Grassland Biome comprises several vegetation types (Mucina & Rutherford, 2006). Most of the proposed sites are situated within the historical extent of the Tsakane Clay Grassland that occurs on slightly undulating plains and low hills (Figure 5). The vegetation is short, dense grassland dominated by a mixture of common highveld grasses such as *Themeda triandra, Heteropogon contortus, Elionurus muticus* and several *Eragrostis* species. Disturbance leads to an increase in the abundance of the grasses *Hyparrhenia hirta* and *Eragrostis chloromelas* (Mucina & Rutherford, 2006). Only about 2% of the 24% target of this grassland is conserved and it is classified as Endangered (Mucina & Rutherford, 2006). More than 60% was transformed by cultivation, urbanisation, mining, dam-building and roads and urbanisation is threatening the remaining portions of this grassland. The most eastern extent of the proposed sites falls within the Soweto Highveld Grassland. This vegetation type is also greatly transformed and classified as being Endangered. The vegetation grows on gently to moderately undulating landscapes of the Highveld Plateau and supports short to medium-high, dense, tufted grassland, dominated by a variety of grasses, mainly *Themeda triandra.*

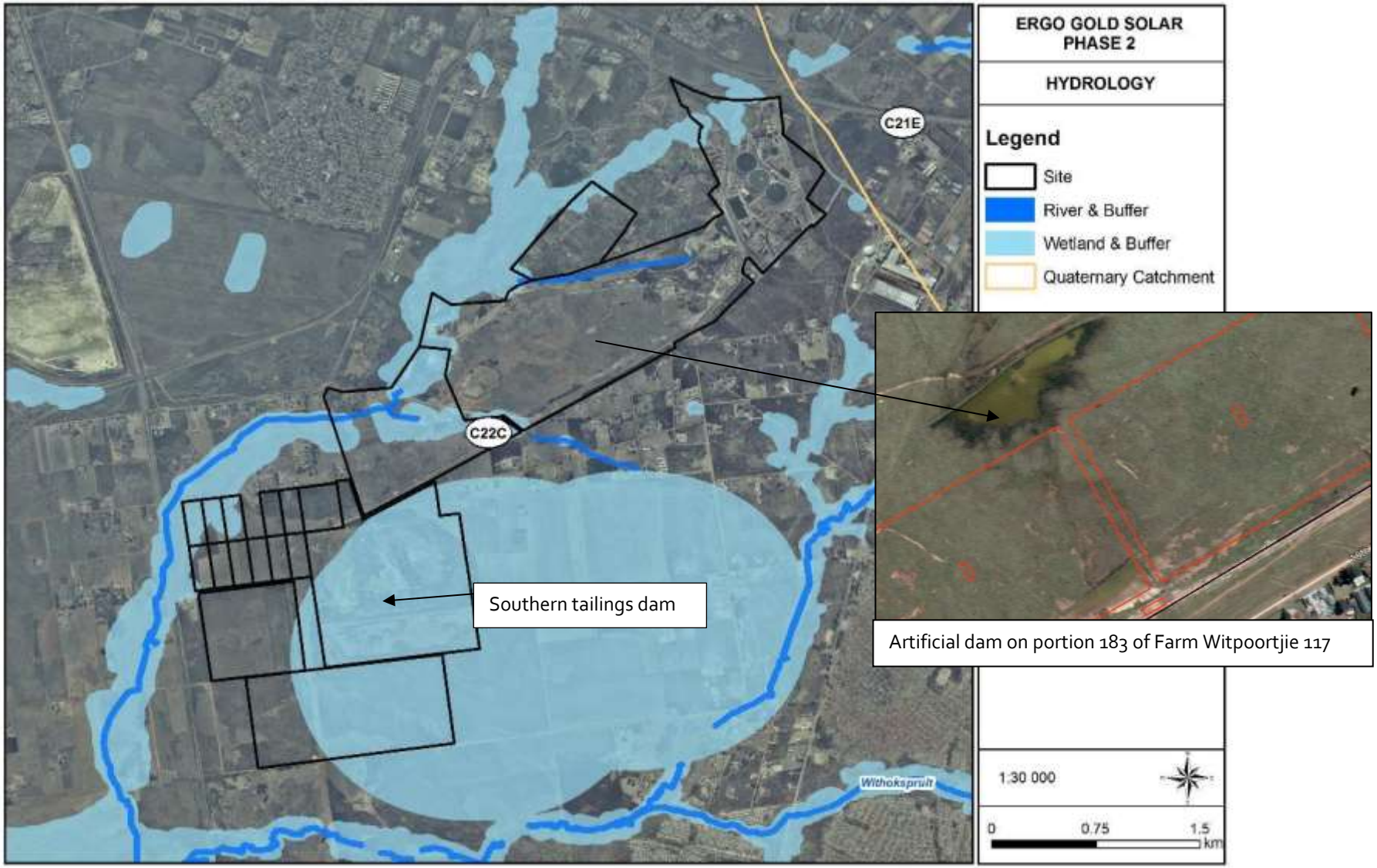


Figure 3: Hydrology of the area that the site is situated in, as per available national spatial data

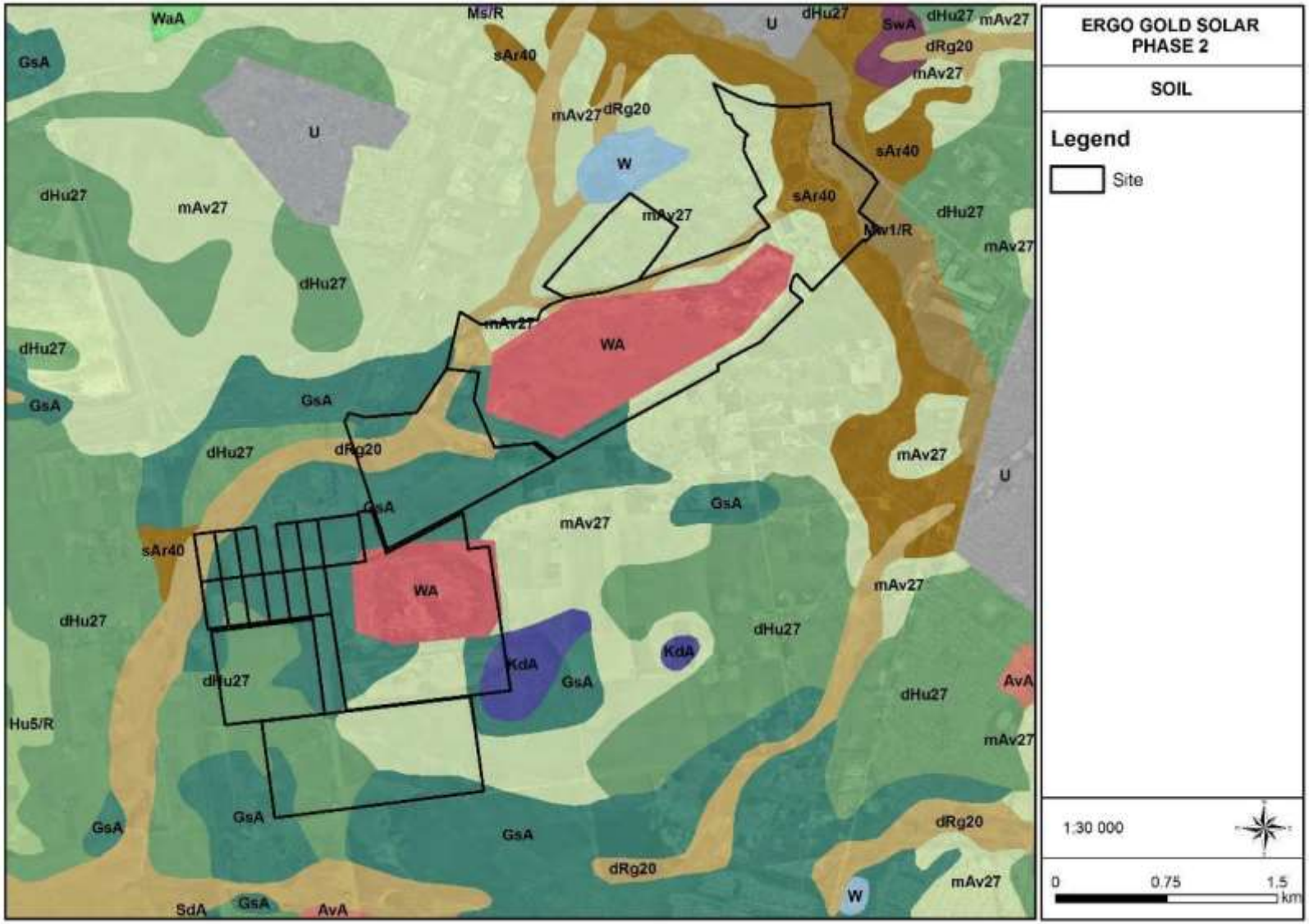


Figure 4: Soils present in the study area

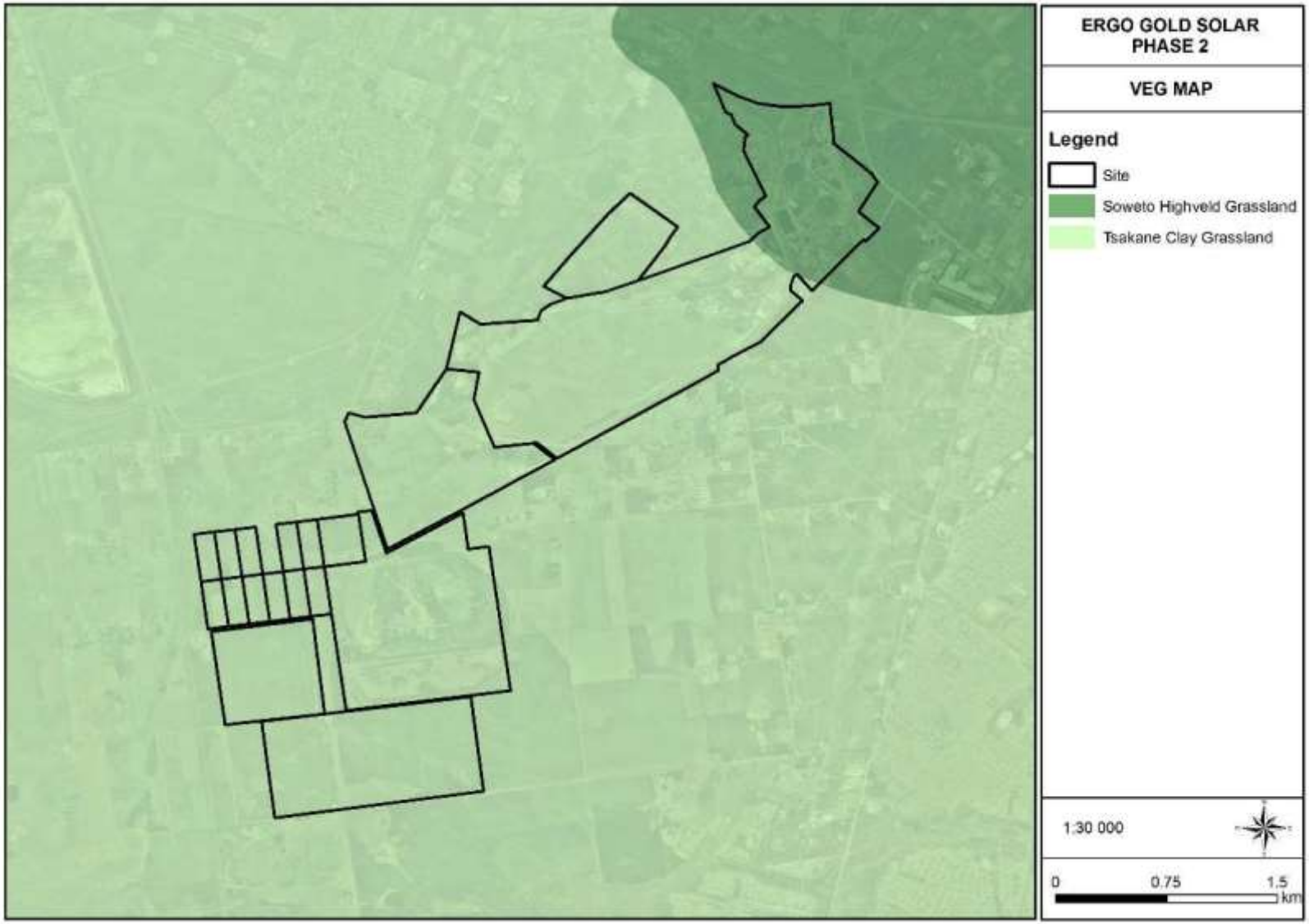


Figure 5: Vegetation units underlying the study area (Mucina and Rutherford, 2006).

3.5 Listed Ecosystems

The South African Biodiversity Act (Act 10 of 2004) provides for the listing of threatened or protected ecosystems. These ecosystems are grouped into Critically Endangered-, Endangered-, Vulnerable- and Protected Ecosystems (Section 52(1) (a) of the National Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, and 9 December 2011)).

Most of the proposed sites fall within the Critically Endangered Klipriver Highveld Grassland ecosystem, whereas the eastern extent thereof falls partly within Soweto Highveld Grassland (Vulnerable), and the Tsakane Clay Grassland (Endangered) listed ecosystems (Figure 6). Google Earth satellite imagery show that much of the development footprint traverse areas that have already been modified from the natural state.

3.6 Gauteng Conservation Plan

The Gauteng Conservation Plan (Version 3.3) (GDARD, 2011) classified areas within the province based on its contribution to reach the conservation targets within the province. These areas are grouped as Critical Biodiversity Areas (CBAs) or Ecological Support Corridors (ESAs). The CBAs comprise 'Irreplaceable' areas that must be conserved and areas classified as 'Important' to reach the conservation targets of the Province. ESA's are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. ESAs ensure sustainability in the long term.

Large portions of the proposed site are not classified as being of conservation concern. However, Critical Biodiversity Areas (CBAs) classified as Important to reach the conservation targets in the Province are present, with the largest unfragmented CBA within the most southern extent of the site (Figure 7). The CBAs indicate areas that likely comprise primary vegetation and could be suitable habitat for plant species of conservation concern. The ESAs present on the site are associated with the Withokspruit tributaries and drainage lines on and around the site.

3.7 Ecological drivers and processes in grassland

Frost, fire and grazing maintain the herbaceous grass and forb layer and prevent the establishment of thickets or encroachment by trees into grasslands (Tainton, 1999). Fire is a natural disturbance caused by lightning, and regular burning is therefore essential for maintaining the structure and biodiversity of grasslands. If fire is prevented due to activities such as agriculture and mining, the vegetation structure degrades, and alien species could eventually dominate the natural vegetation.

When Tsakane Clay Grassland vegetation is disturbed, *Hyparrhenia hirta* (common thatching grass) and *Eragrostis curvulua* become dominant (Mucina and Rutherford, 2006).

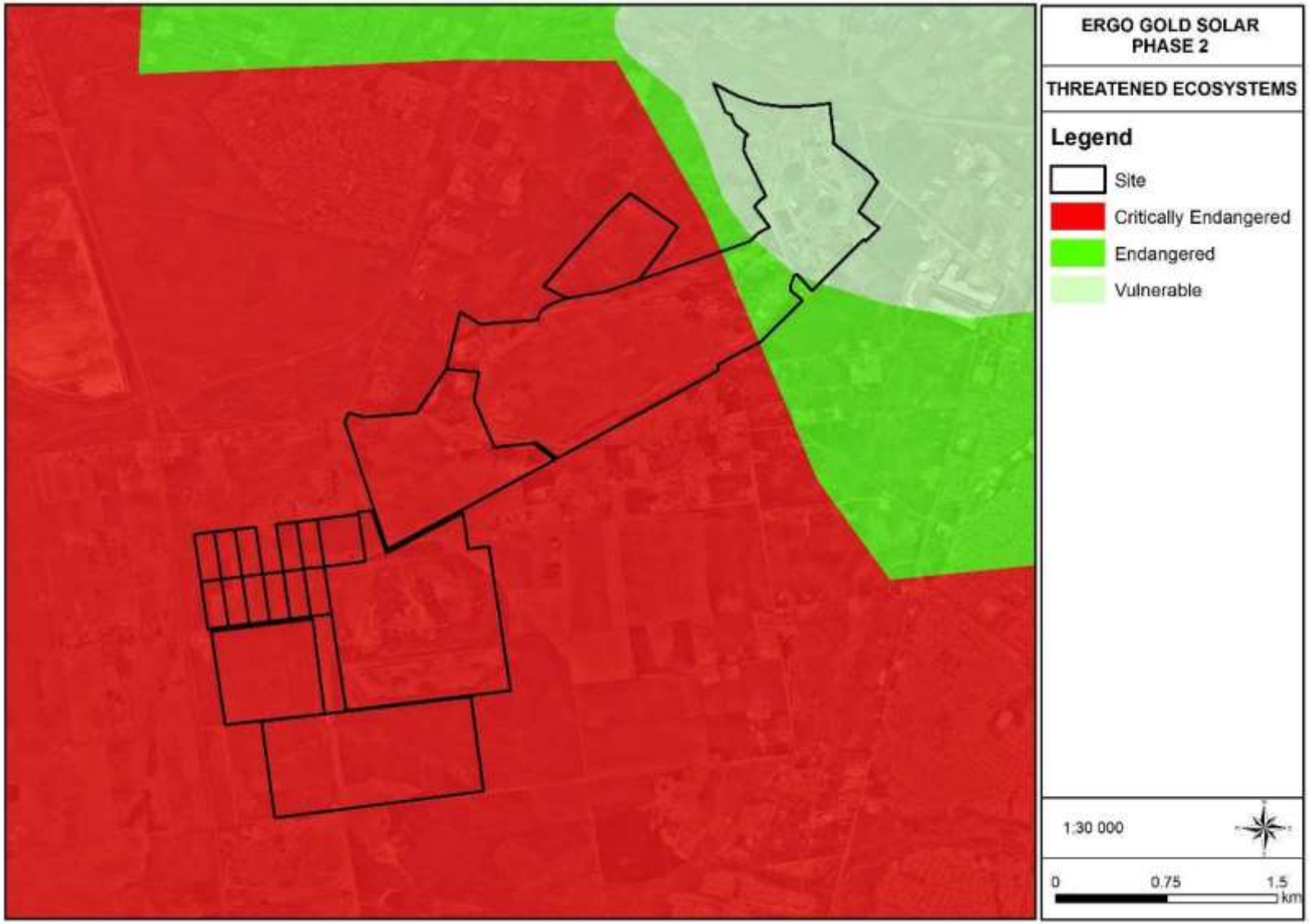


Figure 6: Threatened ecosystems

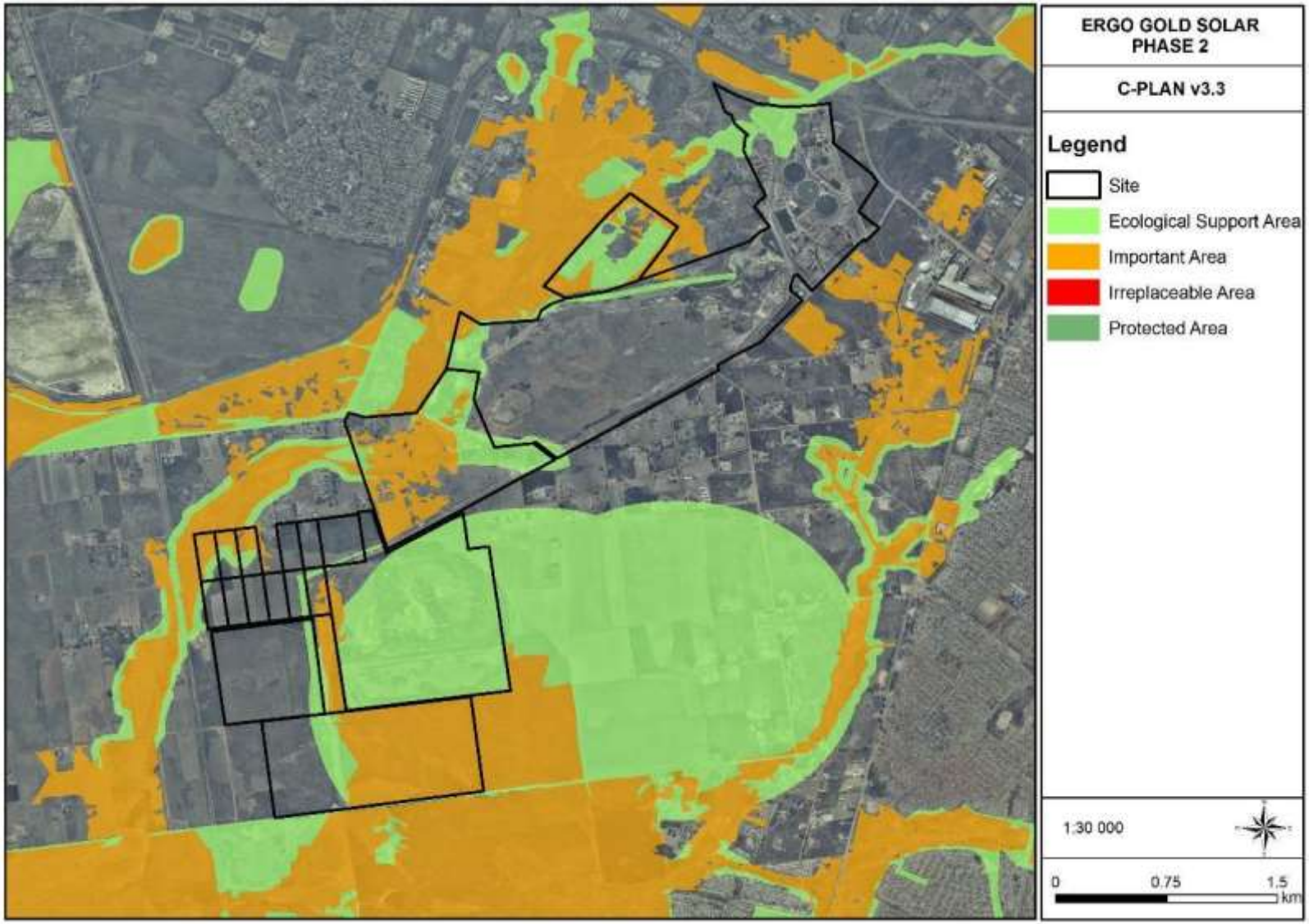


Figure 7: The proposed development in relation to the Gauteng Conservation Plan

3.8 Protected areas within 10km of site

No areas of international conservation (RAMSAR Wetlands and World Heritage Sites), Important Bird Areas (IBAs), National or Provincial Protected Areas, or National Protected Areas Expansion Strategy (NPAES) areas occur within 10km of site. However, a Private Nature Reserve is situated to the west of the site (Figure 8). The status of the reserve is unknown.

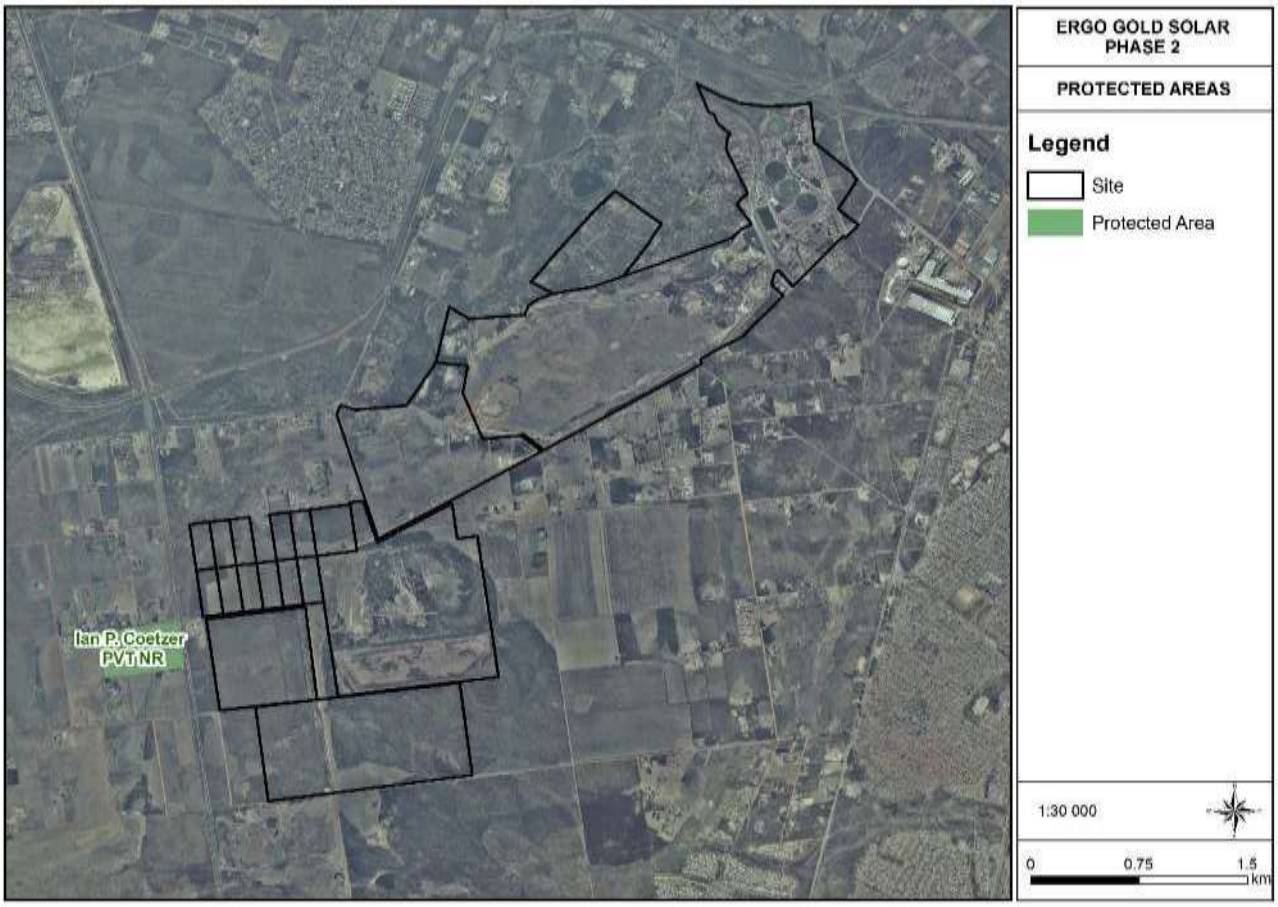


Figure 8: Protected Areas map

4. Results

4.1 Land use and disturbances

Historical aerial imagery indicated that the vegetation on much of the proposed site was historically disturbed. The main disturbance was cultivation, slimes- and tailing dams, edge effects from mining and damming of watercourses. Areas that were not directly impacted on was either too rocky or too wet to cultivate.

Figures 9 and 10 show the mining activities and cultivation on the estimated site area in the years 1968 and 1996. Figure 11 shows the site in the year 2002 with mining and cultivation still being the main forces behind land cover change. In Figure 12, the most recent satellite imagery (Google Earth 2021), the slimes dams are rehabilitated and the historically cultivated areas fallow. There has been a return of some indigenous plant species and ecological function over the ten years. However, most of the vegetation is likely in a secondary state.

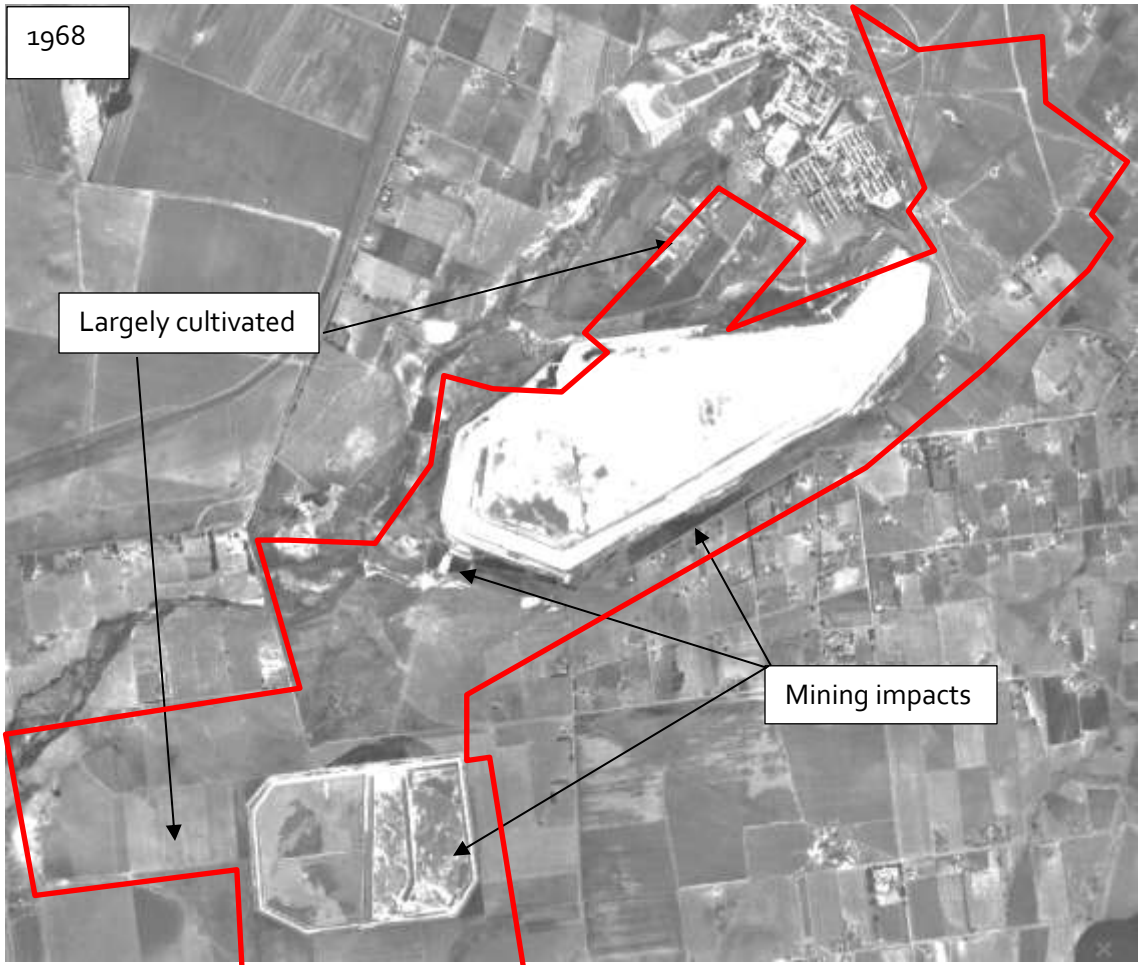


Figure 9: Historical aerial imagery dated 1968 (Chief Directorate National Geospatial Information Geospatial Portal) showing the mined and cultivated land that forms the proposed site

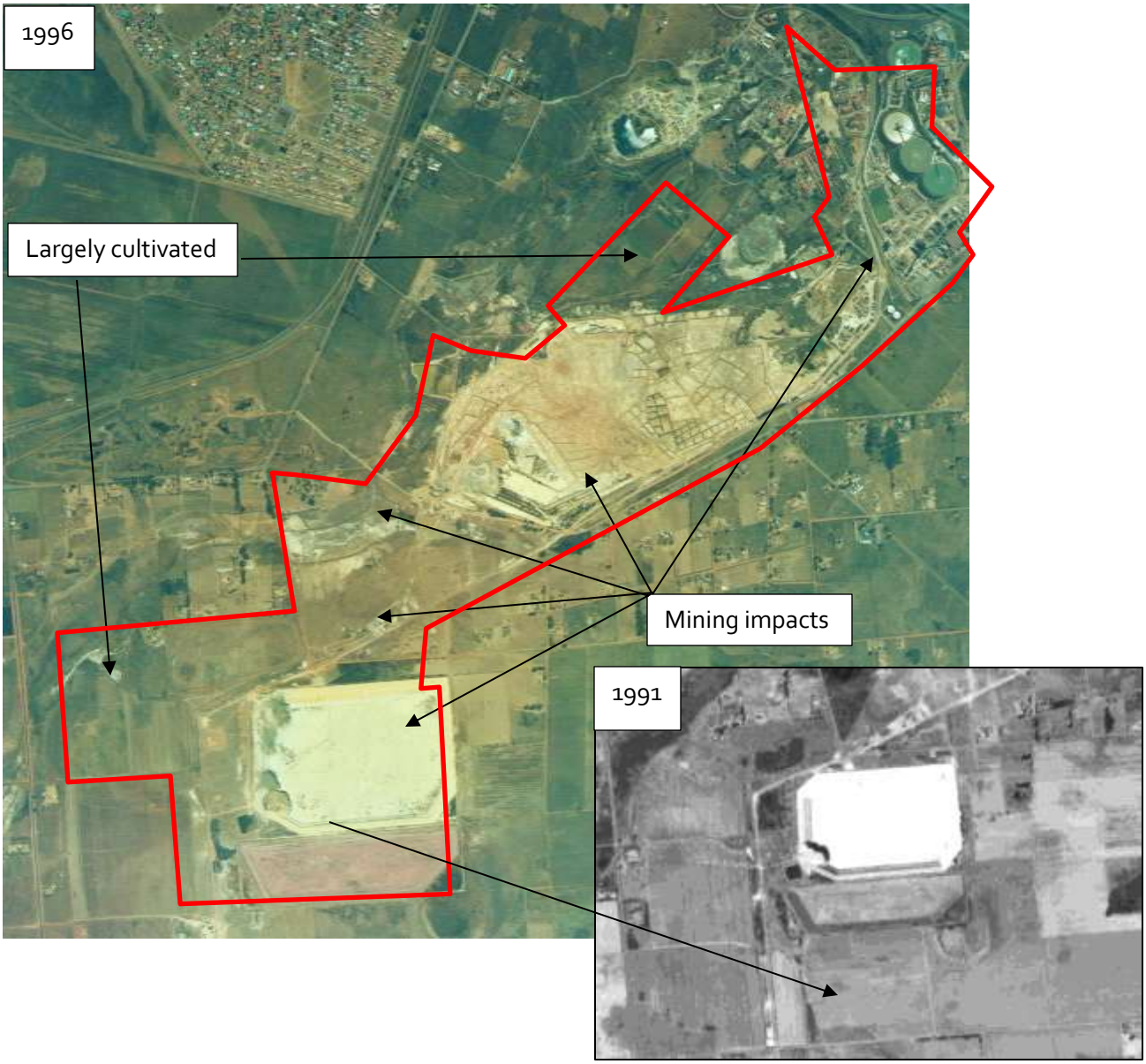


Figure 10: Historical aerial imagery dated 1996 (Chief Directorate National Geospatial Information Geospatial Portal) showing the increase in mining and associated development impacts. The insert dates to 1991 and show that cultivation south and south-west of the tailings dam

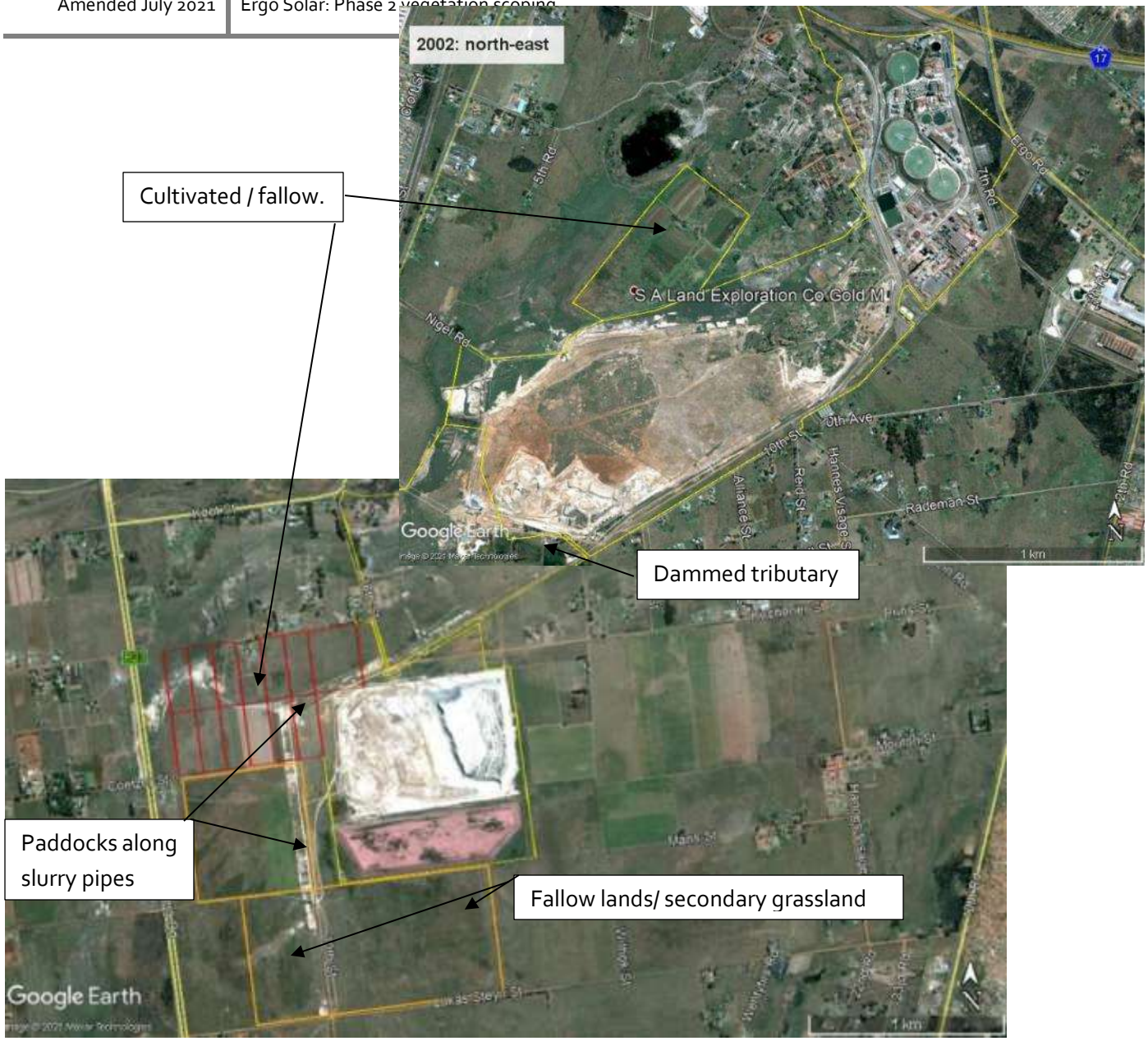


Figure 11: Google Earth imagery dated 2002 with cultivation and mining impacts persisting on the site.

Figure 12: Most recent Google Earth imagery (2021) showing fallow lands and rehabilitated slimes / tailings dams

4.2 Likely Vegetation

Much of the vegetation on the proposed sites were historically disturbed by either cultivation, paddocks surrounding slimes dams, or the presence and maintenance of the slurry pipes. Parts of the proposed site comprise historic slimes dams, that was remined and left to naturally revegetate. Most of the eastern section is modified or built-up.

The *likely* vegetation present, based on aerial imagery and an extrapolation of data recorded during the Phase 1 assessment of the proposed 19.9MW solar facility in the same area, are as follows:

1. Degraded rocky grassland;
2. Secondary grassland;
3. Moist grassland; and
4. Modified vegetation.

These vegetation groups are shortly discussed below and represented in a preliminary vegetation map in Figure 13. Built-up areas are not further discussed.

4.2.1 Degraded rocky grassland

Small portions of natural to near-natural grassland could be present on parts of the Withok Estate holdings and Witpoortjie farm east thereof (Figure 13). A small, patch is also present south of the Ergo Central 88/6.6kV substation. The grasslands were seemingly not cleared for cultivation or mining but was historically disturbed and impacted on by edge effects. The area around the Withok Estate holdings is currently grazed and edge effects from the historic mining activities degraded the grassland. However, some rocky outcrops are noted and could be suitable habitat to plant species of conservation concern. The state of this vegetation and occurrence of plant species of conservation concern needs to be verified to determine its sensitivity to the development.

4.2.2 Secondary grassland

Secondary grasslands develop where the original, undisturbed grassland vegetation was removed (e.g. cultivation or mining). After such disturbances cease, pioneer grassland species, as well as weedy pioneer plants, colonise the fallow lands leading to a pioneer grassland state with a much lower initial species diversity as opposed to the primary (climax) state prior to any disturbances. In the absence of further disturbances, the grassland could reach a secondary grassland state (more diverse and ecologically stable than pioneer grassland, yet lower in species diversity than primary grassland) and theoretically the primary state over time. However, primary grasslands are species rich ecosystems, which once disturbed, are difficult, if not impossible to restore.

Secondary grasslands have undergone extensive modification (e.g. to cultivated or mined areas) and a fundamental shift from their original state but have then been left to return to a grassland state. Although secondary grasslands may superficially look like primary grasslands, they differ markedly with

respect to species composition and vegetation structure, while some or most ecological functions have been compromised.

Most of the proposed site comprise secondary grassland that was either historically cultivated or contained slimes dams and other mining infrastructure. Some ecological functions are restored in the secondary grasslands, although the species diversity is likely low with limited potential to support plant species of conservation concern. The secondary grasslands are likely developable provided that no sensitive plant species are present and edge effects to moist grasslands be limited.

4.2.3 Moist grassland

Moist grasslands in this report refer to grassland vegetation that supported plant species with an affinity to grow in permanent, temporary, or seasonally saturated conditions. Note that the moist grasslands are an indication of where wetlands could occur, based on plant species that are adapted to growing in inundated soils, or species that prefers moist soils, but are not necessarily wetlands.

Most of the moist grasslands are likely dominated by *Phragmites australis*. *Phragmites* plays an important role in wetlands, particularly disturbed or impacted wetlands as it has an extensive root system that binds soils and prevent erosion. It can withstand high levels of environmental contamination and can assimilate heavy metals, nitrogen and phosphorous and can become the dominant grass in disturbed wetland areas (Tarr, 2006).

Data recorded during the Phase 1 assessment, also indicated the presence of moist grassland dominated by *Eragrostis plana*. These moist areas are likely small and isolated from the main tributaries.

Moist grasslands are protected by legislation and form part of the ESAs through the site.

4.2.4 Modified vegetation

Modified land comprises areas where the natural vegetation was destroyed or degraded beyond a threshold of recovery, or replaced by lawns, invasive species, or ongoing activities. Most of the eastern extent of the proposed site as well as large soil heaps or remnant slimes dams were classified as modified land. These areas are developable and of little to no conservation concern.

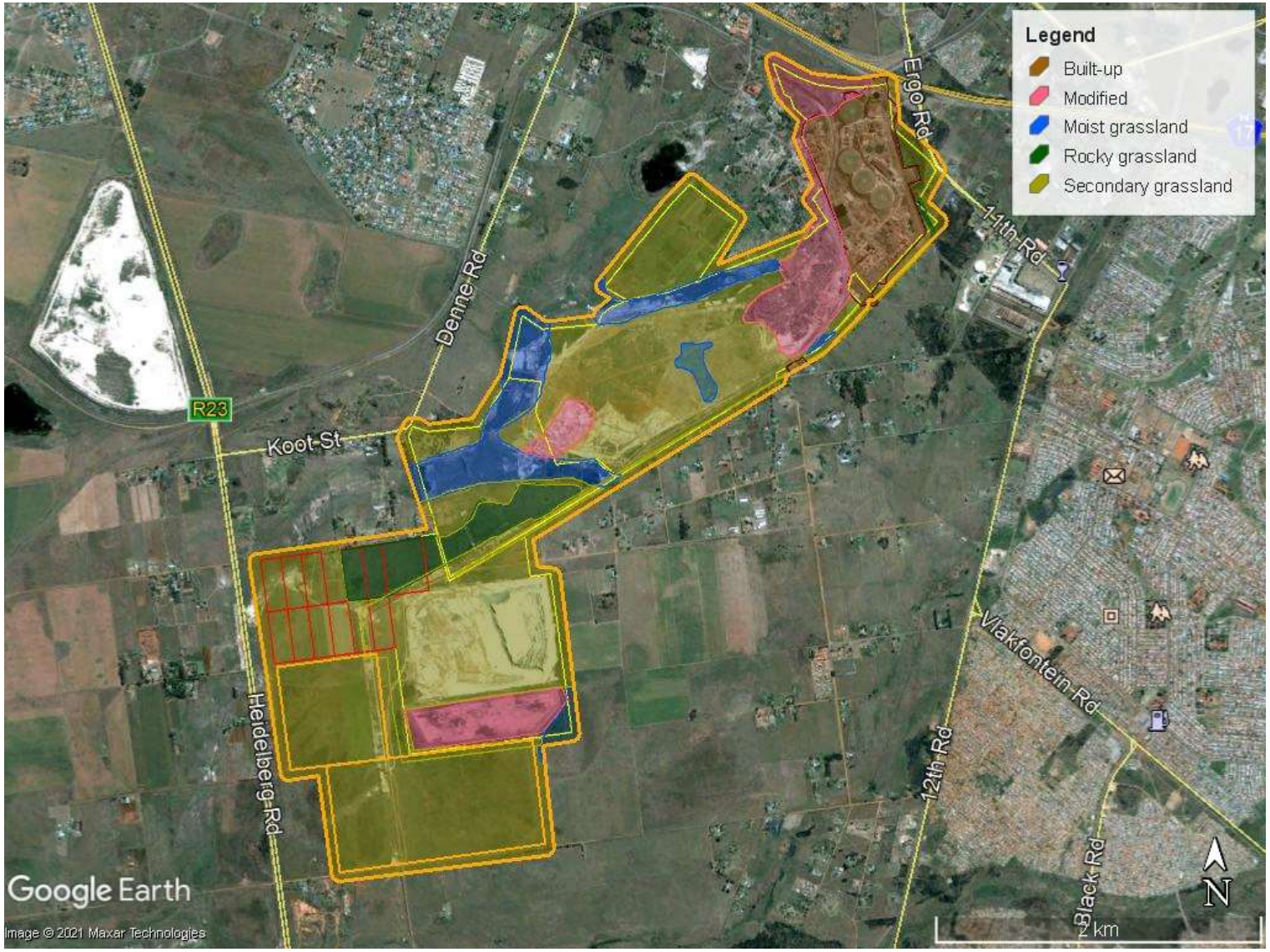
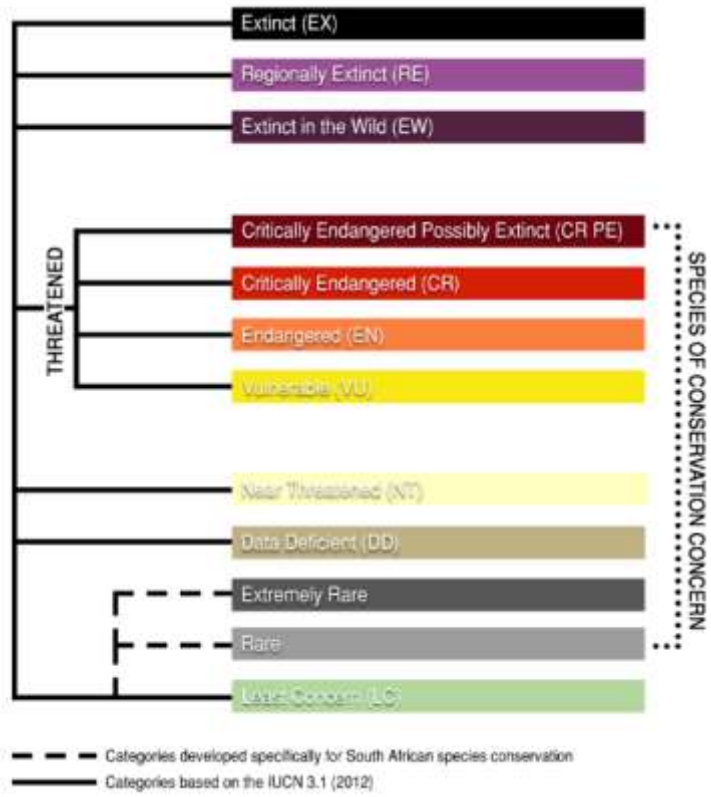


Figure 13: Preliminary vegetation map

3.4 Plant Species of Conservation Concern (PSCC)

Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened, Extinct in the wild, Data deficient, Near-threatened, Critically rare, Rare and Declining (Figure 14). Chapter 4, Part 2 of NEMA Biodiversity Act, 2004 (Act No. 10, 2004) provides for listing of species that are threatened or in need of protection to ensure their survival in the wild, while regulating the activities, including trade, which may involve such listed threatened or protected species and activities which may have a potential impact on their long-term survival.



(Source: http://redlist.sanbi.org/redcat.php)

Figure 14: Threatened species and species of conservation concern

A list of plants of conservation concern was compiled using information from the South African National Biodiversity Institute's (SANBI) checklist (SANBI, 2009), Raimondo *et al*, (2009) and information received from the Gauteng Department of Agriculture and Rural Development (GDARD) for the quarter degree square (qds) 2628AD. Appendix A list the species that was historically recorded in the area and that will be surveyed for during the summer site visit.

3.5 Protected plants

3.5.1 NEMBA Threatened or Protected Plant Species (TOPS)

Chapter 4, Part 2 of the National Environmental Management: Biodiversity Act (No. 10 of 2004), (NEMBA) provides for listing of plant and animal species as threatened or protected. If a species is listed as threatened, it must be further classified as Critically Endangered, Endangered or Vulnerable. These species are commonly referred to as TOPS listed. The Act defines these classes as follows:

- Critically endangered species: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- Endangered species: any indigenous species facing a high risk of extinction in the wild soon, although it is not a critically endangered species.
- Vulnerable species: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- Protected species: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category will include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as 'Restricted Activities', are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling. The first list of threatened and protected species published under NEMBA was published in the government gazette on the 23rd of February 2007 along with the Regulations on Threatened or Protected Species.

The site visit undertaken in summer, will determine the likely occurrence of such species.

3.5.2 Provincially Protected Plants

Several provincially protected plants are listed in the Transvaal Nature Conservation Ordinance Act No. 12 of 1983. These plants are not to be removed, damaged, or destroyed without permit authorisation from Gauteng Department of Agriculture and Rural Development (GDARD).

The site visit undertaken in summer, will determine the likely occurrence of such species.

5. PRELIMINARY SITE ECOLOGICAL IMPORTANCE

It has been clearly demonstrated that vegetation not only forms the basis of the trophic pyramid in an ecosystem, but also plays a crucial role in providing the physical habitat within which organisms complete their life cycles (Kent & Coker 1992). Therefore, the vegetation of an area will largely determine the ecological sensitivity thereof.

5.1 Rating and Analysis

The preliminary Site Ecological Importance (SEI) in terms of vegetation is discussed and mapped as per the requirements of the Draft Species Environmental Assessment Guideline (SANBI, 2020) and detailed in the methodology section (Section 2.5).

SEI is a function of the (BI) of the receptor (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site13) and its resilience to impacts () as follows:

SEI = Biodiversity Importance (**BI) +** Receptor Resilience **(RR)**

Wherein **BI** in turn is:

BI = Conservation Importance (**CI) +** Functional Integrity (**FI)**

Table 5: Preliminary scoring of vegetation that occurs within the PAOI

Preliminary broad vegetation community	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Biodiversity Importance (BI)	Preliminary Site Ecological Importance (SEI) – mitigation
Secondary grasslands*	Very -low	Medium	High	Very-low	**Very-low (Minimise & Restore)**
Modified vegetation	Very -low	Low	High	Very-low	**Very-low (Minimise & Restore)**
Degraded Rocky grassland	Very high (threatened ecosystems)	Medium	Medium	High	**High (Avoid & Minimise)**
Moist grassland	High	Medium	Medium	Medium	**Medium (Minimise & Restore)**

* The site visit may find that some secondary grassland reached an advances succession state and may be rated as medium sensitivity. The areas most likely to be rated medium are south and south west of the southern tailings dam, which was not ground-truthed during the phase 1 assessment.

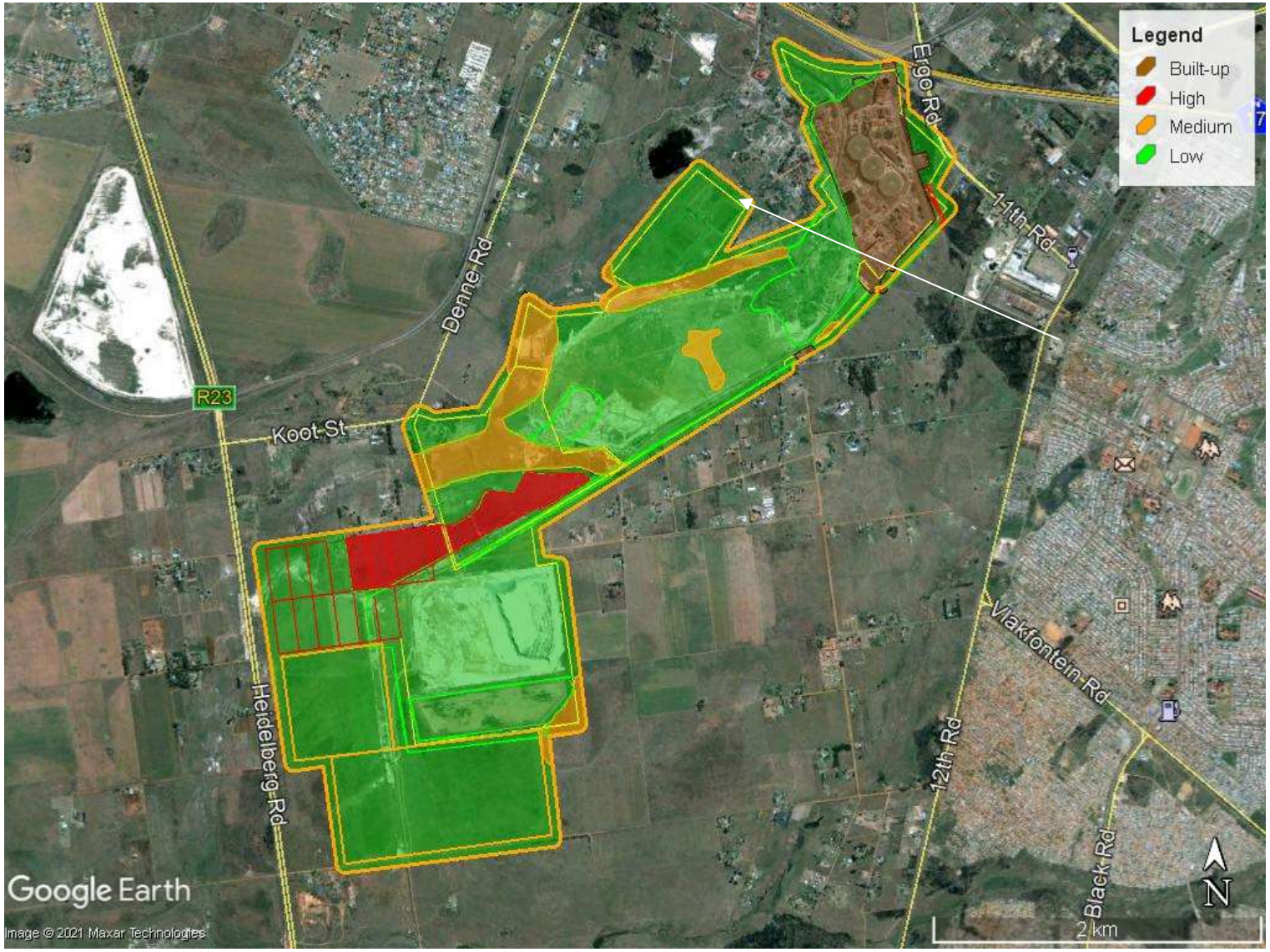


Figure 15: Preliminary Site Ecological Sensitivity for the proposed site, including a 50m buffer

5.2 Discussion of SEI results

The interpretation of the SEI ranks is described in Section 2: Methodologies; Table 4. The preliminary SEI rating was utilised to generate the vegetation sensitivity map (Figure 15). This map must be considered as a preliminary map until such time that it is verified with a field survey.

5.2.1 High SEI

The semi-natural to natural rocky grassland should be regarded as sensitive until its state and potential to support plant species of conservation concern is verified. As per the GDARD sensitivity mapping rules, all good condition grassland must be regarded as sensitive (GDARD, 2012). In addition, the remaining natural vegetation falls within CBAs: Important and provide suitable habitat for plant species of conservation concern.

5.2.2 Medium SEI

The moist grasslands have been impacted on by mining activities. Although the species diversity is likely compromised, the vegetation function remains largely intact. Development must be restricted in footprint and impacts managed and mitigated by an approved management plan.

5.2.3 Low and very-low SEI

The secondary grasslands and modified vegetation are likely not representative of the natural state and will probably comprise of a low species diversity with no plant species of conservation concern present or likely to be present. *Note that secondary grasslands may exhibit a higher species diversity during ground-truthing and may be rated as medium sensitivity*. Development activities of medium to high impact are acceptable followed by appropriate restoration activities. Edge effects must be prevented.

6. PRELIMINARY IMPACT ASSESSMENT AND MITIGATION

Mankind depends on the natural environment for many ecological services provided for by ecosystems, ecological processes, and plant species in general. However, any development activities in natural systems will impact on the surrounding natural environment and usually in a negative way. To limit or negate these impacts, the source, extent, duration, and intensity of the possible impacts needs to be identified. Once the significance of the impacts is understood, the development could both adequately plan for and mitigate these impacts to a best practise and acceptable level. However, if the impacts are significant, especially in already threatened ecosystems and vegetation units, and no adequate mitigation measures could reduce or avert these impacts, then the development should not be allowed to proceed.

6.1 Impact statement and recommendation

Due to the largely modified and secondary nature of the vegetation, the proposed development will have a limited impact on sensitive vegetation. However, the degraded rocky grassland and moist grassland should be investigated as these areas could provide suitable habitat to plant species of conservation concern.

6.2 Impact Assessment Criteria

The possible impacts, as described in the next section, were assessed based on the Significance Rating as received from Environmental Management Assistance. The Significance of the impact is calculated as follows and rating significance is explained below:

Significance = Consequence *(Extent + Duration+ Magnitude)* **X Probability**

I. The **nature,** which shall include a description of what causes the effect, what will be affected and how it will be affected.

II. The **extent,** wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):

III. The **duration,** wherein it will be indicated whether
- the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
- the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
- medium-term (5–15 years) – assigned a score of 3;
- long term (> 15 years) - assigned a score of 4; or
- permanent - assigned a score of 5;

IV. The **consequences (magnitude),** quantified on a scale from 0-10, where
- 0 is small and will have no effect on the environment,
- 2 is minor and will not result in an impact on processes,
- 4 is low and will cause a slight impact on processes,
- 6 is moderate and will result in processes continuing but in a modified way,
- 8 is high (processes are altered to the extent that they temporarily cease), and
- 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

V. The **probability** of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where
- 1 is very improbable (probably will not happen),
- 2 is improbable (some possibility, but low likelihood),
- 3 is probable (distinct possibility),
- 4 is highly probable (most likely) and
- 5 is definite (impact will occur regardless of any prevention measures).

VI. The significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and

VII. The **status**, which will be described as either positive, negative or neutral.

VIII. The degree to which the impact can be reversed.

IX. The degree to which the impact may cause irreplaceable loss of resources.

X. The degree to which the impact can be mitigated.

The **significance** weightings for each potential impact are as follows:

- **< 30 points:** **Low** (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- **30-60 points:** **Medium** (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- **60 points:** **High** (i.e. where the impact must have an influence on the decision process to develop in the area).

6.3 Impact Assessments

The tables below list the activities that could impact on the vegetation due to the proposed development on the site. The tables also list recommended mitigation measures to limit the impacts.

6.3.1 Destruction of natural vegetation of high and medium sensitivity (rocky grassland and moist grasslands)

Activity:	Clearing of vegetation at construction footprints				
Impact:	Destruction of natural vegetation (rocky grassland and moist grassland): • Edge effects e.g. heavy vehicles turning in adjacent areas; and • Storage of equipment within vegetation				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2 Site and surrounds	8	4	**48 Medium**
Post-Mitigation	2	1 Site	4	3	**21 Low**
Is the Impact Reversible?	• Impact on rocky- and moist grassland is difficult to rehabilitate and therefore must be avoided				
Mitigation Measures:	*Planning:* • The rocky grassland and moist grasslands should be assessed in the summer months to determine the state of the vegetation and potential to support plant species of conservation concern. • Do not plan any construction camps or laydown areas within the sensitive moist grassland and rocky grassland vegetation. *Construction:*				

	An independent Ecological Officer (EO) or Environmental Control officer (ECO) should be appointed to oversee construction. No go areas can be demarcated prior to commencement of works as per recommendations of ecological specialist. • A temporary fence or demarcation must be erected around the construction area (include the servitude, construction camps, areas where material is stored and the actual footprint of the development) to prevent access to sensitive environs. • Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area. • No open fires are permitted within naturally vegetated areas. • Make use of existing roads and tracks. • Do not dump litter or material within any vegetated aeras. *Operation and Maintenance:* • After construction, the land must be cleared of rubbish (refuse, waste material and litter), surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction. • Ensure that maintenance work does not take place haphazardly, but according to a fixed plan. • Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. • Address erosion, applying soil erosion control and bank stabilisation procedures as needed.
Cumulative impacts:	• Degradation of watercourses and fragmentation of open spaces. • Increase in similar developments.
Residual impacts:	• Trampling of rocky grassland and moist grassland vegetation. • Degradation due to edge effects • Localized alteration of soil surface characteristics and loss of flora, possible increased fragmentation of remaining natural grassland. If mitigation measures are adequately undertaken, the residual risk is considered to be low.
Climate Change:	• NA

6.3.2 Destruction of modified vegetation of low sensitivity

Activity:	Clearing or disturbance to vegetation at construction footprints
Impact:	Destruction of modified and secondary vegetation: • Clearing of and damage to vegetation in construction footprint, access roads, construction camps, vehicle / machinery traffic and trampling by workers

<table>
<tr><td></td><td colspan="5">

Illegal disposal and dumping of construction material such as cement or oil, as well as maintenance materials during construction;
Edge effects e.g. heavy vehicles turning in adjacent areas;
Storage of equipment within vegetation; and
Maintenance vehicles driving within natural or rehabilitated vegetation, not impacted on during the construction, will lead to the destruction of naturally occurring vegetation and compaction of soils and subsequent erosion or colonisation by alien invasive plant species. In addition, failed rehabilitation could lead to soil erosion during rainfall events and flooding

</td></tr>
<tr><td>Significance rating:</td><td>Duration</td><td>Extent</td><td>Magnitude</td><td>Probability</td><td>Significance</td></tr>
<tr><td>Pre-Mitigation</td><td>2</td><td>2 Site and surrounds</td><td>4</td><td>5</td><td>40 Medium</td></tr>
<tr><td>Post-Mitigation</td><td>2</td><td>1 Site</td><td>2</td><td>5</td><td>25 Low</td></tr>
<tr><td>Is the Impact Reversible?</td><td colspan="5">

Yes, modified and secondary vegetation can be re-established.

</td></tr>
<tr><td>Mitigation Measures:</td><td colspan="5">
Planning:

Keep the development footprint as small as possible to make sure the vegetation remains functional. This will ensure that the surrounding vegetation can serve as a seedbank for the disturbed areas.

Construction:
An independent Ecological Officer (EO) or Environmental Control Officer (ECO) should be appointed to oversee construction. No go areas can be demarcated prior to commencement of works as per recommendations of ecological specialist.

Keep the development footprint as small as possible.
A temporary fence or demarcation must be erected around the construction area (include the servitude, construction camps, areas where material is stored and the actual footprint of the development) to prevent access to sensitive environs.
Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area.
No open fires are permitted within naturally vegetated areas.
Make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas.
A vegetation rehabilitation plan should be implemented at the start of construction. The modified grassland can be removed as sods and stored within modified areas – remove alien invasive vegetation prior to storing grasslands sods in transformed areas. The sods must preferably be removed during the winter months and be replanted by latest springtime. The sods should not be stacked on top of each

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</table>

	other. Once construction is completed, these sods should be used to rehabilitate the disturbed areas from where they have been removed. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks. • Grass species, typical of the Highveld Grasslands can be sown in prepared soils. Revegetation should take place successively to re-establish vegetation as soon as possible after construction in a specific area. • Construction workers may not remove flora and neither may anyone collect seed from the plants without permission from the local authority. • Where topsoils need to be removed, store such in a separate area where such soils can be protected until they can be re-used for post-construction rehabilitation. o Never mix topsoils with subsoils or other spoil materials • Maintain site demarcations in position until the cessation of construction work. • After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction. *Operation and Maintenance:* • After construction, the land must be cleared of rubbish (waste material, refuse or litter), surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction. • Ensure that maintenance work does not take place haphazardly, but according to a fixed plan. • Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. • Address erosion, applying soil erosion control and bank stabilisation procedures as needed. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • Delay the re-introduction of livestock (where applicable) to all rehabilitation areas until an acceptable level of re-vegetation has been reached.
Cumulative impacts:	• Degradation of watercourses. • Increase in similar developments.
Residual impacts:	• Degradation due to edge effects • Localized alteration of soil surface characteristics and loss of flora,

	possible increased fragmentation of remaining natural grassland If mitigation measures are adequately undertaken, the residual risk is low.
Climate Change:	• NA

6.3.3 Exposure to erosion and subsequent sedimentation or pollution of proximate moist grassland

Activity:	Clearing of vegetation at construction footprints, access roads and lack of rehabilitation. Possible impacts can arise during maintenance.				
Impact:	The removal of surface vegetation will expose the soils, which in rainy events would wash down into moist grasslands and rivers, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive plant species can spread easily into these eroded soils. After construction, a lack of rehabilitation or failed rehabilitation will result in bare soils that are susceptible to erosion. Furthermore, maintenance vehicles could disturb rehabilitated areas which could lead to soil erosion, habitat modification, trampling of vegetation as well as the destruction of protected plants and plants of conservation concern. The sources of this impact include: • Removal of vegetation upslope of the moist grassland, without proper rehabilitation or failure of rehabilitation; • Access roads, especially on slopes, channels rainfall and causes erosion; • Maintenance vehicles disturbing rehabilitated areas; • Spillages of construction material and harmful chemicals; and • Failure of rehabilitation of the construction footprint.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2 Site and surrounds	8	4	**48 Medium**
Post-Mitigation	2	1 Site	4	3	**21 Low**
Is the Impact Reversible?	• Yes, however, rehabilitation activities are costly				
Mitigation Measures:	*Planning:* • Where possible, no construction / activities should be undertaken within the moist grasslands. The extent of wetland conditions should be verified by a wetland specialist and no activities should take place within these areas without that a Water Use License was granted by the Department of Water and Sanitation (DWS) for these activities. *Construction:* • Do not allow erosion to develop on a large scale (e.g. beyond the initial onset of erosion) before acting.				

	• Make use of existing roads and tracks where feasible, rather than creating new routes through grassland areas. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area (DWAF, 2005). • Runoff from roads must be managed to avoid erosion and pollution problems. • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. The grassland can be removed as sods and re-established after construction is completed. • Colonisation of the disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. • Prevent spillage of construction material, oils or other chemicals, strictly prohibit other pollution. Ensure there is a method statement in place to remedy any accidental spillages immediately. • After construction clear any temporarily impacted areas of all foreign materials, re-apply and/or loosen topsoils and landscape to surrounding level. *Operation and Maintenance:* • Do not disturb soil unnecessary during maintenance. • Ensure maintenance work does not take place haphazardly, but according to a fixed plan. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • Monitor rehabilitation and ensure that rehabilitated areas do not erode. • If monitoring finds that indigenous vegetation from the surrounding grasslands is not colonising the site, implement a re-vegetation plan to ensure that grass species that naturally occur in the Tsakane Clay Grassland, are sowed to re-establish indigenous plant cover. • Monitor rehabilitation and delay the re-introduction of livestock (where applicable) to all rehabilitated areas until an acceptable level of re-vegetation has been reached.

	• Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.
Cumulative impacts:	• Erosion of the development footprint upslope from the moist grasslands could increase sedimentation in already degraded watercourses in the area. However, this could be mitigated. • Possible erosion of areas lower than the access roads, possible contamination of wetlands and/or groundwater reserves due to hydrocarbon or other spillage and an increase of modified areas (together with surrounding developments) that will affect flora population dynamics and runoff patterns
Residual impacts:	• A risk that heavy rain and flooding could erode the base of structures, or the subsequent removal or destruction of the vegetation by other land uses do remain.
Climate Change:	• Loss of biodiversity and soil condition that buffer climate change

6.3.4 Removal / Destruction of protected plants and plants of conservation concern

Activity:	Construction and possibly maintenance				
Impact:	Provincially protected or threatened plants and their habitat could be impacted.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2 Site and surrounds	8	4	**48 Medium**
Post-Mitigation	2	1 Site	4	3	**21 Low**
Is the Impact Reversible?	Depending on the species recorded, if any				
Mitigation Measures:	*Planning:* • Avoid natural vegetation (rocky and moist grasslands) that can house plant species of conservation concern, until such time that a specialist determined the state thereof and whether habitat for such species is present. *Construction:* • The EO / ECO should take note of any unearthed geophytes or orchids and contact a specialist for the correct naming and threat status of the species. This will determine whether any follow-up action is required.				

Cumulative impacts:	• If mitigation measures are adequately implemented, no cumulative impacts are expected.
Residual impacts:	• Trampling during maintenance
Climate Change:	• NA

6.3.5 Potential increase in invasive vegetation

Activity:	Disturbed soils due to construction and trampling				
Impact:	The seed of alien invasive plant species that occur on and in the vicinity of the construction areas could spread into the disturbed and stockpiled soil. Also, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds or indigenous plants not belonging to this vegetation unit to the construction site. In addition, if rehabilitation of the indigenous vegetation along the route are unsuccessful or is not enforced, exotic and invasive vegetation may invade the area.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2 Site and surrounds	6	4	**40 Medium**
Post-Mitigation	2	1 Site	4	3	**21 Low**
Is the Impact Reversible?	Yes, however, rehabilitation activities are costly and can take several years to clear invasive species and destroy their seedbank.				
Mitigation Measures:	*Planning:* • Alien invasive species, in particular category 1b species that were identified within the study area (Dimela Eco Consulting, 2021), should be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation. • Manual removal is preferred to chemical control, particularly in the moist grassland. • Only suitably trained contractors (e.g. certified by the South African green Industries Council (SAGIC)) with knowledge of the species in question should be employed. • All alien seedlings and saplings must be removed as they become evident for the duration of construction. • All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO.				

	• If filling material is to be used, this should be sourced from areas free of invasive species. *Construction:* • Implement an alien invasive plant monitoring and management plan whereby the spread of alien and invasive plant species into the areas disturbed by the construction are regularly removed and re-infestation monitored.
Cumulative impacts:	• Several invasive species are present within the area that the proposed development is situated in. Therefore, if mitigation measures to limit and prevent the spread of alien species are not implemented, the cumulative impact could lead to remaining natural vegetation transformed by alien plant species.
Residual impacts:	• Re-infestation in areas initially cleared.
Climate Change:	• Loss of biodiversity that buffer climate change

6.3.6 Compaction and destruction of soils

Activity:	Clearing of vegetation and soil disturbance.				
Impact:	The movement of heavy machinery over vegetated areas during construction and maintenance will result in soil compaction that will modify habitats, destroy vegetation, and inhibit re-vegetation. Soil compaction because of vehicles and traffic, could lead to a decrease of water infiltration and an increase of water runoff. Such areas are more likely to be colonised by pioneer, alien invasive plant species, than indigenous species. This will further transform the vegetation of the area. The health of the topsoil is imperative for re-vegetation. Incorrect stripping, handling and storage could lead to failed rehabilitation.				
Significance rating:	**Duration**	**Extent**	**Magnitude**	**Probability**	**Significance**
Pre-Mitigation	2	2 Site and surrounds	8	4	**48 Medium**
Post-Mitigation	2	1 Site	4	3	**21 Low**
Is the Impact Reversible?	• Yes.				
Mitigation Measures:	*Construction:* • Vehicles and machinery may not veer from the dedicated roads. • Once construction is complete, obsolete roads should be obliterated by breaking the surface crust and erecting earth embankments to prevent erosion, while the natural species composition should be re-established.				

	• Prior to construction, the topsoil must be removed and stored separately from subsoil. The topsoil is imperative for the successful re-establishment of indigenous vegetation and it carries seed from the existing vegetation. • Topsoil (the upper 25 cm of soil) is an important natural resource; where it must and can be stripped, never mix it with subsoil or any other material, store and protect it separately until it can be re-applied, minimise handling of topsoil. • Topsoil is typically stored in berms with a width of 150 – 200 cm, and a maximum height of 100 cm, preferably lower, ideally in a disturbed but weed-free area. Place berms along contours or perpendicular to the prevailing wind direction. • Rapid decomposition of organic material in warm, moist topsoils decreases microbial activity necessary for nutrient cycling, and reduces the number of beneficial micro-organisms in the soil. Therefore, topsoil should therefore not be stored for extensive periods and it is recommended that the reapplication of topsoil takes place as soon as possible. Adhere to the following general rule: *the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored* • Topsoil handling should be limited to stripping, piling (once), and re-application. • Any movement of heavy machinery or vehicles over stored topsoils must be strictly prohibited. *Maintenance:* • Maintenance vehicles may not deviate from dedicated roads.
Cumulative impacts:	• Failed rehabilitation and soil compaction could lead to a cumulative invasion by alien invasion plant species from the surrounding transformed vegetation that can easily spread into the compacted soils.
Residual impacts:	• Altered soil characteristics and vegetation that remain in an unstable, pioneer phase or invaded by alien invasive plant species.
Climate Change:	• Soil disturbances, resulting in a loss of biodiversity.

7. CONCLUSION

The site falls in an area that is listed by the National Screening Tool as being of 'High' terrestrial biodiversity. Furthermore, the Screening Tool lists a 'Medium' sensitivity for plant species, indicating that there is a likelihood of plant species of conservation concern being present.

However, much of the proposed development footprint has been modified from the naturally vegetated state. Due to the largely modified and secondary nature of the vegetation, the proposed development of the PV facility, will likely have a limited impact on sensitive vegetation. Rocky grassland and moist grassland areas are potentially sensitive and must be assessed during the summer months to determine

the state of the vegetation, whether suitable habitat for plant species of conservation concern is present or to confirm localities if found to be present. The final layout should thus take cognisance that rocky grassland and moist grassland may be undevelopable, depending on the findings.

The specialist must assess the proposed footprint and based on the findings:

1. Amend the vegetation sensitivity map and discuss no-go areas.
2. Discuss the occurrence of plant species of conservation concern, if any.
3. Give a reasoned opinion whether the development can go ahead from a vegetation perspective and recommend mitigation measures to limit the perceived negative impacts on vegetation.

8. PROTOCOL SUMMARY

For ease of reference, the following table summarises results of the assessment as per the main requirements of the Protocols for Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial (Vegetation) Biodiversity as published on 20 March 2020.

Table 6: Summary of the main terrestrial (vegetation) biodiversity findings

Biodiversity (vegetation) aspect	Result
Conservation Plan Category: **CBA**	**Reason for the CBA** The CBAs within and around the proposed site are classified based on the potential habitat for plant species of conservation concern and the potential presence of primary vegetation **Can CBA be maintained?** Depends on final layout. Secondary grasslands that correspond to CBAs should be considered with caution for any development, or not at all. **Impact on species composition and structure of vegetation** Areas that will be developed are proposed to be contained within the existing secondary and modified vegetation. If mitigation is implemented no natural to semi-natural grasslands will be affected, if present. **Impact on ecosystem threat status** Limited natural vegetation remains and therefore the proposed site has limited potential to conserve threatened ecosystems **Impact on explicit subtypes in the vegetation; and the impact on overall species and ecosystem diversity of the site;** See above
Protected Areas	• Not applicable
Strategic Water Source Areas (SWSA):	**Impact(s) on the terrestrial habitat of a SWSA**

Biodiversity (vegetation) aspect	Result
	The site is not situated within a SWSA, however clearing of vegetation can have an impact on water infiltration and flow dynamics to the moist grassland and downstream watercourses. **Impacts of the proposed development on the SWSA water quality and quantity** Erosion, sedimentation and pollution caused by clearing of vegetation for the development, could impact on the downstream water quality temporarily (e.g. during construction). Once indigenous vegetation has re-established or recovered, the impact will be negligible, provided that impermeable surfaces are limited, and no runoff water are directed towards the moist grassland
National Freshwater Ecosystems Priority Areas (NFEPA):	See wetland assessment
Indigenous forest	Not applicable
Sensitive Areas	• As per the GDARD Requirements for Biodiversity Assessments Version 2 (2012): "All good condition natural vegetation must be designated as ecologically sensitive". The rocky grassland may be in a good ecological condition and falls within a CBA that forms part of a Critically Endangered Ecosystem. However, the extent of the rocky grassland is limited, and it has likely been degraded by surrounding impacts. This will be the focus of the summer survey. • The buffer area to the moist grasslands, as delineated by the wetland specialist must be avoided.
No go areas	Avoid direct impacts to moist grasslands and rocky grassland.
Plant species of conservation concern	• To be confirmed during site survey in summer.
Main impacts:	The main impacts expected are as follows: • Destruction of natural vegetation of high and medium sensitivity (rocky- and moist grassland) • Destruction of modified vegetation of low sensitivity • Exposure to erosion and subsequent sedimentation or pollution of proximate moist grassland (watercourse) • Removal / Destruction of protected plants and plants of conservation concern • Potential increase in invasive vegetation • Compaction and destruction of soils
Cumulative impacts:	• If mitigation measures are adequately implemented, no cumulative impacts are expected.
Residual impacts:	• Trampling and edge effects; and • Impacts to the watercourse such as runoff from roads.

9. REFERENCES

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Internet recourses:

DEA screening tool report for the site: https://screening.environment.gov.za/screeningtool/

10. GLOSSARY

Conservation concern (Plants of..)	Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened (see **Threatened**), Extinct in the wild, Data deficient, **Near threatened**, Critically rare, Rare and **Declining**. These plants are nationally protected by the National Environmental Management: Biodiversity Act. Within the context of these reports, plants that are provincially protected are also discussed under this heading.
Critically Endangered	A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
Data Deficient	There is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. However, "data deficient" is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.
Declining	A taxon is declining when it does not meet any of the five IUCN criteria and does not qualify for the categories Threatened or Near Threatened, but there are threatening processes causing a continuous decline in the population (Raimondo *et al*, 2009).
Edge effect	Inappropriate influences from surrounding activities, which physically degrade habitat, endanger resident biota and reduce the functional size of remnant fragments including, for example, the effects of invasive plant and animal species, physical damage and soil compaction caused through trampling and harvesting, abiotic habitat alterations and pollution
Endangered	A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future
Exotic species	Plant taxa in a given area, whose presence there, is due to the intentional or accidental introduction as a result of human activity
Forb	A herbaceous plant other than grasses.
Indigenous	Any species of plant, shrub or tree that occurs naturally in South Africa
Invasive species	Naturalised alien plants that have the ability to reproduce, often in large numbers. Aggressive invaders can spread and invade large areas
Irreversibly modified	An ecological condition class in which the ecosystem has been modified completely, with an almost complete loss of composition and structure. All or

	most ecosystem function has been destroyed and the changes are irreversible. Can apply to a site or an ecosystem.
Mitigation	The implementation of practical measures to reduce adverse impacts
Moderately modified	An ecological condition class in which ecological function is predominantly unchanged even though composition and structure have been compromised. Equates to a fair ecological condition or semi-natural
Natural	Unmodified. No significant changes in composition, structure or function have taken place. Good ecological condition.
Near Natural	Small changes in composition and structure may have taken place, but ecosystem functions are essentially unchanged. Good ecological condition
Near Threatened	A Taxon is Near Threatened when available evidence indicates that that it nearly meets any of the five IUCN criteria for Vulnerable and is therefore likely to qualify for a threatened category in the near future (Raimondo *et al*, 2009).
Protected Plant	According to Provincial Nature Conservation Ordinances or Acts, no one is allowed to sell, buy, transport, or remove this plant without a permit from the responsible authority. These plants are protected by provincial legislation.
Red Data	A list of species, fauna and flora that require environmental protection - based on the IUCN definitions. *Now termed Plants of Conservation Concern*
Semi-natural	Ecological function is predominantly unchanged even though composition and structure have been compromised. Fair ecological condition
Severely modified	An ecological condition class in which loss of composition, structure and ecological function is extensive. The land is in a poor ecological condition.
Species diversity	A measure of the number and relative abundance of species
Species richness	The number of species in an area or habitat
Threatened	Threatened Species are those that are facing a high risk of extinction, indicated by placing in the categories Critically Endangered (CR), Endangered (E) and Vulnerable (VU) (Raimondo *et al,* 2009)
Vegetation Unit	A complex of plant communities ecologically and historically (both in spatial and temporal terms) occupying habitat complexes at the landscape scale. Mucina and Rutherford (2006) state: "Our vegetation units are the obvious vegetation complexes that share some general ecological properties such as

	position on major ecological gradients and nutrient levels, and appear similar in vegetation structure and especially floristic composition".
Vulnerable	A taxon is Vulnerable when it is not Critically Endangered or Endangered but meets any of the five IUCN criteria for Vulnerable and are therefore facing a high risk of extinction in the wild in the future (Raimondo *et al*, 2009)

APPENDIX A: PLANTS OF CONSERVATION CONCERN

The species listed below have previously been recorded in the qds and are the most likely to occur on or around the site.

Species	Conservation Status	Habitat notes and *likelihood of occurrence*	Flowering period
Boophone distichia	Declining (reclassified to LC nationally)	Rocky grassland *Suitable habitat is present in the degraded rocky grassland*	Oct-Jan
Crinum bulbispermum	Declining (reclassified to LC nationally)	Occurs near rivers, streams, seasonal pans and in damp depressions. *Suitable habitat is present along the tributaries of the Withokspruit.*	Sept-Nov
Hypoxis hemerocallidea	Declining (reclassified to LC nationally)	Occurs in a wide range of habitats, from sandy hills on the margins of dune forests to open rocky grassland. *Suitable habitat is present in the degraded rocky grassland and secondary grasslands*	Sept-March
Gunnera perpensa	Declining (reclassified nationally as Least Concern)	Damp marshy area and vleis from coast to 2400m. *Suitable habitat within the tributaries to the Withokspruit.*	Oct-March
Eucomis autumnalis	Declining (reclassified nationally as Least Concern)	Damp, open grassland and sheltered places between rocks. Up to 2450m. *Suitable habitat is present in moist grasslands and along the tributaries to the Withokspruit.*	Nov-April
Argyrolobium campicola	Near threatened	Highveld grassland. *Suitable habitat is present within the degraded rocky grassland.*	Nov-Feb
Delosperma leendertziae	Near Threatened	Rocky ridges, on rather steep south facing slopes of quartzite in mountain grassveld. *No suitable habitat is thought to be present on the site*	Oct-April
Gnaphalium nelsonii	Near threatened	Seasonally wet places in grassland and savanna, and along dry watercourses. *Suitable habitat is present.*	Oct-Dec
Habenaria barbertoni	Near threatened	In grassland on rocky hillsides and in bushveld in association with Acacia-trees at an altitude of 1000-1500m. *No suitable habitat is thought to be present on the site*	Feb-March
Habenaria bicolor	Near Threatened	Terrestrial in drained grassland, recorded from about 1600m. *Suitable habitat is present in the degraded rocky grassland, however, it is thought to be unlikely to occur.*	Jan-April

Species	Conservation Status	Habitat notes and *likelihood of occurrence*	Flowering period
Habenaria kraenzliniana	Near threatened	Stony, grassy hillsides, mainly in Gauteng *Suitable habitat is present in the degraded rocky grassland.*	Feb-April
Kniphofia typhoides	Near Threatened	Heavy, black clay soil, climax *Themeda triandra* grassland, low lying marshy ground - pans or vleis. *Suitable habitat is present in moist grasslands and along the tributaries to the Withokspruit.*	Feb-March
Lithops lesliei subsp. *lesliei*	Near threatened	Primary habitat appears to be the arid grasslands in the interior of South Africa where it usually occurs in rocky places, growing under the protection of surrounding forbs and grasses. This plant is well camouflaged in brown shale on hilltops and difficult to spot when not in flower. *Suitable habitat is present in the degraded rocky grassland and it is therefore **likely** in the rocky grassland north of the slurry pipes.*	March-June
Bowiea volubilis subsp. *volubilis*	Vulnerable	Climber. Usually occurs along mountain ranges and in thickly vegetated river valleys. Often grows under bush clumps and in boulder screes it is often found in open and or on steep rocky hills usually in well-shaded situations. Tolerates wet and dry conditions. *No suitable habitat is thought to be present*	Sept-April
Cineraria longipes	Vulnerable	This specie occurs in grassland amongst rocks and along seepage areas and exclusively on basalt koppies on south facing slopes in association with *Pteridium*. The species has previously been recorded within the Klipriviersberg *No suitable habitat is present on the site*	March-May
Eulophia coddii	Vulnerable	Steep slopes, growing on sandstone-derived soils in grassland or bushveld. Heidelberg, Magaliesberg and Waterberg. *No suitable habitat is present on the site*	Late sprint - Early Dec
Khadia beswickii	Vulnerable	Open shallow soil over rocks in grassland. Known locations are declining due to habitat loss to urban and infrastructure development, alien plant invasion, mining and collecting for the specialist succulent horticultural trade. The plants main distribution is around the town of Nigel *Suitable habitat is present in the degraded rocky grassland*	Jul-April
Holothrix micrantha	Endangered	Terrestrial on grassy cliffs, recorded from 1500 to 1800m. *No suitable habitat is present on the site.*	Oct

APPENDIX B: SPECIALIST QUALIFICATIONS

Curriculum Vitae

Antoinette Eyssell-Knox

Personal Information Summary

Name:	Antoinette Eyssell-Knox
Highest qualification:	MSc Environmental Science (2010), University of Pretoria
Professional membership:	SACNASP Pr Sci Nat (400019/11) Ecological Science
Company:	Dimela Eco Consulting
Contact details:	Antoinette@dimela-eco.co.za
	Tel 083 642 6295

Professional Experience

1. Environmental Management:

I have been working in the field of environmental management as a vegetation specialist since the year 2007 (11 years). I have been self-employed since November 2011.

Nov 2011 – current:	Dimela Eco Consulting
Sep 2007 – Nov 2011:	Strategic Environmental Focus (SEF)

Main field of work and experience include:

- Vegetation assessments, overviews or scans;
- Strategic ecological assessments;
- Ecological management, rehabilitation- and biodiversity action plans (including alien vegetation management);
- Specialist input: Gauteng and North-West Outlook Reports, ecological conditional requirements for Green Star rating;
- Ground-truthing of vegetation related data;
- Review of ecological reports; and
- Mentoring.

2. Environmental Education:

2011 – current:	Writer of the ecology feature for the bimonthly Supernova Kids Magazine
Aug 2003 – Sep 2007:	Snr Environmental Education Officer, South African National Biodiversity Institute (SANBI), Pretoria National Botanical Garden

3. Horticulture

Jun – Jul 2003:	Horticultural Trainer, 7 Shaft Training Centre, Johannesburg
May 1997 – Mar 2002	Horticulturist, Pretoria National Botanical Garden (then NBI, now SANBI)

Qualifications

- M.Sc Environmental Science, University of Pretoria (2010)

Dissertation: *Land cover change and its effect on future land uses*

- B. Sc (Hons) Horticulture, University of Pretoria (1999-2000)

Dissertation: *Horticultural uses of the indigenous Barleria species*

- B. Sc (Agriculture) Horticulture, University of Pretoria (1993-1996)

Memberships and Affiliations

SACNASP: Registered as a Professional Natural Scientist in the field of ecology since 2011 (Reg no 400019/11)

Botsoc: Member of the Botanical Society of Southern Africa since 2013

Course History

2018: Asteraceae Identification Course

2015: SAGIC Invasive Species Consultant Training

2012: Tools for Wetland Assessment (Rhodes University – September 2012)

2012: Landscape Functional Assessment, introductory workshop with David Tongway and Prof Klaus Kellner (North West University)

2012: Soil Classification and Wetland Delineation (Terra Soil)

2007: ISO 14000 Advanced EMS Auditors Course (SGS & University of Pretoria)

2007: Introduction into Forestry Stewardship Council (FSC) (University of Pretoria)

2006: Permaculture training course (S.E.E.D)

2005: Project Management Course (Wildlife and Environment Society of South Africa (WESSA) Umgeni Valley)

2004: Grass and plant identification courses

Presentations

July 2007: Environmental Education in a changing world, World Environmental Education Conference (WEEC), Durban

Sept2006: Environmental Education, BGCI Conference, Oxford England

Selected Project Experience (2011 onwards)

1. <u>Provincial Environmental Outlook Reports</u>

2017-2018: Vegetation input: Gauteng Outlook Report

in process: Vegetation input: North-West Outlook Report

2. <u>Open Space Planning</u>

Nov 2015: The proposed Kaalspruit Open Space Project, Thembisa, Gauteng. Kaalspruit River Rehabilitation Biodiversity Scan: (NuLeaf Planning and Environmental)

2015-2016: City of Johannesburg Open Space Planning – vegetation input for Linbro Park, Bassonia, Kyalami and Ruimsig areas (Iggdrasil)

3. Management- and Rehabilitation Plans

April-May 2012: Vegetation base line study and input into Biodiversity Action Plan for Kumba Iron Ore (Lidwala Consulting Engineers)

Jan 2015: Environmental Management Plan for the Krugersdorp Nature Reserve – vegetation section

Jan 2016: Tharisa Mine Railway Line – Vegetation rehabilitation plan (Limosella Consulting)

Sept 2016: General vegetation rehabilitation plan for the proposed Mezo Kitchens Panel Processing Facility (Shangoni)

Nov 2016: General Ecological Rehabilitation and Monitoring Plan for the N4 additional lane between: R52 Koster offramp & D1325 Marikana Interchange; and The R512 (Brits West Interchange) & K67 (Ga-Rankuwa Interchange) North West and Gauteng Provinces

Nov 2016: Biodiversity Management Plan: Afrisam (Sa) (Pty) Ltd, Dudfield Cement – vegetation input

June 2017: Rehabilitation planning for the Klip- Lower and Upper Rietspruit Water Management Units (Pregio, via Limosella Consulting)

Dec 2017: Eskom underground cable river crossings – vegetation input into rehabilitation plants (Envirolution)

4. Linear Infrastructure

March 2012: Kranspoort road upgrade Protected tree identification (Lidwala Consulting Engineers)

Oct 2012: Eskom: Perseus to Gamma Vegetation assessment (Mokgope Consulting)

March 2013: Diepsloot Eskom line and substation, Johannesburg (Envirolution)

Nov 2013: Masa Ngwedi 750kV and 400kV lines (Limpopo & North-West Provinces) Section D & E Vegetation Input for EMP (Mandara Consulting)

2013-2014 Eskom: Northern Alignments (Perseus in the Northern Cape to Juno in the Western Cape) (Mokgope Consulting)

Feb 2014: Meteor substation, as well as the 88kV line between the Pulsar, Meteor and Sonland substations, Sebokeng, (Nsovo Environmental Consulting)

Dec2014: Upgrading of Internal Roads in Stinkwater, Hammanskraal (Gauteng) (GladAfrica)

Sept 2015: Railway Siding for GCMC Open Cast Mine, Lephalale (Limpopo)

Feb 2016: N4 - Additional lane between Brits and Rustenburg (Environamic)

Nov 2016: Aggeneis-Paulputs 400kV Powerline and Substations Upgrades

Feb 2017: Proposed Lulamisa to Diepsloot East to Blue Hills to Crowthorne 88kv Power Line / Cable and 2 Substations Gauteng (Envirolution)

May 2017: Proposed 132 kV Powerline Between Fochville Municipal Substation and an Existing Line, Gauteng Province (Envirolution)

5. Solar Developments

January 2012: Schmidsdrift, Northern Cape Vegetation Assessment for Solar Panels (Nuleaf)

Aug 2015: Proposed Construction of A 75mw Solar Energy Facility Project, Limpopo Tshikovha Environmental and Communication Consulting

6. Mining

April 2012:	Rietfontein Open Cast Vegetation assessment (Cabanga Concepts)
Jan 2013:	Vierfontein Colliery Vegetation assessment and EMP input (Cabanga Concepts)
Jan 2017:	G&W Base and Industrial Minerals Koppies Betonite Mine Vegetation Assessment & Management Input Report (Cabanga Concepts)

7. Other Development

Dec 2013:	Marekele Bush camp – vegetation & fauna assessments (NuLeaf)
May 2013:	Komati Power Station – Coal stockyard (Envirolution)
April 2014:	Blesboklaagte & Leeupoort Township development (Shangoni)
May 2014:	Goldi Farm Composting Site, Section 24G Fauna and Flora assessment and Summary document (Shangoni)
Feb 2015:	TOPIGS: Proposed Piggery,Mpumalanga(Shangoni)
May 2015:	Kwaggasrant Recycling Facility Upgrade (Shangoni)
Oct 2016:	Proposed piggery on portion 139 of the farm Honingnestkrans 269JR Vegetation and Fauna investigation (Methale Environmental Consulting)
Oct 2017:	Ongoing Clinic Development & Proposed Emergency Medical Services Facility on Prt 79 of the farm De Wagendrift 417 JR Gauteng Province. (Methale Environmental Consultants)

8. Plant relocation and monitoring

April 2014:	Relocation of *C bulbipermum,* overlooked Colliery in Mpumalanga (Cabanga Concepts)
Feb 2017:	Monitoring report for the relocated *Crinum bulbispermum* at Overlooked Colliery
May 2017:	Relocation of protected plant species: Evander Mine
Feb 2018:	Monitor populations of the Critically Endangered *Chlorophytum radula* at the Woodbush Plantation, Limpopo.

9. International:

Oct 2009:	Tatu, Nairobi: Vegetation Assessment (Kenya) (Lokisa Environmental Consulting)
Sept 2014:	Vegetation input to the Regional Environmental and Social Assessment of Coal-based Energy Projects along the South Africa- Botswana Border (World bank Project, Mott MacDonald)

10. Mentorship:

May 2017:	Technical Peer Review of the vegetation section for the Emfuleni Bulk Water Supply Pipelines: Ecological Assessment. GIBB Engineering & Architecture (Pty) Ltd
Nov 2017:	Mentorship and Technical Peer Review of the vegetation section for the Merensky-Kennedy Powerline: vegetation assessment GIBB Engineering & Architecture (Pty) Ltd