

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

**Terrestrial Biodiversity (Vegetation) Assessment
and plant Species Compliance Statement**

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- Working in the field of ecology, and in specific vegetation related assessments, since 2007;
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- Has been working with plants indigenous to South Africa since 1997.

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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.

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2022.08.30
Date

EXECUTIVE SUMMARY

The applicant, Tshedza 3 Investments (Pty) Ltd (Tshedza), wants to establish a 40MW Photovoltaic (PV) facility on portions 183 and 272 of the farm Witpoortje 117, Gauteng. As an alternative, portion 9 of Withok 131 is also proposed. 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. This final terrestrial vegetation report thus comprises a terrestrial (vegetation) assessment, with reference to the occurrence or possible occurrence of plant species of conservation concern on the site. This report included a site visit, as well as data collected during prior work undertaken in the area for the Phase 1¹ 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 alternative layouts: (note the alternatives has Prt 183 of Witpoortje 117IR in common).

Preferred site layout:

- Portion 183 of the Farm Witpoortje 117 I.R.
- Portion 272 of the Farm Witpoortje 117 I.R.

Alternative site layout:

- Portion 183 of the Farm Witpoortje 117 I.R.
- Portion 9 of the Farm Withok 131 I.R.

Complete a terrestrial plant assessment in line with the terrestrial biodiversity protocols, including:

- Supply background information on the site relating to conservation plans and threatened ecosystems;
- Field survey to determine the state of the vegetation and whether threatened or protected species are present or could be impacted on;
- Report and map describing the vegetation communities found on the site and its conservation importance and function within the landscape;
- Assessment and report on the impacts that the proposed development and related activities could have on the vegetation on site, as well as recommendations to limit or negate these perceived impacts.

¹ Phase 1, a 19.9MW PV facility with a 22kV Overhead power line and 100MWh Battery Energy Storage System (BESS) has previously been assessed and approved through a Basic Assessment Process (DMRE REF: GP 30/5/1/2/2 (158) MR).

Complete a terrestrial plant species site verification that will form part of the terrestrial vegetation assessment and will contain:

- An indication on whether plant species of conservation concern were recorded on the site or the likelihood of such species occurring;
- Map indicating confirmed or potential habitat for plant species that are of conservation concern, as well as ecologically sensitive vegetation groupings; and
- Where plant species of conservation concern are found on site or have been confirmed to be likely present, a Terrestrial Plant Species Specialist Assessment will be recommended that must be undertaken in accordance with the requirements specified in the protocol for environmental impacts on terrestrial plant species.

Baseline information:

The landscape of the study area is characterised by moderately undulating plains. However, portions of the Farm Witpoortje 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 Portion 183 of the Farm Witpoortje 117. 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 however 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 vegetation present were delineated follows:

1. Secondary grassland;
2. Moist grassland; and

3. Modified vegetation.

The preliminary Site Ecological Importance is described below:

| Preliminary broad vegetation community | <i>Preliminary</i> Site Ecological Importance (SEI) – mitigation |
|--|--|
| Secondary grasslands | Very-low (Minimise & Restore) |
| Modified vegetation | Very-low (Minimise & Restore) |
| 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. Development activities of medium to high impact are acceptable in the secondary grasslands, followed by appropriate restoration activities where needed. Most of the eastern extent of the proposed site as well as large soil heaps or remnant slimes material were classified as modified land. These areas are developable and of little to no conservation concern.

The sites fall 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. The results found that although the sites are within an area of high terrestrial biodiversity, the vegetation is disturbed and in a secondary state. However, it does retain some ecological function but the rating of "high" is challenged. Also, no sensitive plant species were recorded or are expected to be present in the Preferred and Alternative sites.

Due to the modified and secondary nature of the vegetation, the proposed development of the PV facility, will likely have no to limited impact on sensitive vegetation. The impacts on the Preferred and Alternative sites are comparable with the greatest impact on moist grasslands. The wetland assessment must be consulted for the definitive boundaries of wetlands. No plant species of conservation concern were recorded in the moist grasslands and therefore the wetland specialist recommendations and buffers take preference. One protected plant species was recorded within the secondary grassland on the Alternative Site.

Although the impacts are comparable, this report motivates the approval of the Optimized Layout on the Preferred Site. Development on the Preferred Sites will concentrate the proposed activities in an area adjacent to the current mining activities and infrastructure. This will reduce edge effects to natural areas, as well as fragmentation of larger, connected open spaces. Development on the Alternative Site will fragment a larger open space that comprise of secondary and good condition grassland (Phase 1 assessment, Dimela

Eco Consulting, 2021). The Alternative site is also closer to good condition grassland and moist grassland present in the Withok Estates Agricultural holdings north of the Alternative Site. If for any reason the Preferred Site is not approved, this report has no objection with the Alternative site being used for the proposed PV facility.

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 and ESA | <p>Reason for the CBA The CBAs within and around the proposed sites are classified based on the potential habitat for plant species of conservation concern and the potential presence of primary vegetation</p> <p>Can ESA / CBA be maintained? The ESA on both sites correspond with secondary grasslands. The vegetation within the CBA on the Preferred site was historically cultivated, currently comprise secondary grassland and no plant species of conservation concern were recorded or are expected to be present. The CBA on the sites functions rather as an ESA and if movement corridors along the Withokspruit and moist grasslands remain undeveloped, then the function can be maintained.</p> <p>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.</p> |
| Ecosystem threat status | <p>Impact on ecosystem threat status No natural or good condition vegetation is present within the Preferred- or Alternative sites. The vegetation is not representative of Tskane Clay Grassland and therefore can not contribute to the conservation thereof. The remnant Tsakane Clay Grassland around the site boundaries are also in a secondary to highly degraded state and the impact of the proposed development on the threat status of this ecosystem is negligible.</p> <p>Impact on explicit subtypes in the vegetation; and the impact on overall species and ecosystem diversity of the site; See above.</p> |
| Protected Areas | <ul style="list-style-type: none"> • Not applicable |
| Strategic Water Source Areas (SWSA): | <p>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.</p> |

| Biodiversity (vegetation) aspect | Result |
|--|---|
| | <p>Impacts of the proposed development on the SWSA water quality and quantity</p> <p>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</p> |
| <p>National Freshwater Ecosystems Priority Areas (NFEPA):</p> | <p>See wetland assessment.</p> |
| <p>Indigenous forest</p> | <p>Not applicable</p> |
| <p>Sensitive Areas</p> | <ul style="list-style-type: none"> • The buffer area to the moist grasslands, as delineated by the wetland specialist must be avoided. • As per the GDARD Requirements for Biodiversity Assessments Version 2 (2012): "All good condition natural vegetation must be designated as ecologically sensitive". Rocky grassland to the southwest of the Preferred site and the north of the Alternative site may be in a good ecological condition and falls within a CBA that forms part of a Critically Endangered Ecosystem. This area is outside of the Project Area of Influence (PAOI) and may not be considered for any development or edge effects. |
| <p>No go areas</p> | <p>Avoid direct impacts to moist grasslands and no edge effects or scope creep towards rocky grasslands outside of the PAOI are allowed.</p> |
| <p>Plant species of conservation concern</p> | <ul style="list-style-type: none"> • No plant species of conservation concern were recorded or are expected to be present |
| <p>Main impacts:</p> | <p>The main impacts expected are as follows:</p> <ul style="list-style-type: none"> • Destruction of natural vegetation of 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) • Unlikely destruction of protected plants and plants of conservation concern • Potential increase in invasive vegetation • Compaction and destruction of soils |
| <p>Cumulative impacts:</p> | <ul style="list-style-type: none"> • If mitigation measures are adequately implemented, no cumulative impacts are expected. |
| <p>Residual impacts:</p> | <ul style="list-style-type: none"> • 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. (Tshedza), wants to establish a 40MW PV facility on portions 183 and 272 of the farm Witpoortje 117, Gauteng. As an alternative, portion 9 of Withok 131 is also proposed. Most of the land proposed for the development was historically cultivated or impacted on by mining activities.

The proposed sites fall 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. However, most of the proposed site historically comprised slimes dams or were cultivated. This report thus comprises a terrestrial (vegetation) assessment, with reference to the occurrence or possible occurrence of plant species of conservation concern on the site. This report included a site visit, as well as data collected during prior work undertaken in the area for the Phase 1² 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 alternative sites: (note the alternatives has Prt 183 of Witpoortje 117IR in common)

Preferred site:

- Remaining Extent of Portion 183 of the Farm Witpoortje 117 I.R.
- Portion 272 of the Farm Witpoortje 117 I.R.

Alternative site:

- Portion 183 of the Farm Witpoortje 117 I.R.
- Portion 9 of the Farm Withok 131 I.R.

1.3 Terms of reference

Complete a terrestrial plant assessment in line with the terrestrial biodiversity protocols, including:

- Supply background information on the site relating to conservation plans and threatened ecosystems;
- Field survey to determine the state of the vegetation and whether threatened or protected species are present or could be impacted on;

² Phase 1, a 19.9MW PV facility with a 22kV Overhead power line and 100MWh Battery Energy Storage System (BESS) has previously been assessed and approved through a Basic Assessment Process (DMRE REF: GP 30/5/1/2/2 (158) MR).

- Report and map describing the vegetation communities found on the site and its conservation importance and function within the landscape;
- Assessment and report on the impacts that the proposed development and related activities could have on the vegetation on site, as well as recommendations to limit or negate these perceived impacts.

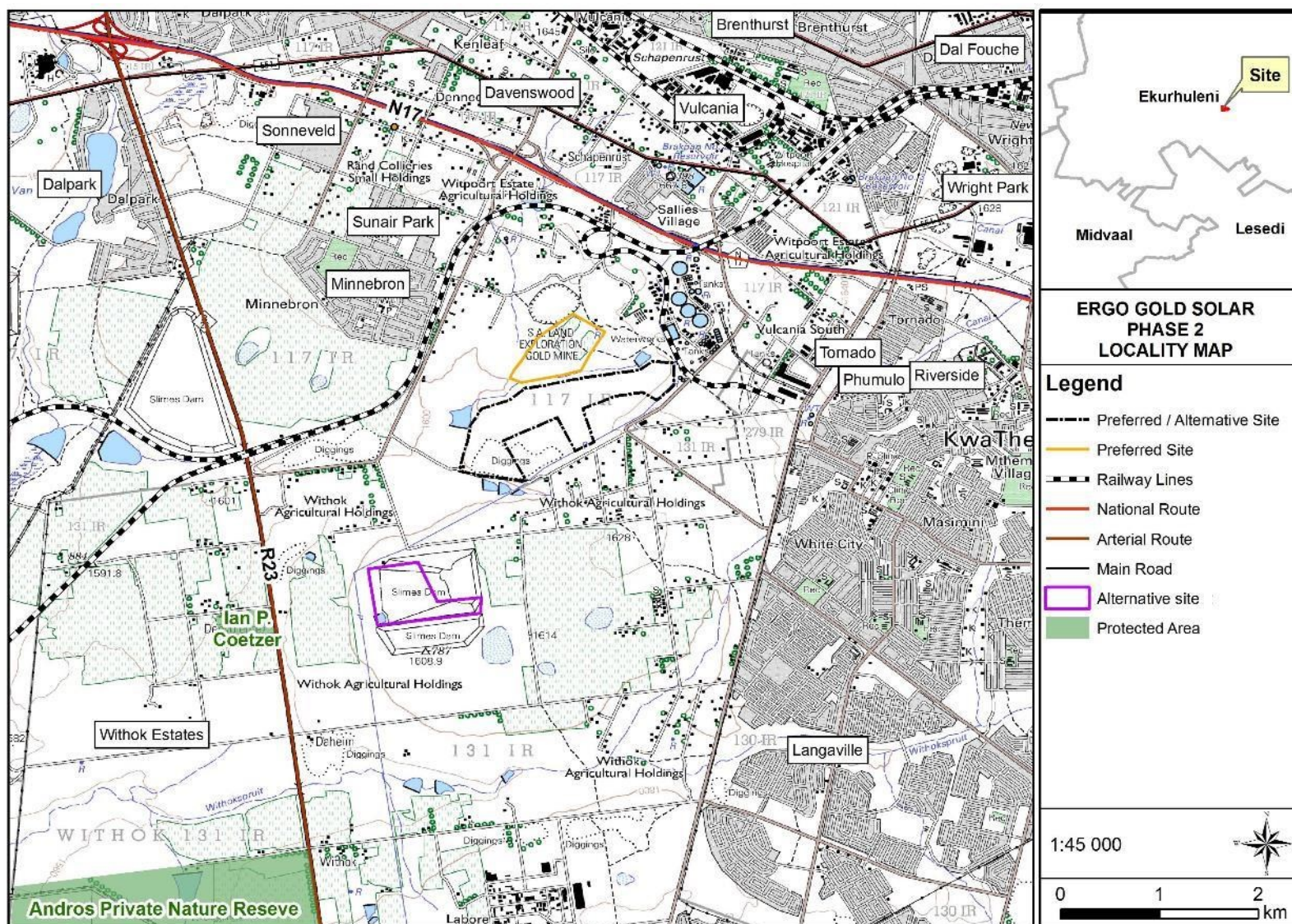
Complete a terrestrial plant species site verification that will form part of the terrestrial vegetation assessment and will contain:

- An indication on whether plant species of conservation concern were recorded on the site or the likelihood of such species occurring;
- Map indicating confirmed or potential habitat for plant species that are of conservation concern, as well as ecologically sensitive vegetation groupings; and
- Where plant species of conservation concern are found on site or have been confirmed to be likely present, a Terrestrial Plant Species Specialist Assessment will be recommended that must be undertaken in accordance with the requirements specified in the protocol for environmental impacts on terrestrial plant species.

1.4 Assumptions and Limitations

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

- Due to project time frames outside of the specialists' control, the field survey took place on the 30th of May 2022, when grasses were already dry and forbs dormant. However, the areas sampled were found to be modified and thus the late season assessment of these areas was not considered a fatal flaw.
- The specialist also undertook a site visit on the 8th of February 2021, and the 26th of March 2021 for Phase 1 of the project. The plant species data of Phase 1 was consulted for this report. The area was thus sampled thrice.
- During the May 2022 site visit, illegal miners were encountered on the most north-eastern section of the site, and therefore that area was not further sampled. However, the area was degraded and in a secondary state.



2. METHODOLOGY

The assessment entailed a literature review of available literature, a site visit 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, as well as May 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 Witpoortje 117 I.R, undertaken on the 8th of February 2021, forms part of the desktop assessment (Dimela Eco Consulting, 2021)
- Historical aerial imagery downloaded from Chief Directorate: National Geospatial Information Geospatial Portal (<http://www.cdngiportal.co.za/cdngiportal>).
- Citizen Science Website: iNaturalist.org

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.

The proposed sites for the PV facility were regarded as the primary PAOI. A buffer of 50m around the proposed sites was assessed to include potential secondary areas of impact. Pollution (e.g., pollutants, chemicals, fuel) could affect downstream habitats, and these were included as tertiary PAOI. The extent of potential impacts downstream will depend on the activity and waterflow at the time of the impact, and the area indicated in Figure 2 is only illustrative of the possible impact area.

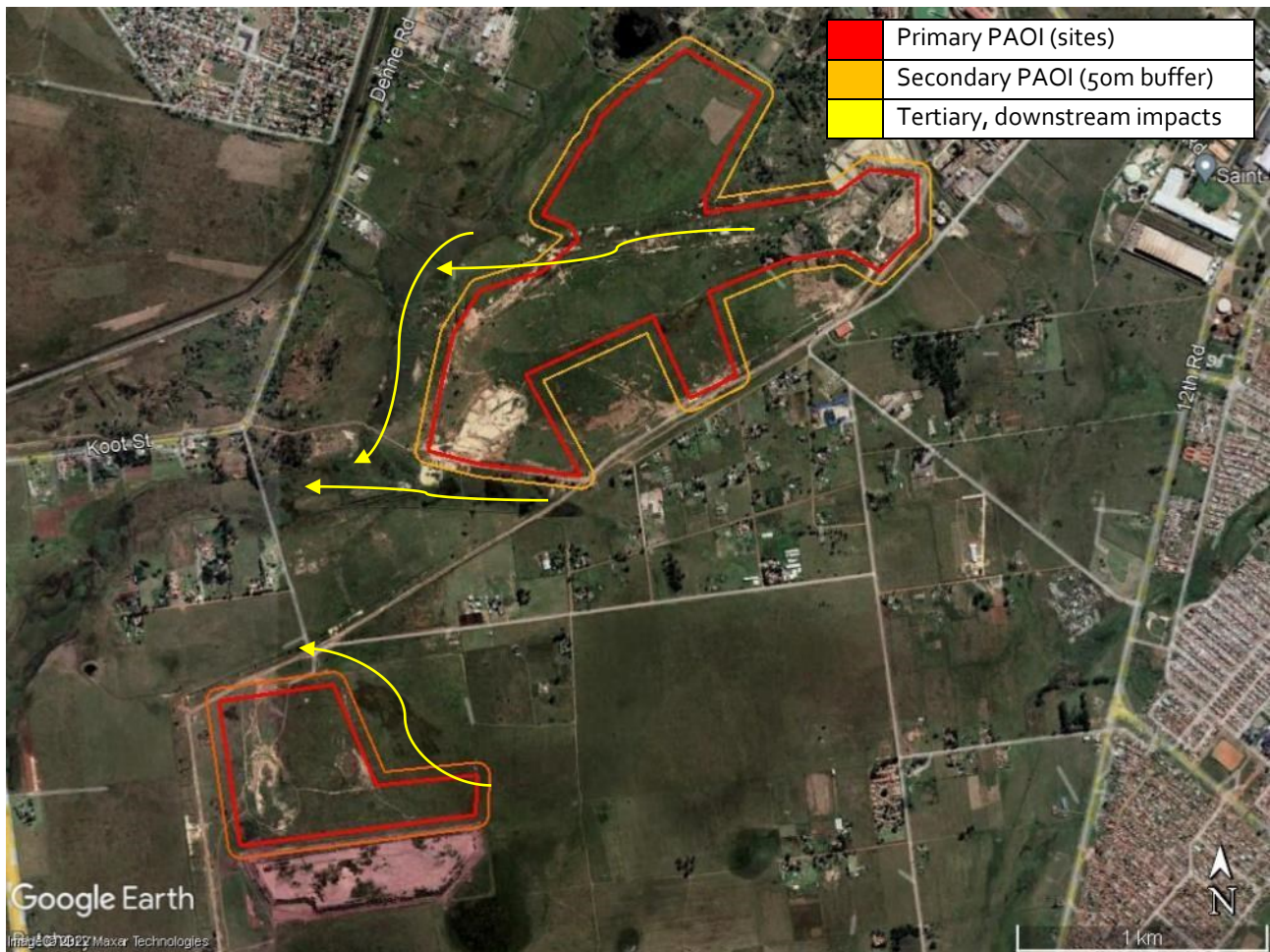


Figure 2: Project Area of Influence

2.3 Field survey

A field survey was undertaken on the 30th of May 2022. An interested and affected party, Ms Jeanne White who grew up and still lives in the area and is passionate about biodiversity search and rescue, accompanied the specialist, and shared some knowledge of the area. The specialist also undertook a site visit on the 8th of February 2021, and the 26th of March 2021 for Phase 1 of the project. This information was used as background information.

2.4 Site Ecological Importance (sensitivity)

The 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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) | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Confirmed or highly likely occurrence of populations of NT species, threatened | <ul style="list-style-type: none"> Medium (>5 ha but <20 ha) semi-intact area for any conservation status of | <ul style="list-style-type: none"> Recovers slowly (>10 years for >70 % of the original |

| Classification | Conservation Importance | Functional Integrity | Receptor Resilience |
|----------------|---|---|---|
| | <p>species (CR, EN, VU) listed under A criterion only and which have more than 10 locations or more than 10 000 mature individuals.</p> <ul style="list-style-type: none"> 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 | <p>ecosystem type or > 20 ha for VU ecosystem types</p> <ul style="list-style-type: none"> Only narrow corridors of good habitat connectivity or larger areas of poor 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 | <p>species composition and functionality</p> <ul style="list-style-type: none"> Species moderately likely to remain at site during impact. Species moderately likely to return to site once impact ceases. |
| Low | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining. | <ul style="list-style-type: none"> Very small (<1 ha) area. No connectivity except for flying species. Several major current ecological impacts. | <ul style="list-style-type: none"> 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 |

| Biodiversity Importance (BI) | | Conservation Importance (CI) | | | | |
|------------------------------|----------|------------------------------|------|----------|----------|----------|
| | | Very High | High | Medium | 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. <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Development within these areas is undesirable and impacts are difficult to mitigate, if at all. |

| SEI | Interpretation in relation to proposed development activities (SANBI, 2020), with <i>mitigation added by the specialist</i> |
|----------|---|
| | <ul style="list-style-type: none"> Impacts must be avoided or managed by an ecological management plan |
| Medium | <p>Minimization & restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities</p> <ul style="list-style-type: none"> Development within these areas could proceed, limiting impact to sensitive vegetation, provided that appropriate mitigation measures are taken. 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 | <p>Minimization & restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities</p> <ul style="list-style-type: none"> Developable areas that are connected to sensitive features. Edge effects must be prevented. |
| Very Low | <p>Minimization mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required</p> <ul style="list-style-type: none"> 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 Witpoortje 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 Witpoortje 117. A tributary of the Withokspruit flows along much of the western boundaries of the Preferred sites (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 Basaltic 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 comprise 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). The symbol WA indicates 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 Preferred sites encroaches into 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*.

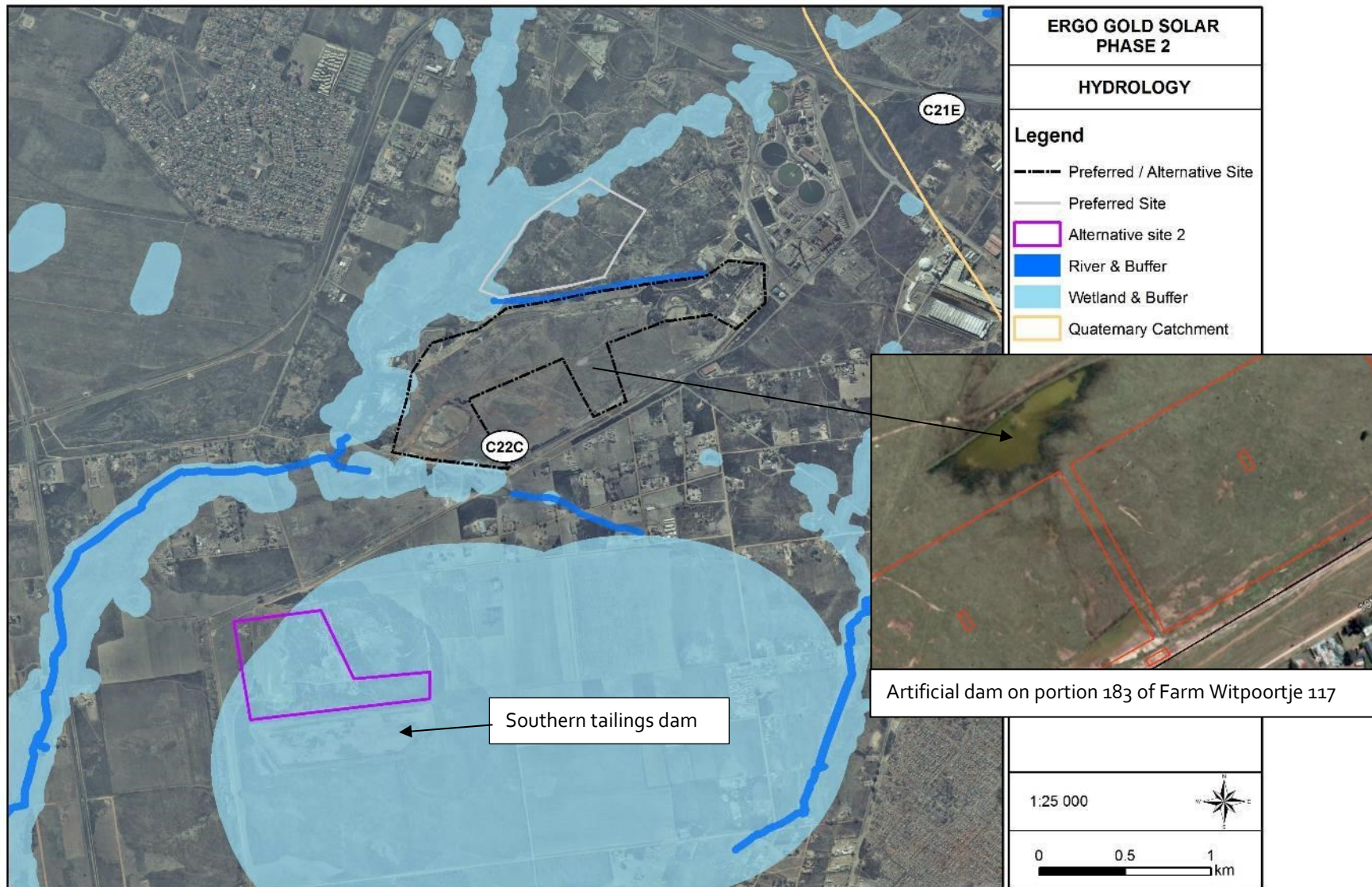


Figure 3: Hydrology of the area that the site is situated in, as per available national spatial data

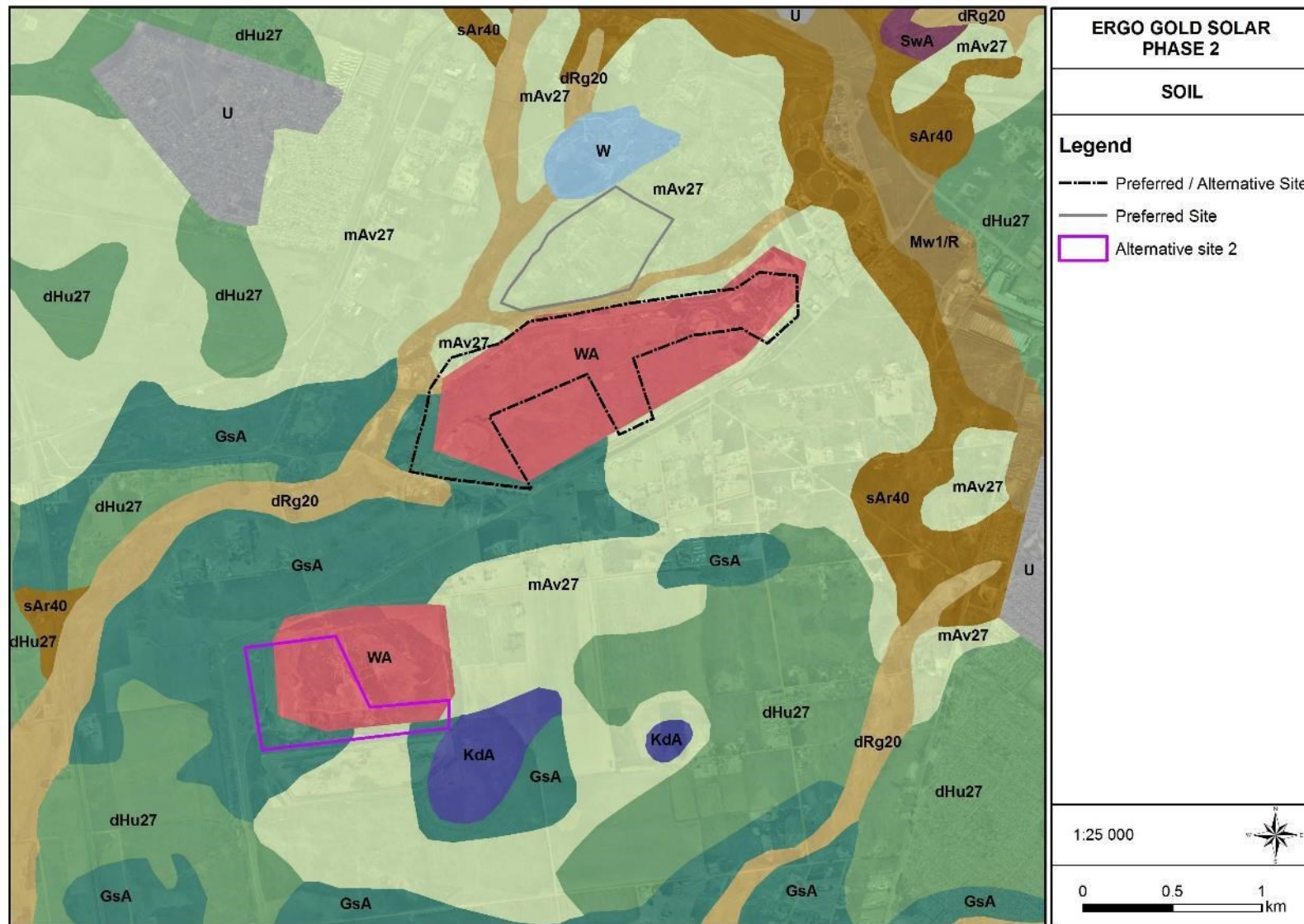


Figure 4: Soil groups present in the study area

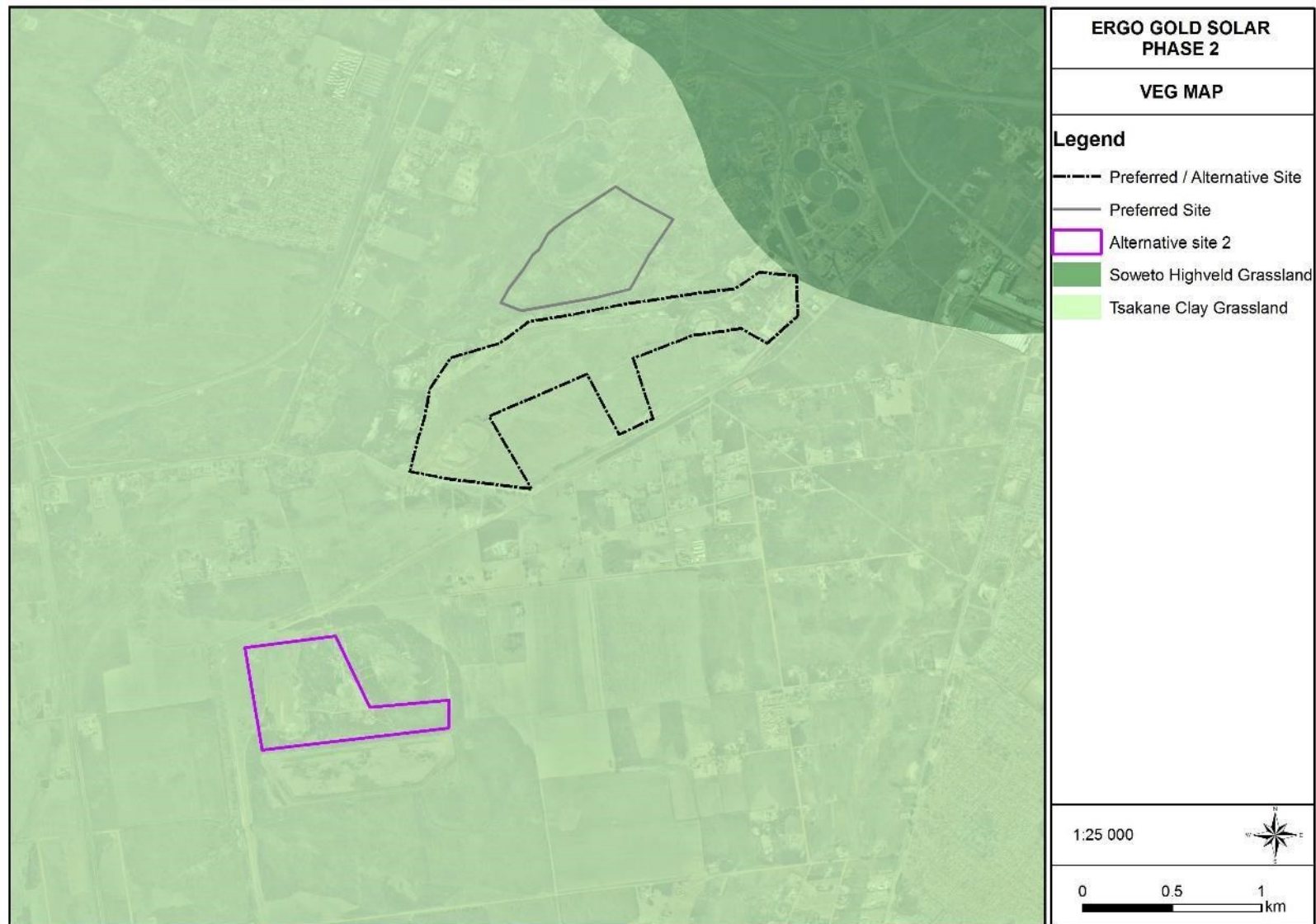


Figure 5: Vegetation units underlying the study area (Mucina and Rutherford, 2006).

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.

Although the National List of Threatened Terrestrial Ecosystems published in terms of the Biodiversity Act in 2011 remains in legal force, the data contained in the recent National Biodiversity Assessment (NBA) 2018 represents an update of the assessment of threat status for terrestrial ecosystems, but the National List of Threatened Terrestrial Ecosystems has not yet been revised and therefore the gazetted 2011 Listed Ecosystems is still in force. The updated threatened ecosystems as per the recent NBA (2018) places portions of the site and surrounds within the Endangered Tsakane Grassland (Figure 7).

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 around the sites (Figure 8). 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).

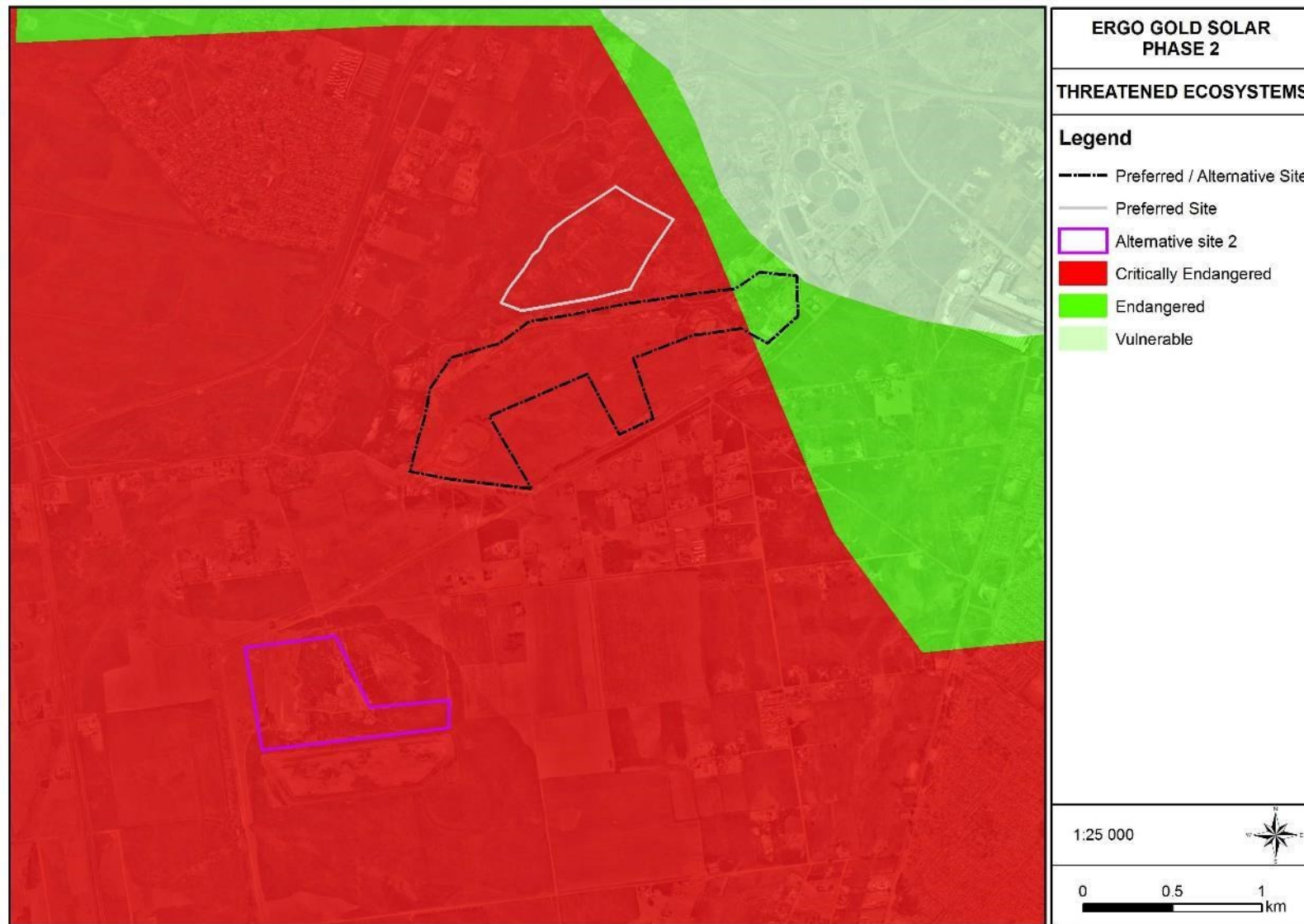


Figure 6: Threatened ecosystems (Government Gazette 34809, Government Notice 1002, and 9 December 2011)).

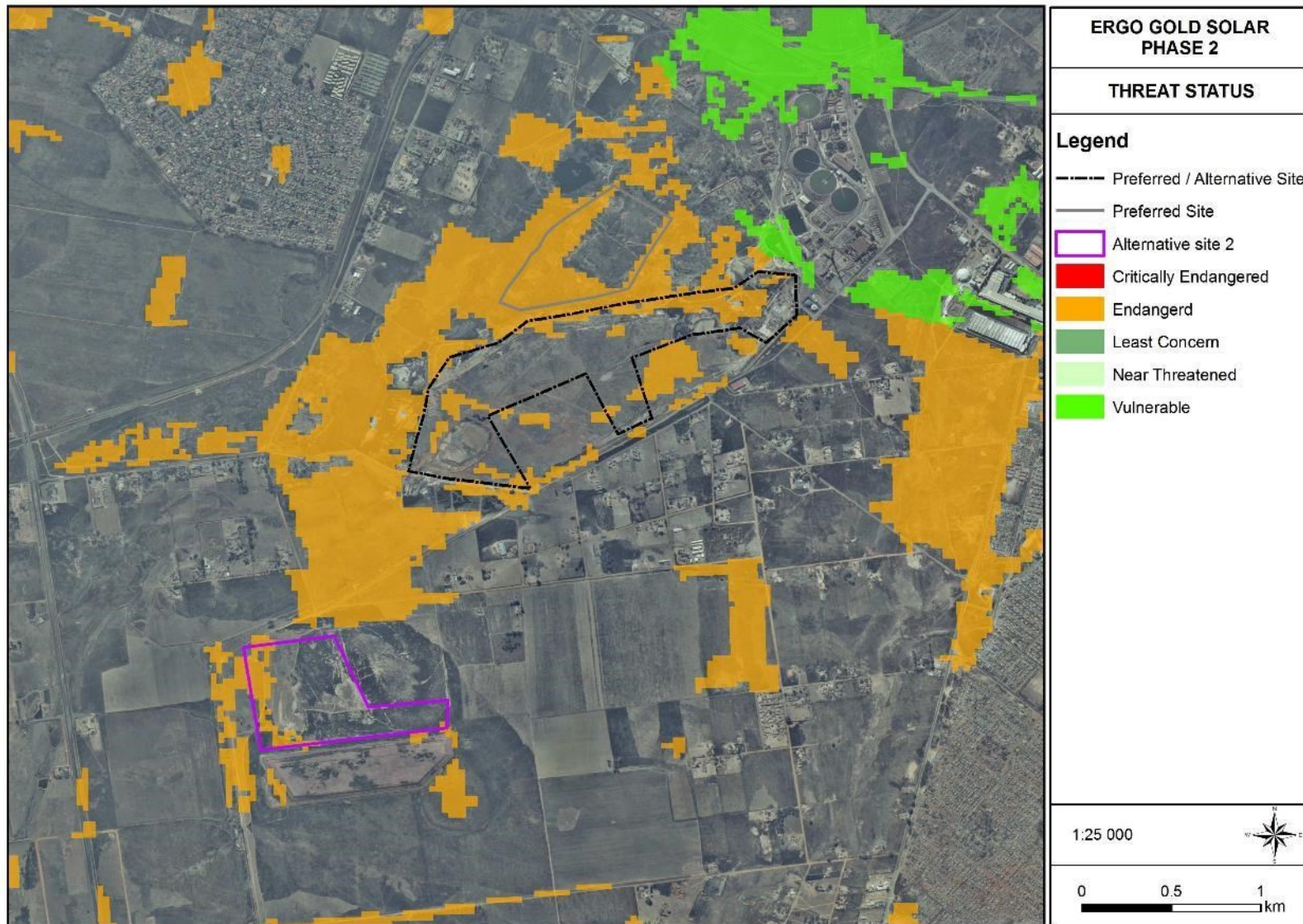


Figure 7: The updated threatened ecosystems as per the recent NBA (2018) shows some remnant patches of the Endangered Tsakane Grassland around the sites

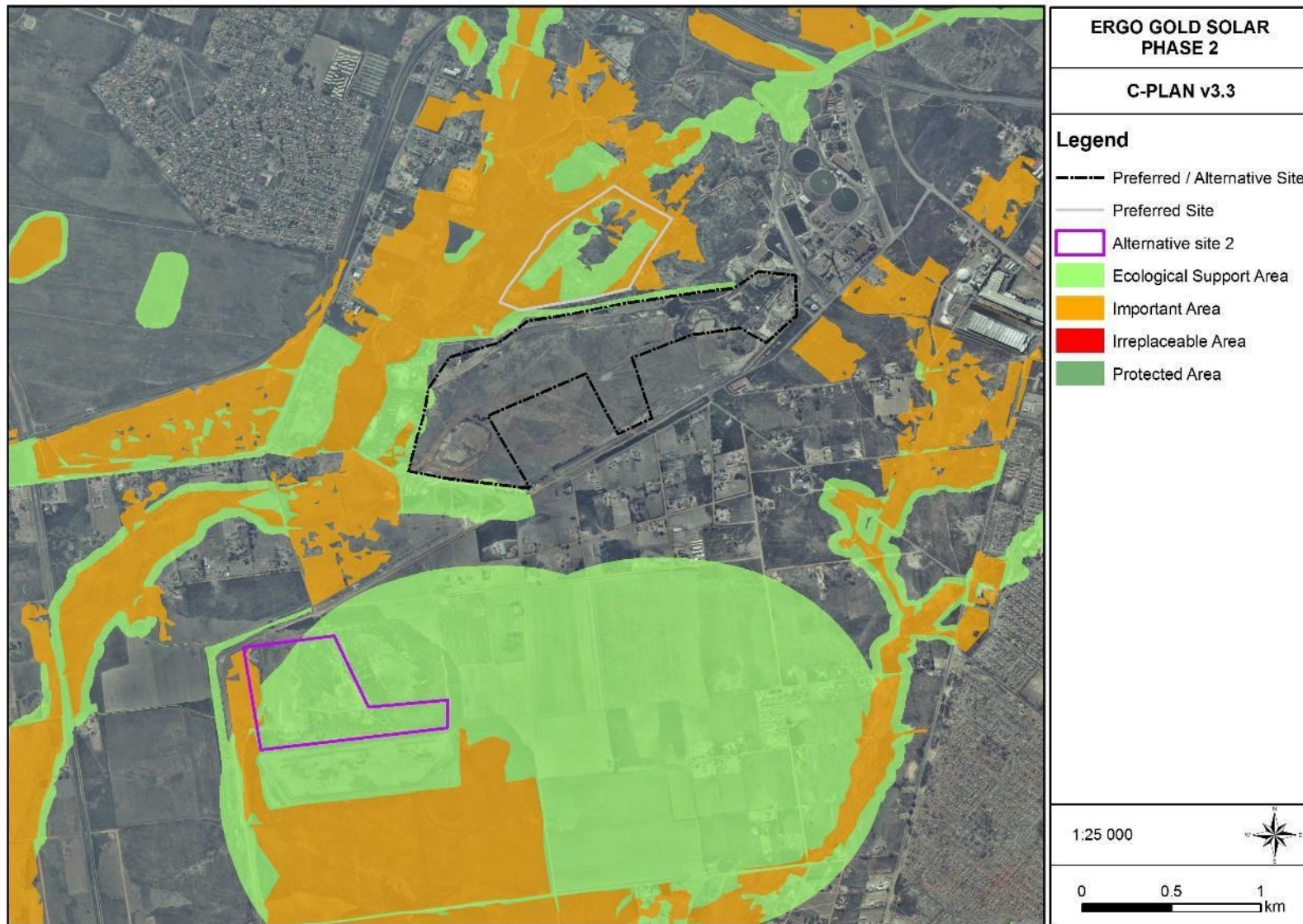


Figure 8: The proposed development in relation to the Gauteng Conservation Plan

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 1). The status of the reserve is unknown.

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 remaining 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 in a secondary state.

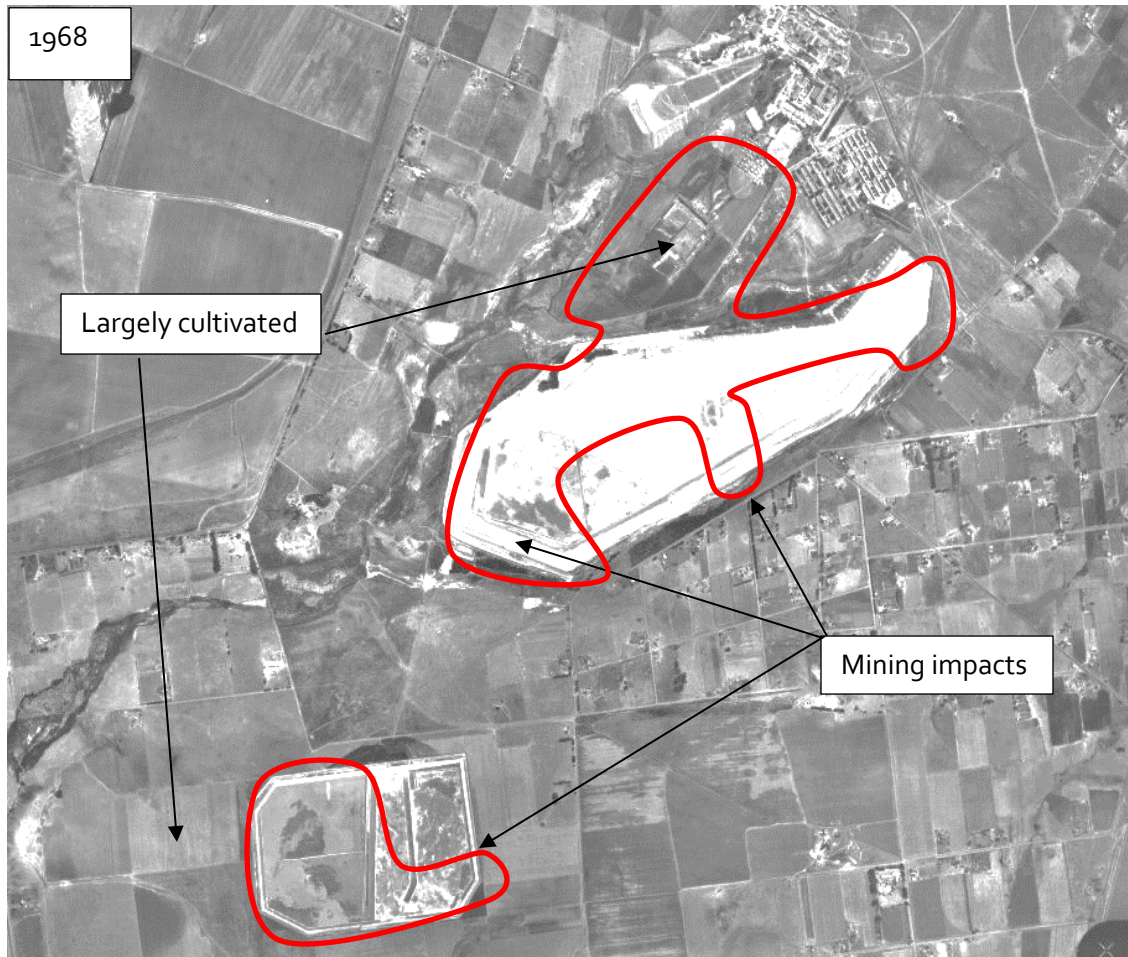


Figure 9: Historical aerial imagery dated 1968 (Chief Directorate National Geospatial Information Geospatial Portal) showing the mined and cultivated land within the site (estimated in red polygons)

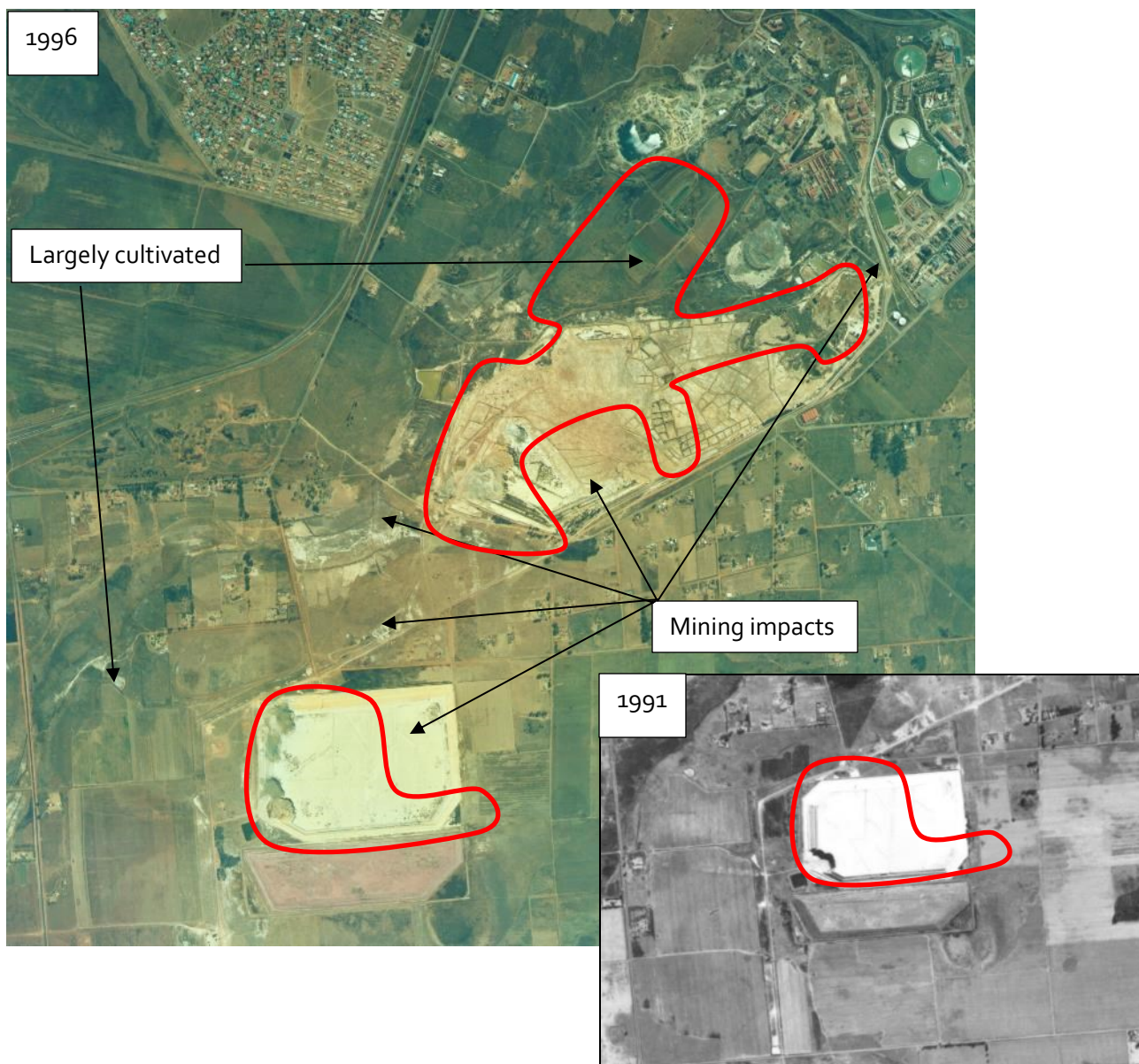


Figure 10: Historical aerial imagery dated 1996 (Chief Directorate National Geospatial Information Geospatial Portal) showing the increase in mining and associated development impacts. The insert dates to 1991 and shows cultivation south and south-west of the tailings dam

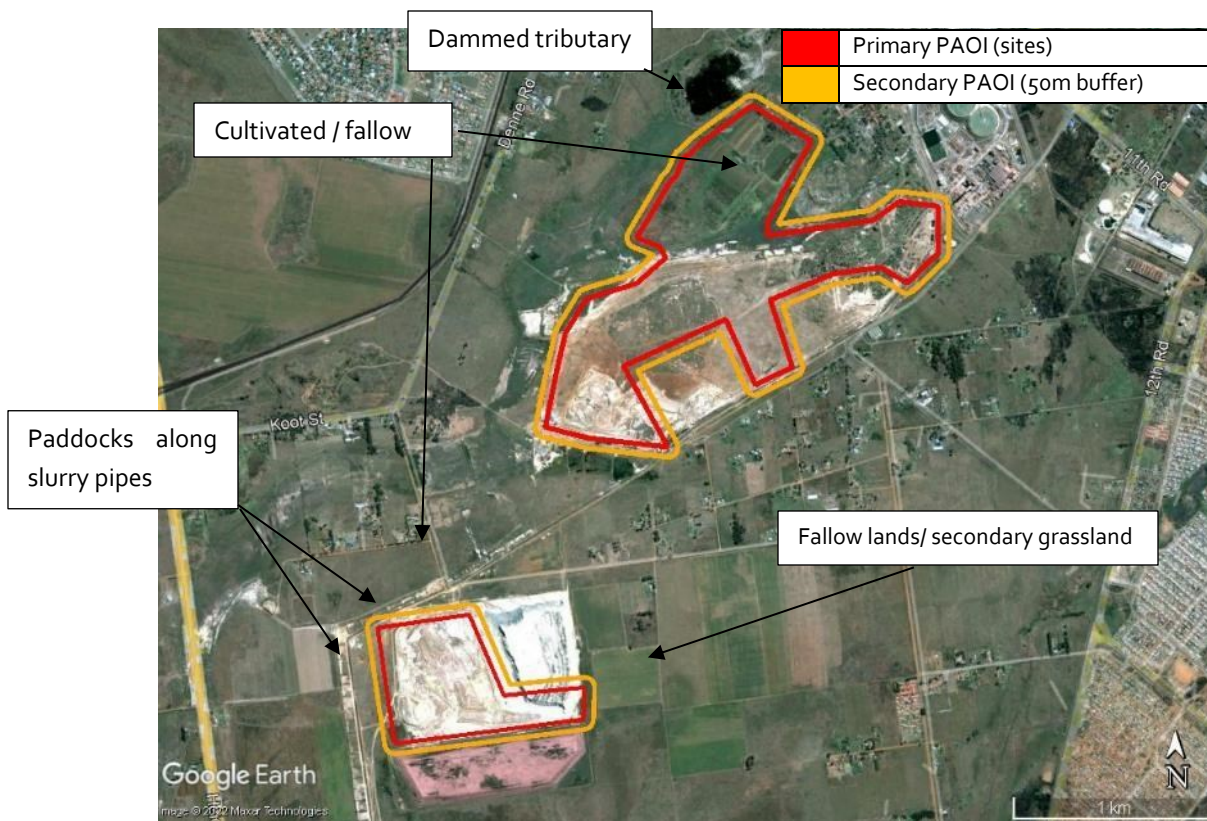


Figure 11: Google Earth imagery dated 2002 with cultivation and mining impacts persisting on the site.

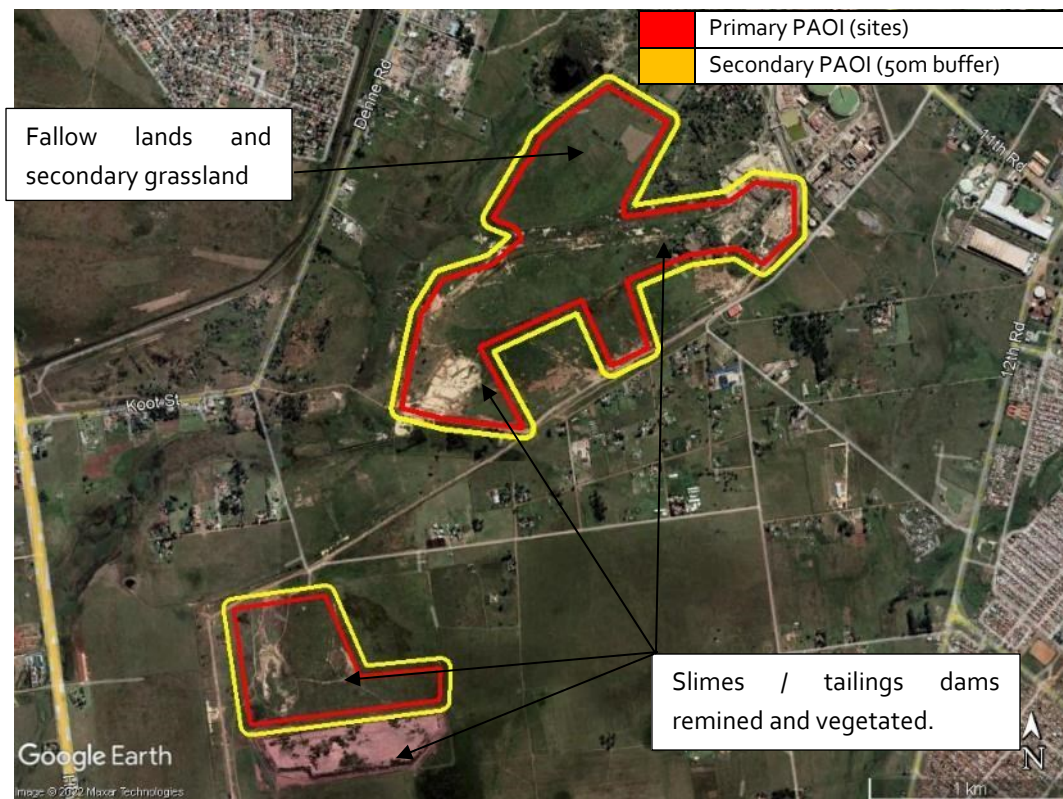


Figure 12: Most recent Google Earth imagery (2021) showing fallow lands and rehabilitated slimes / tailings dams

4.2 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 vegetation present were delineated follows:

1. Secondary grassland;
2. Moist grassland; and
3. Modified vegetation.

These vegetation groups are shortly discussed below and geographically represented in Figure 13. A list of plant species recorded in each vegetation groups is given in Appendix B.

4.2.1 Secondary grassland

Most of the preferred and alternative sites for the PV facility site comprised secondary grassland and are grazed by cattle. Secondary grasslands develop where the original, undisturbed grassland vegetation was removed (in this case by historical cultivation and mining). After cultivation ceased, 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. The historic slimes dam areas were rehabilitated and sowed with grasses, which also constitutes a secondary state. 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.

The vegetation structure on both the Preferred and Alternative sites comprised grassland, dominated by the pioneer grasses *Cynodon dactylon*, *Eragrostis plana* and *E. curvula* (Photo plate 1 and 2). The grass species diversity, especially of palatable grasses such as *Digitaria eriantha* and *Themeda triandra*, was low and the hardy pioneer and perennial grasses (e.g., *Cynodon*, *Eragrostis*, *Chloris*), typical of rehabilitated grassland dominated. The forb diversity was also low and dominated by hardy species (*Conyza podocephala*, *Helichrysum rugulosa*, *Gazania krebsiana*, and *Felicia muricata*). Several weedy and invasive species were also recorded (*Verbena tenuisecta*, *Schkuhria pinnata*, *Tagetes minuta* and *Verbena bonariensis*).

Secondary grasslands have undergone extensive modification and a fundamental shift from their original 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. No plant species of conservation concern were recorded during any of the site

visits to this area, and due to the historical disturbance and secondary state of the grassland, none are expected to be present. One provincially protected orchid species was recorded in the secondary grassland on Prt 9 of the Farm Withok 131 (Alternative site) (see section 4.5.2).



Photo plate 1: Secondary *Cynodon* and *Eragrostis* dominated grassland on the preferred sites. Image a&b) shows the secondary grassland on Prt 183 of the Farm Witpoortje in February 2021 (rehabilitated slimes dam). Images c&d) shows the grassland on Prt 272 of the farm Witpoortje in May 2022 (fallow lands)



Photo plate 2: Secondary grassland on the alternative site on Prt 9 of the Farm Withok 131, taken during the May 2022 assessment

Table 5: Summary of the prominent and dominant species recorded within the secondary *Eragrostis-Cynodon* grassland (Appendix B)

| Dominant taxa recorded during the site visit |
|---|
| <u>Grasses:</u> <i>Eragrostis plana</i> , <i>Cynodon dactylon</i> , <i>Eragrostis curvula</i> , <i>Digitaria eriantha</i> , <i>Paspalum</i> sp, <i>Chloris virigata</i> , <i>Hyparrhenia hirta</i> , <i>Aristida congesta</i> , <i>Melinis repens</i> <u>Forbs:</u> <i>Conyza podocephala</i> , <i>Helichrysum rugulosa</i> , <i>H. nudifolium</i> , <i>Gazania krebsiana</i> , <i>Felicia muricata</i> , <i>Stoebe plumosa</i> , <i>Plantago lanceolata</i> , <i>Senecio greagatus</i> <u>Sedge:</u> <i>Cyperus esculentus</i> |
| Species richness (indigenous species) at the time of the site visit |
| <u>Grasses:</u> 10 <u>Forbs:</u> 14 <u>Sedges:</u> 1 |
| Protected or threatened plant species |
| An orchid, believed to be a <i>Habenaria</i> species was recorded on Prt 9 of the farm Withok 131 |
| Alien and/or invasive plant species |
| <i>Verbena tenuisecta</i> , <i>Schkuhria pinnata</i> , <i>Verbena bonariensis</i> , <i>Tagetes minuta</i> |
| Ecological function |
| <ul style="list-style-type: none"> • Soil stabilization • Potential groundwater recharge zones |

4.2.2 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.

The moist grassland was divided into three groups, based on the dominant species:

1. *Phragmites australis* moist grassland
2. *Eragrostis plana* moist grassland
3. *Andropogon eucomus* moist grassland (only on prt 9 of the farm Withok 131, Alternative site)

4.2.2.1 *Phragmites australis* moist grassland

Most of the moist grasslands that could be impacted on are dominated by *Phragmites australis* (Photo plate 3). The tall growing grass *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). The temporarily wet areas around the *P australis* were dominated by the grasses *Cynodon dactylon* and *Eragrostis plana*, with patchy occurrence of sedges such as *Juncus effusus* and *Cyperus congestus*.

An area mapped as *Phragmites australis* moist grassland traverses the land between Prt 272 and Prt 183 of the Farm Witpoortje 1171R (Photo plate 4). This area is highly disturbed with patches of *P australis* embedded in a mosaic of moist grassland with other dominant species such as *Eragrostis plana*, *Paspalum dilatatum* and the invasive *Arundo donax*.



Photo plate 3: *Phragmites australis* moist grassland to the east and north of Prt 183 and 272 of Witpoortje 117



Photo plate 4: Highly disturbed moist grassland between Prt 183 and 272 of the farm Witpoortje 117 comprising a mosaic of dominant species

Table 6: Summary of the prominent and dominant species associated in the *P. australis* moist grassland (Appendix B)

| Dominant taxa recorded during the site visit |
|---|
| Permanently wet areas <u>Grasses:</u> <i>Phragmites australis</i> , <i>Cynodon dactylon</i> , <i>Eragrostis plana</i> , <i>Paspalum dilatatum</i> <u>Sedges:</u> <i>Juncus effusus</i> , <i>Pycreus macranthus</i> , <i>Cyperus congestus</i> , <i>C. esculentus</i> |

| |
|---|
| Forbs: <i>Conyza podocephala</i> , <i>Berkheya radula</i> |
| Species richness (indigenous species) at the time of the site visits |
| Grasses: 6 Forb species: 4 Sedges: 2 |
| Protected or threatened plant species |
| A population of the provincially protected orchid, <i>Habenaria schimperiana</i> was recorded adjacent to 17 th Road |
| Alien and/or invasive plant species |
| <i>Verbena bonariensis</i> , <i>Arundo donax</i> , |
| Ecological function |
| <ul style="list-style-type: none"> • Soil stabilization • Water purification |

4.2.2.2 *Eragrostis plana* moist grassland

A small artificial dam and inundated grassland are present on Prt 183 of the farm Witpoortje (Photo plate 5). These are artificial wetlands (please refer to the wetland assessment for a definitive delineation of wetlands). The edges of the moist areas were dominated by *Cynodon dactylon* (couch grass) and *Eragrostis plana* (tough love grass). Sedges such as *Juncus effusus* and *Cyperus congestus* were recorded. No plant species of conservation concern were observed, and none are expected to be present due to the secondary nature of the vegetation.



Photo plate 5: *E plana* dominated moist grassland

Eragrostis plana moist grassland was also recorded to the east of Prt 9 of the farm Withok (Alternative site). This large area historically comprised a slimes dam and was rehabilitated. The area is grazed and included the grasses *Cynodon dactylon*, *Hyparrhenia hirta* and *Aristida congesta* (Photo plate 6)



Photo plate 6: *Eragrostis plana* moist grassland to the east of Prt 9 of the Farm Withok (Alternative site)

Table 7: Summary of the prominent and dominant species associated in the *E plana* moist grassland (Appendix B)

| |
|--|
| Dominant taxa recorded during the site visit |
| <u>Grasses:</u> <i>Eragrostis plana</i> , <i>Cynodon dactylon</i> , <i>Imperata cylindrica</i> , <i>Paspalum</i> species |
| <u>Sedges:</u> <i>Juncus effusus</i> , <i>Pycreus macranthus</i> , <i>Cyperus congestus</i> , <i>C. esculentus</i> |
| <u>Forbs:</u> <i>Senecio cf innornatus</i> , <i>Berkheya radula</i> - |
| Species richness (indigenous species) at the time of the site visit |
| <u>Grasses:</u> 7 <u>Forb species:</u> 6 <u>Sedges:</u> 4 |
| Protected or threatened plant species |
| None recorded and none are expected to occur |
| Alien and/or invasive plant species |
| <i>Verbena species</i> |
| Ecological function |
| <ul style="list-style-type: none"> • Soil stabilization • Water purification |

4.2.2.3 *Andropogon eucomus* moist depression

A moist depression formed within the rehabilitated areas on Prt 9 of the Farm Withok 131 (Alternative site). This area was dominated by the grass *Andropogon eucomus* (old man's beard) and *Imperata cylindrica* (cotton wool grass) (Photo plate 7). These grasses are good stabilisers of wet soils and indicative of poor drainage. Other grasses included *Eragrostis plana*, *E. gummiflua* (gum grass) and *Cynodon dactylon*. The forb layer included weedy species such as *Gomphocarpus fruticosus* and *Verbena bonariensis*. The invasive tree *Tamarix cf ramosissima* (pink tamarisk) also colonised this area.

No plant species of conservation concern were recorded or were expected to be present due to the secondary state of the vegetation.



Photo plate 7: *Andropogon eucomis* moist depression

Table 8: Summary of the prominent and dominant species associated in the *A eucomis* moist grassland (Appendix B)

| Dominant taxa recorded during the site visit |
|---|
| <u>Grasses:</u> <i>Anropogon eucomis</i> , <i>Cynodon dactylon</i> , <i>Eragrostis plana</i> , <i>E gummiflua</i> , <i>Imperata cylindrica</i> , <i>Paspalum</i> species, |
| <u>Sedges:</u> <i>Cyperus congestus</i> , <i>C esculentus</i> |
| <u>Forbs:</u> <i>Senecio cf innornatus</i> , <i>Berkheya radula</i> , <i>Hermannia depressa</i> |
| Species richness (indigenous species) at the time of the site visit |
| <u>Grasses:</u> 5 <u>Forb species:</u> 3 <u>Sedges:</u> 2 |
| Protected or threatened plant species |
| None recorded and none are expected to occur |
| Alien and/or invasive plant species |
| <i>Verbena bonariensis</i> , <i>Tamarix ramosissima</i> |
| Ecological function |
| <ul style="list-style-type: none"> • Soil stabilization • Water purification |

4.2.3 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. The western and eastern extent of Prt 183 Witpoortje 117, as well as a portion of Prt 9 of the Farm Withok 131 (Alternative site) was modified. These areas included compacted soils, large soil dumps, illegal mining activities or remnant slimes dams (Photo plate 8). The vegetation was sparse and dominated by the pioneer grass *Cynodon dactylon*. The category 1b invasive *Cortaderia selloana* (fountain grass) and invasive tree species (e.g Wattle, Eucalyptus and Tamarix) were common. Artificial depressions supported the hydrophylic grass *Phragmites australis*.

No plant species of conservation concern were recorded or are expected to be present.



Photo plate 8: Modified land on a&b) Prt 9 of the Farm Withok (Alternative site), c-f) prt 183 of the Farm Witpoortje

Table 9: Summary of the prominent and dominant species recorded within the modified vegetation (Appendix B)

| |
|---|
| Dominant taxa recorded during the site visit |
| <u>Grasses</u> : <i>Cynodon dactylon</i> , <i>Hyparrhenida hirta</i> , <i>Phragmites australis</i> <u>Forbs</u> : none |
| Species richness (indigenous species) at the time of the site visit |
| <u>Grasses</u> : 3 |
| Protected or threatened plant species |
| None recorded and none are expected to occur |
| Alien and/or invasive plant species |
| <i>Eucalyptus sp</i> , <i>Acacia dealbata</i> , <i>Tamarix ramosissima</i> |
| Ecological function |
| <ul style="list-style-type: none"> • none |

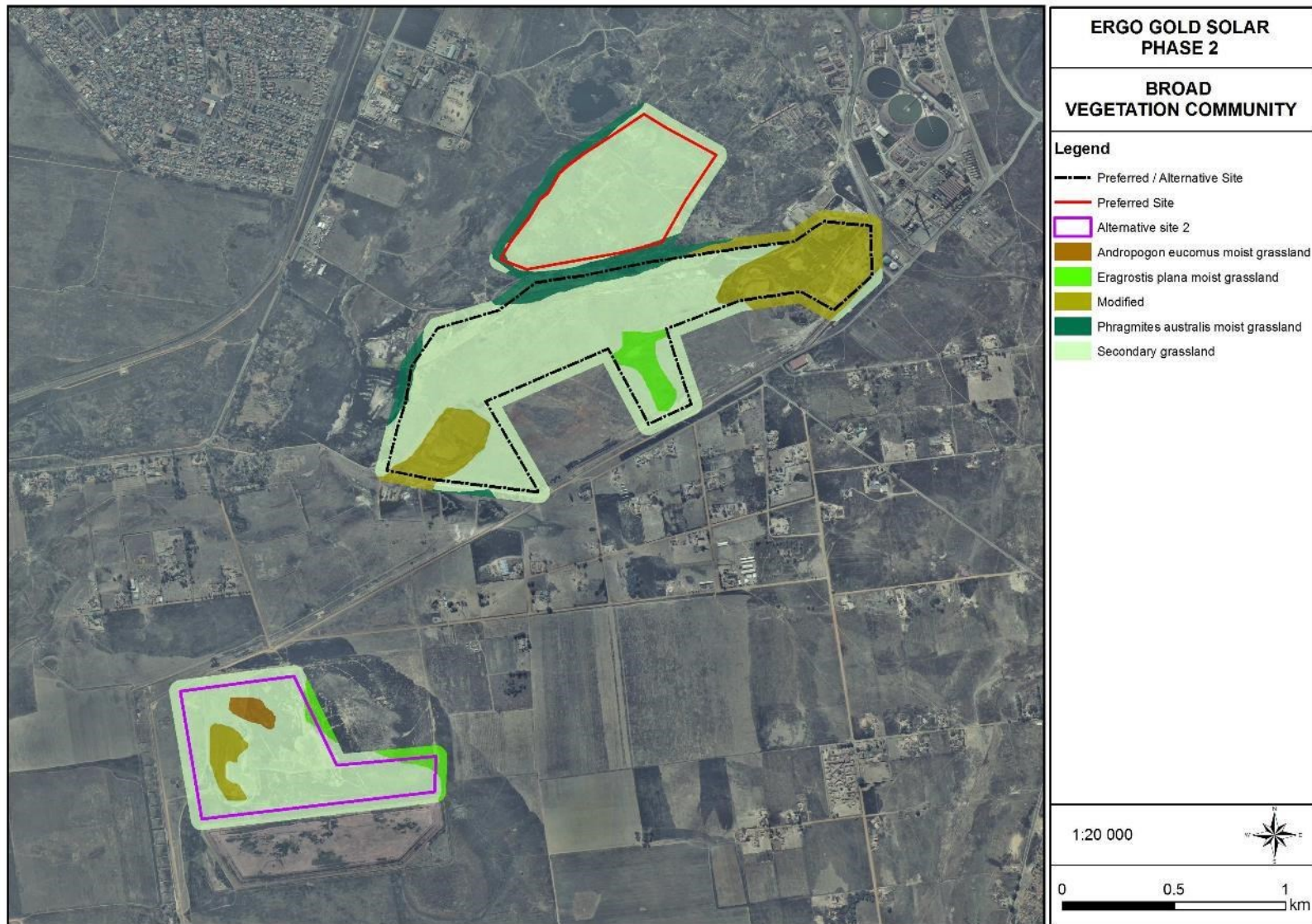
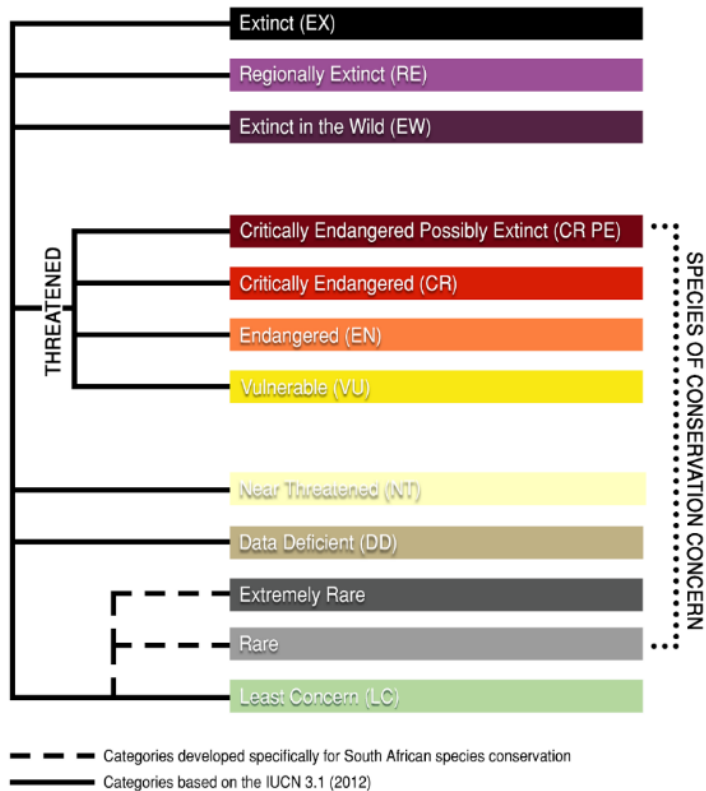


Figure 13: Vegetation map

4.3 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 C list the species that was historically recorded in the area and which was surveyed for.

None of the species listed was recorded. Due to the disturbed and secondary state of the vegetation within the preferred and alternative sites, such species are not expected to be present.

4.4 Protected plants

4.4.1 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.

No TOP listed species was recorded. Due to the disturbed and secondary state of the vegetation within the preferred and alternative sites, such species are not expected to be present.

4.4.2 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).

One provincially protected species was recorded on Prt 9 of the Farm Withok (Alternative site) during the May 2022 field survey. The orchid species was already dry and the flowers dead (Photo plate 9). However, it is believed to be a *Habenaria* species, likely *Habenaria schimperiana*. *H schimperiana* was recorded during Phase 1 along the proposed powerline (Dimela Eco Consulting, 2022).



Photo plate 9: Orchid species recorded in the secondary grassland on Prt 9 of the Farm Withok (Alternative site)

5. 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 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:

$$\text{SEI} = \text{Biodiversity Importance (BI)} + \text{Receptor Resilience (RR)}$$

Wherein **BI** in turn is:

$$\text{BI} = \text{Conservation Importance (CI)} + \text{Functional Integrity (FI)}$$

Table 10: 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) |
| Moist grasslands | High | Medium | Medium | Medium | Medium (Minimise & Restore) |

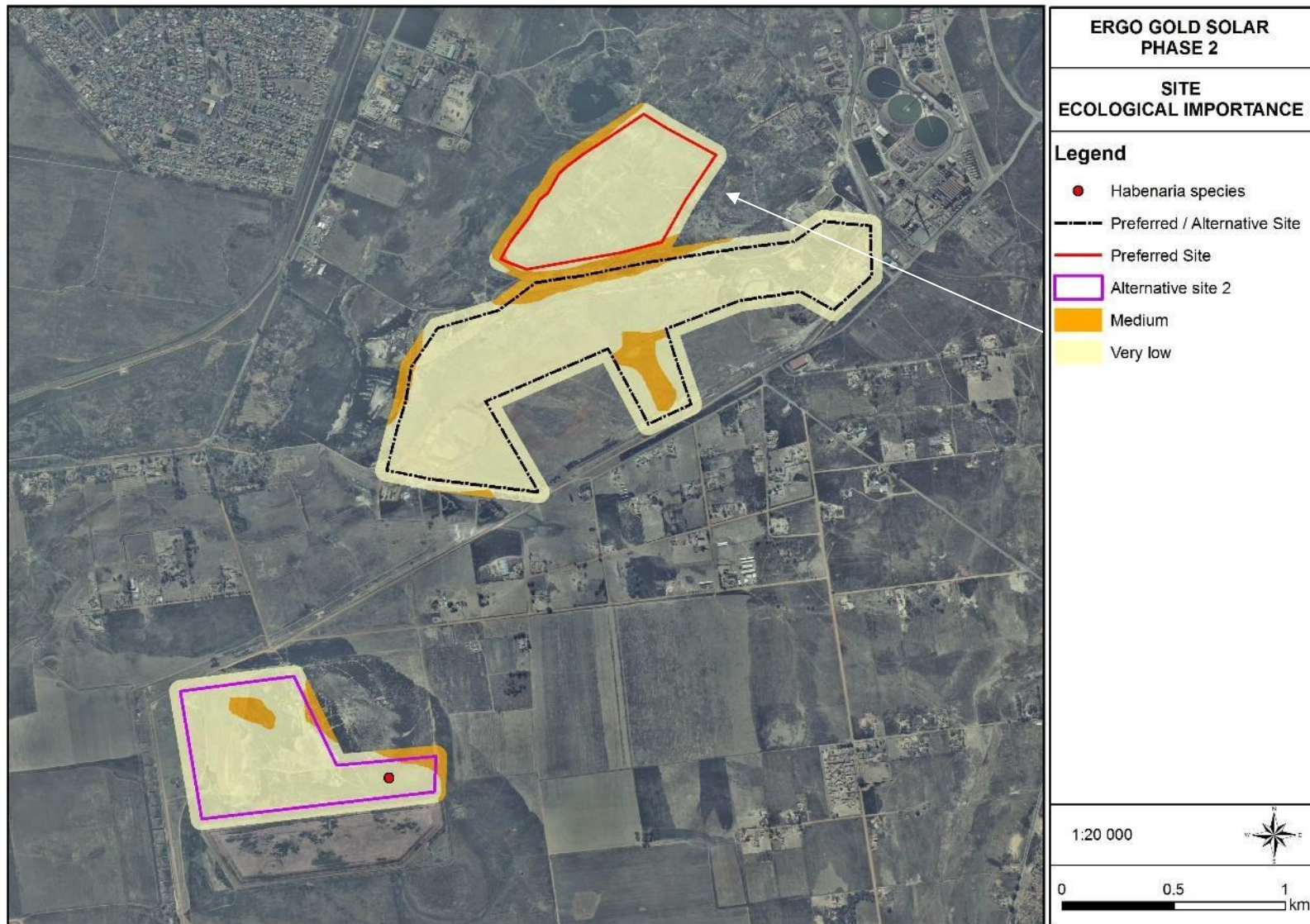


Figure 15: Site Ecological Sensitivity for the proposed sites, including a 50m buffer

5.2 Discussion of SEI results

The interpretation of the SEI ranks is described in Section 2: Methodologies; Table 4. The SEI rating was utilised to generate the vegetation sensitivity map (Figure 15). The moist grassland sensitivity must be compared to the wetland assessment, which is the definitive document with regards to wetland boundaries.

5.2.1 Medium SEI

The moist grasslands have been impacted on by mining activities and some are likely artificial wetlands or depressions in the landscape of the rehabilitated slimes dams. Although the species diversity is compromised, the vegetation function remains largely intact. Development must adhere to recommendations of the wetland specialists and impacts managed and mitigated by an approved management plan.

5.2.2 Low and very-low SEI

The secondary grasslands and modified vegetation are not representative of the natural state and will comprised of a low species diversity with no plant species of conservation concern present or likely to be present. Development activities of medium to high impact are acceptable as it will utilise historically disturbed land. Appropriate mitigation must still be implemented to prevent edge effects into moist grasslands.

6. PREFERRED SITE MOTIVATION

Due to the largely modified and secondary nature of the vegetation, the proposed development will have limited to no impact on sensitive vegetation. However, moist grassland areas should be protected as it is associated with wetland conditions and could include plant species of conservation concern.

Figure 16 shows the proposed panel layout on the Preferred sites. The panel layout respects the flow of the Withokspruit, however, the artificial dam area (*Eragrostis plana* moist grassland) on Prt 183 of the Farm Witpoortje, will be destroyed. Table 11 compares the impacts on sensitive features between the Preferred and Alternative site.

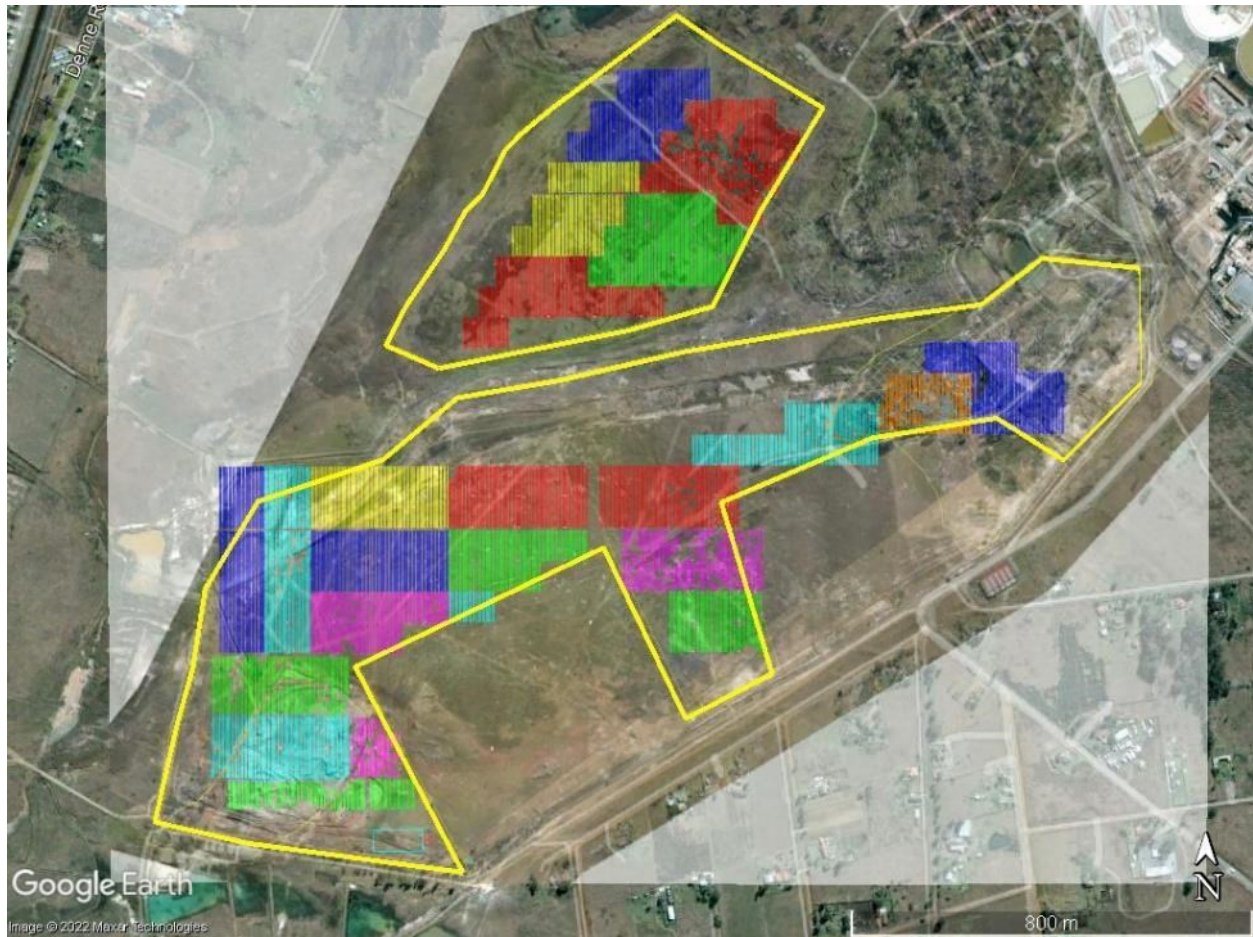


Figure 16: Estimation of the proposed panel layout on the Preferred site, overlaid onto Google Earth imagery. Note there is a data error of about 50m on the map, all panels will be developed within the site boundary

Table 11: Comparison of sensitive features between the Preferred and Alternative site

| Feature considered | Preferred sites | Alternative sites |
|-----------------------------|---|---|
| CBA | Small portion present on Prt 272 of the Farm Witpoortje. The area comprised secondary grassland | Small portion on western boundary of Prt 9 of the Farm Withok. The area comprised secondary grassland |
| ESA | Most of Prt 272 of Witpoortje. The area comprised secondary grassland | The entire Prt 9 of Withok. The area comprised secondary grassland |
| Sensitive vegetation | <p><i>Phragmites australis</i> moist grasslands. No direct impacts are envisaged</p> <p><i>Eragrostis plana</i> moist grassland (artificial dam) will be destroyed by panelling</p> | <p>The <i>Andropogon eucomus</i> moist grassland will be destroyed. This is likely an artificial depression and the wetland assessment recommendations must be adhered to</p> <p><i>Eragrostis plana</i> moist grassland is present within the eastern 50m buffer. No direct impacts are envisaged.</p> |

| Feature considered | Preferred sites | Alternative sites |
|-------------------------------|--|---|
| Threatened plant species | None recorded and none expected to be present. | None recorded and none expected to be present. |
| Provincially protected plants | None recorded | One individual of a <i>Habenaria</i> species (orchid) was recorded. |

The impacts on the Preferred and Alternative sites are comparable with the greatest impact on moist grasslands. The wetland assessment must be consulted for the definitive boundaries of wetlands. No plant species of conservation concern were recorded in the moist grasslands and therefore the wetland specialist recommendations and buffers take preference. One protected plant species was recorded within the secondary grassland on the Alternative Site.

Although the impacts are comparable, this report motivates the approval of the Preferred Sites. Development on the Preferred Sites will concentrate the proposed activities in an area adjacent to the current mining activities and infrastructure. This will reduce edge effects to natural areas, as well as fragmentation of larger, connected open spaces. Development on the Alternative Site will fragment a larger open space that comprise of secondary and good condition grassland (Phase 1 assessment, Dimela Eco Consulting, 2021). The Alternative site is also closer to good condition grassland and moist grassland present in the Withok Estates Agricultural holdings north of the Alternative Site. If for any reason the Preferred Site is not approved, this report has no objection with the Alternative site being used.

7. OPTIMIZED LAYOUT

This report was submitted in July 2022, whereafter engineers came up with an Optimized Layout for the development on the Preferred site. This included a slight increase in footprint towards the north-western corner of the site, fencing around the site, two elevated crossings over the central, west flowing wetland area, as well as an additional road to access Portion 272 of the Farm Witpoortje 117.

7.1 Limitations with regards to the vegetation mapping

Some portions of the optimized layout were not sampled. However, the specialist has undertaken three (3) field investigations to the site and surrounds over the course of 2,5 years and in different season. The confidence level of the extrapolated data used, is thus medium to high. Also, the additional access road to Portion 272 of the farm Witpoortje 177 was assessed via photographs received from the client.

7.2 Result of desktop assessment for the additional access road

The additional road proposed to access Portion 272 of the Farm Witpoortje 117 was not sampled, however, Google Earth Satellite imagery and photographs received from the client, indicated that most of the vegetation along the proposed road were also modified (Figure 17). The road comprises an existing tar road in the south and an existing dirt road in the north. The vegetation includes stands of *Eucalyptus*

trees and was impacted on by historical activities around the hostel and mine. The road has been used for several years and will likely only be widened.



Figure 17: Google Earth satellite imagery of the additional access road in the years 2002 and 2022 showing the largely modified state of the vegetation along the road and within a 20m buffer thereof

The road may impact on some secondary grassland as it enters the PV block (Photo plate 10). Satellite imagery suggest that the vegetation was impacted on historically as it is adjacent to a sports field and historically cultivated land. It is highly unlikely that plant species of conservation concern are present in this area and therefore this report does not object to the utilisation of this existing road.



Photo plate 10: Images of the secondary and historically disturbed land along the northern extent of the additional access road

7.3 Results and vegetation opinion on the Optimized Layout

Most of the area that will be impacted on by the Optimized layout comprises secondary grassland and modified land which was classified in this report as being of low sensitivity to the proposed development (Section 5). The remainder of the vegetation comprises moist grasslands that have been impacted on by mining activities and some are likely artificial wetlands or depressions in the landscape of the rehabilitated slimes dams. Although the species diversity is compromised, the vegetation function remains largely intact. Development must adhere to recommendations of the wetland specialists and impacts managed and mitigated by an approved management plan.

The Optimized layout on the Preferred Sites will concentrate the proposed activities in an area adjacent to the current mining activities and infrastructure (Figure 18). This will reduce edge effects to natural areas, as well as fragmentation of larger, connected open spaces. This report has no objection to the Optimized layout and is confident that no sensitive vegetation groupings will be impacted on.

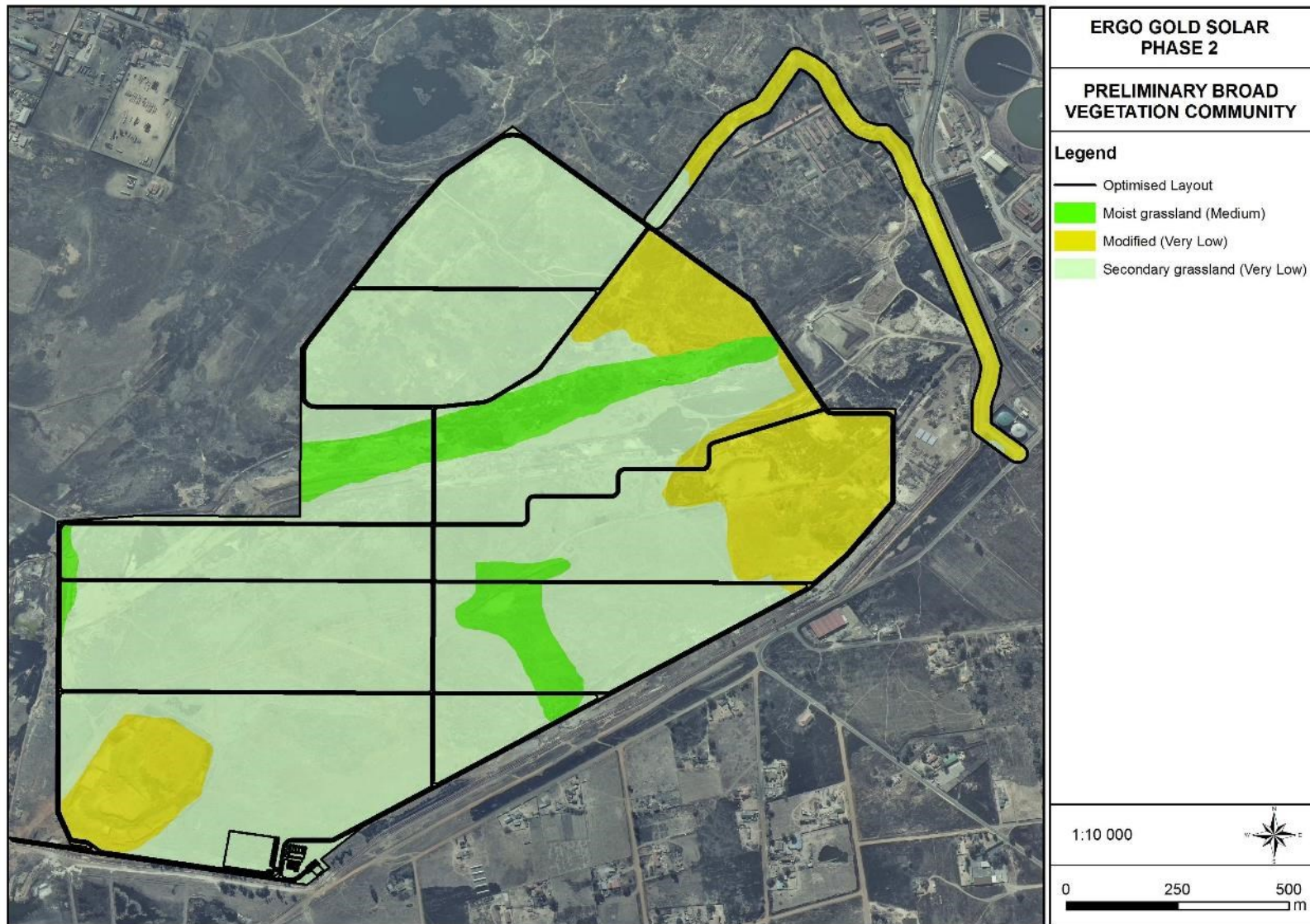


Figure 18: Optimized layout and vegetation sensitivity

8. 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.

8.1 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:

| |
|---|
| $\text{Significance} = \text{Consequence (Extent + Duration+ Magnitude)} \times \text{Probability}$ |
|---|

- 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).

8.2 Impact Assessments

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

8.2.1 Destruction of natural vegetation of medium sensitivity (moist grasslands)

| | | | | | |
|----------------------------------|--|----------------------|------------------|--------------------|---------------------|
| Activity: | Clearing of vegetation at construction footprints | | | | |
| Impact: | Destruction of natural vegetation (moist grassland): <ul style="list-style-type: none"> • Edge effects e.g. heavy vehicles turning in adjacent areas; and • Storage of equipment within vegetation • Construction of elevated access over wetland | | | | |
| 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? | <ul style="list-style-type: none"> • Impact on moist grassland is difficult to rehabilitate and can impact on its functional role. Therefore, these areas must be avoided, or impacts managed as per the recommendations of the wetland assessment report. | | | | |

| | |
|-----------------------------|---|
| Mitigation Measures: | <p><i>Planning:</i></p> <ul style="list-style-type: none"> Do not plan any construction camps or laydown areas within the sensitive moist grassland or grassland vegetation that was not assessed by this report. <p><i>Construction:</i></p> <p>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.</p> <ul style="list-style-type: none"> 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 areas. <p><i>Operation and Maintenance:</i></p> <ul style="list-style-type: none"> 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: | <ul style="list-style-type: none"> Degradation of watercourses and fragmentation of open spaces. Increase in similar developments. |
| Residual impacts: | <ul style="list-style-type: none"> Trampling of surrounding grassland vegetation. Degradation due to edge effects Localized alteration of soil surface characteristics and loss of flora, possible increased fragmentation of remaining natural grassland. <p>If mitigation measures are adequately undertaken, the residual risk is low.</p> |
| Climate Change: | <ul style="list-style-type: none"> NA |

8.2.2 Destruction of modified vegetation of low sensitivity

| | |
|------------------|--|
| Activity: | Clearing or disturbance to vegetation at construction footprints |
|------------------|--|

| | | | | | |
|----------------------------------|--|----------------------|------------------|--------------------|---------------------|
| Impact: | <p>Destruction of modified and secondary vegetation:</p> <ul style="list-style-type: none"> • Clearing of and damage to vegetation in construction footprint, access roads, construction camps, vehicle / machinery traffic and trampling by workers • 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 | | | | |
| Significance rating: | Duration | Extent | Magnitude | Probability | Significance |
| Pre-Mitigation | 2 | 2 Site and surrounds | 4 | 5 | 40 Medium |
| Post-Mitigation | 2 | 1 Site | 2 | 5 | 25 Low |
| Is the Impact Reversible? | <ul style="list-style-type: none"> • Yes, modified, and secondary vegetation can be re-established. | | | | |
| Mitigation Measures: | <p><i>Planning:</i></p> <ul style="list-style-type: none"> • 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. <p><i>Construction:</i></p> <p>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.</p> <ul style="list-style-type: none"> • 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 | | | | |

| | |
|--|--|
| | <p>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 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.</p> <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> ◦ 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. <p><i>Operation and Maintenance:</i></p> <ul style="list-style-type: none"> • 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. • Maintain vegetation under PV panels. |
|--|--|

| | |
|----------------------------|---|
| Cumulative impacts: | <ul style="list-style-type: none"> Degradation of watercourses. Increase in similar developments. |
| Residual impacts: | <ul style="list-style-type: none"> Degradation due to edge effects Localized alteration of soil surface characteristics and loss of flora, possible increased fragmentation of remaining natural grassland <p>If mitigation measures are adequately undertaken, the residual risk is low.</p> |
| Climate Change: | <ul style="list-style-type: none"> NA |

8.2.3 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: | <p>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:</p> <ul style="list-style-type: none"> Removal of vegetation upslope of the moist grassland, without proper rehabilitation or failure of rehabilitation; Access roads, especially on slopes, and over the <i>Phragmites australis</i> moist grasslands; 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? | <ul style="list-style-type: none"> Yes, however, rehabilitation activities are costly | | | | |
| Mitigation Measures: | <p><i>Planning:</i></p> <ul style="list-style-type: none"> 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 | | | | |

| | |
|--|---|
| | <p>granted by the Department of Water and Sanitation (DWS) for these activities.</p> <p><i>Construction:</i></p> <ul style="list-style-type: none"> • 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. <p><i>Operation and Maintenance:</i></p> <ul style="list-style-type: none"> • 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 |
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|----------------------------|--|
| | <p>to ensure that grass species that naturally occur in the Tsakane Clay Grassland, are sowed to re-establish indigenous plant cover.</p> <ul style="list-style-type: none"> • 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: | <ul style="list-style-type: none"> • 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: | <ul style="list-style-type: none"> • 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: | <ul style="list-style-type: none"> • Loss of biodiversity and soil condition that buffer climate change |

8.2.4 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? | No threatened species was recorded. Provincially protected species on the Alternative Site can be relocated. | | | | |
| Mitigation Measures: | <p><i>Planning:</i></p> <ul style="list-style-type: none"> • If the development proceeds on Prt 9 of the Farm Withok (Alternative Site), the <i>Habenaria</i> species should be identified in its flowering period (likely March). • Apply for a permit from the GDARD to remove the species. • The species must be relocated in accordance with a relocation and monitoring plan. | | | | |

| | |
|----------------------------|--|
| | Construction: <ul style="list-style-type: none"> 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: | <ul style="list-style-type: none"> If mitigation measures are adequately implemented, no cumulative impacts are expected. |
| Residual impacts: | <ul style="list-style-type: none"> Trampling during maintenance |
| Climate Change: | <ul style="list-style-type: none"> NA |

8.2.5 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: <ul style="list-style-type: none"> 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. | | | | |

| | |
|----------------------------|--|
| | <ul style="list-style-type: none"> 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. <p><i>Construction:</i></p> <ul style="list-style-type: none"> 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: | <ul style="list-style-type: none"> 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: | <ul style="list-style-type: none"> Re-infestation in areas initially cleared. |
| Climate Change: | <ul style="list-style-type: none"> Loss of biodiversity that buffer climate change |

8.2.6 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? | <ul style="list-style-type: none"> Yes. | | | | |

| | |
|-----------------------------|---|
| Mitigation Measures: | <p><i>Construction:</i></p> <ul style="list-style-type: none"> • 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: <u>the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored</u> • 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. <p><i>Maintenance:</i></p> <ul style="list-style-type: none"> • Maintenance vehicles may not deviate from dedicated roads. |
| Cumulative impacts: | <ul style="list-style-type: none"> • 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: | <ul style="list-style-type: none"> • Altered soil characteristics and vegetation that remain in an unstable, pioneer phase or invaded by alien invasive plant species. |
| Climate Change: | <ul style="list-style-type: none"> • Soil disturbances, resulting in a loss of biodiversity. |

9. CONCLUSION

The sites fall 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. The results found that although the sites are within an area of high terrestrial biodiversity, the vegetation is disturbed and in a

secondary state. However, it does retain some ecological function but the rating of “high” is challenged. Also, no sensitive plant species were recorded or are expected to be present in the Preferred and Alternative sites.

Due to the modified and secondary nature of the vegetation, the proposed development of the PV facility, will likely have no to limited impact on sensitive vegetation. The impacts on the Preferred and Alternative sites are comparable with the greatest impact on moist grasslands. The wetland assessment must be consulted for the definitive boundaries of wetlands. No plant species of conservation concern were recorded in the moist grasslands and therefore the wetland specialist recommendations and buffers take preference. One protected plant species was recorded within the secondary grassland on the Alternative Site.

Although the impacts are comparable, this report motivates the approval of the Preferred Site, including the Optimized layout. Development on the Preferred Sites will concentrate the proposed activities in an area adjacent to the current mining activities and infrastructure. This will reduce edge effects to natural areas, as well as fragmentation of larger, connected open spaces. Development on the Alternative Site will fragment a larger open space that comprise of secondary and good condition grassland (Phase 1 assessment, Dimela Eco Consulting, 2021). The Alternative site is also closer to good condition grassland and moist grassland present in the Withok Estates Agricultural holdings north of the Alternative Site. If for any reason the Preferred Site is not approved, this report has no objection with the Alternative site being used for the proposed PCV facility.

10. 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 12: Summary of the main terrestrial (vegetation) biodiversity findings

| Biodiversity (vegetation) aspect | Result |
|--|--|
| Conservation Plan Category: CBA and ESA | Reason for the CBA The CBAs within and around the proposed sites are classified based on the potential habitat for plant species of conservation concern and the potential presence of primary vegetation Can ESA / CBA be maintained? The ESA on both sites correspond with secondary grasslands. The vegetation within the CBA on the Preferred site was historically cultivated, currently comprise secondary grassland and no plant species of conservation concern were recorded or are expected to be present. The CBA on the sites functions rather as an ESA and if |

| Biodiversity (vegetation) aspect | Result |
|---|---|
| | <p>movement corridors along the Withokspruit and moist grasslands remain undeveloped, then the function can be maintained.</p> <p>Impact on species composition and structure of vegetation</p> <p>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.</p> |
| Ecosystem threat status | <p>Impact on ecosystem threat status</p> <p>No natural of good condition vegetation is present within the Preferred- or Alternative sites. The vegetation is not representative of Tskane Clay Grassland and therefore can not contribute to the conservation thereof. The remnant Tsakane Clay Grassland around the site boundaries are also in a secondary to highly degraded state and the impact of the proposed development on the threat status of this ecosystem is negligible.</p> <p>Impact on explicit subtypes in the vegetation; and the impact on overall species and ecosystem diversity of the site;</p> <p>See above</p> |
| Protected Areas | <ul style="list-style-type: none"> • Not applicable |
| Strategic Water Source Areas (SWSA): | <p>Impact(s) on the terrestrial habitat of a SWSA</p> <p>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.</p> <p>Impacts of the proposed development on the SWSA water quality and quantity</p> <p>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</p> |
| National Freshwater Ecosystems Priority Areas (NFEPA): | See wetland assessment |
| Indigenous forest | Not applicable |
| Sensitive Areas | <ul style="list-style-type: none"> • The buffer area to the moist grasslands, as delineated by the wetland specialist must be avoided. • As per the GDARD Requirements for Biodiversity Assessments Version 2 (2012): "All good condition natural vegetation must be designated as ecologically sensitive". Rocky grassland to the southwest of the Preferred site and the north of the Alternative site may be in a good ecological condition and falls within a CBA that forms part of a Critically Endangered Ecosystem. This area is outside of the PAOI and may not be considered for any development or edge effects. |

| Biodiversity (vegetation) aspect | Result |
|--|---|
| No go areas | Avoid direct impacts to moist grasslands and no edge effects or scope creep towards rocky grasslands outside of the PAOI are allowed. |
| Plant species of conservation concern | <ul style="list-style-type: none"> • No plant species of conservation concern were recorded or are expected to be present |
| Main impacts: | <p>The main impacts expected are as follows:</p> <ul style="list-style-type: none"> • Destruction of natural vegetation of 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) • Unlikely destruction of protected plants and plants of conservation concern • Potential increase in invasive vegetation • Compaction and destruction of soils |
| Cumulative impacts: | <ul style="list-style-type: none"> • If mitigation measures are adequately implemented, no cumulative impacts are expected. |
| Residual impacts: | <ul style="list-style-type: none"> • Trampling and edge effects; and • Impacts to the watercourse such as runoff from roads. |

11. REFERENCES

- Department of Environmental Affairs (DEA), (2011): National Environmental Management: Biodiversity Act (Act 10 of 2004). National List of Ecosystems that are threatened and in need of protection. Government Gazette (34809).
- Dimela Eco Consulting, (2021): ERGO SOLAR PHASE 1: Up to 19.9MW PV facility, including a 11km of 22kV Overhead Power Line on the farm Witpoortjie 117 and Withok Estates, Ekurhuleni Municipality, Gauteng. Terrestrial Biodiversity (Vegetation) Report. Date: February 2021 Amended with Preferred Layout in May 2021. Report drafted on behalf of: Environmental Management Assistance (Pty) Ltd
- Gauteng Department of Agriculture and Rural Development, (2011): Gauteng Conservation Plan Version 3 ArcGIS Spatial data.
- Gauteng Department of Agriculture, Conservation and the Environment (2006): Red List Plant Species Guidelines. Updated 2017
- Gauteng Department of Agriculture, Conservation, Environment and Landcare (2001): Development guidelines for ridges. Updated April 2006.
- Kent, M. and Coker, P. (1992): Vegetation description and analysis: a practical approach. CRC Press
- Mucina, L. & Rutherford, M.C. (2006): The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.
- Perlman, D.L., and Milder, J.C. (2005): Practical ecology for planners, developers and citizens. Island Press, Washington.
- Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama P.A., (eds) (2009): Red List of South African plants 2009. *Strelitzia* 25, South African National Biodiversity Institute.
- South African National Biodiversity Institute (SANBI).(2020): Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.0.
- SANBI, (2016): Lexicon of Biodiversity Planning in South Africa. Beta Version, June 2016. South African National Biodiversity Institute, Pretoria. 72 pp.
- Tarr, J.A., (2006): An evaluation of the *Phragmites australis* reed use by communities neighbouring the Tembe Elephant Park, Maputaland, KwaZulu-Natal, South Africa. Submitted in partial fulfilment of the requirements for the degree Magister Scientiae in Wildlife Management. Centre for Wildlife Management, Faculty of Natural and Agricultural Sciences. University of Pretoria
<http://repository.up.ac.za/bitstream/handle/2263/23606/01chapter1.pdf?sequence=2>

Internet recourses:

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

12. 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 <i>et al</i> , 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.

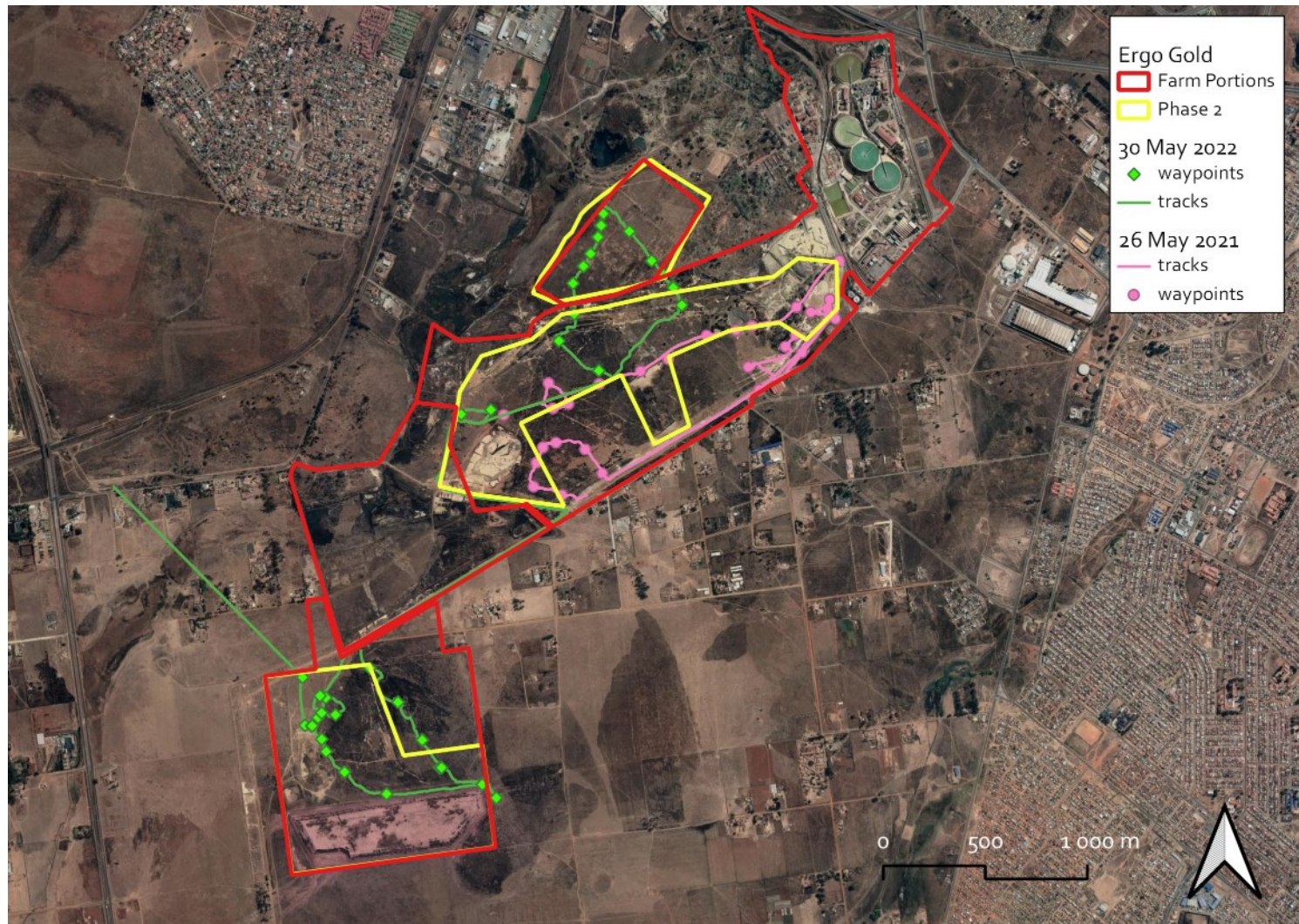
| | |
|----------------------------|--|
| Mitigation | The implementation of practical measures to reduce adverse impacts |
| Moderately modified | An ecological condition class in which ecological function is predominantly unchanged even though composition and structure have been compromised. Equates 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 <i>et al</i> , 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. <i>Now termed Plants of Conservation Concern</i> |
| 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 <i>et al</i> , 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 |

Vulnerable

position on major ecological gradients and nutrient levels, and appear similar in vegetation structure and especially floristic composition”.

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: SAMPLE POINT AND TRACK MAP



APPENDIX B: SPECIES RECORDED DURING THE FIELD SURVEYS OF 2021 AND 2022 (PHASE 1 AND 2)

1 = species recorded in broad vegetation group

M = Medicinal

P= Protected by provincial legislation

D=Declining

| Species | Common name | Habitat notes | Secondary grasslands | Moist grasslands | | |
|------------------------------|---------------------|---|-------------------------------------|---------------------|-----------------|---------------------------|
| | | | <i>Eragrostis-Cynodon</i> dominated | <i>P. australis</i> | <i>E. plana</i> | <i>Andropogon eucomis</i> |
| Grasses | | | | | | |
| <i>Andropogon eucomis</i> | Old Man's Beard | Wet areas such as vlei's, seepage lines. Good stabiliser of wet soils and indicative of a poor drainage. Increaser II | | | | 1 |
| <i>Aristida adscensionis</i> | Annual Three-awn | Disturbed land such as road reserves. Increaser II | 1 | | | |
| <i>Aristida congesta</i> | Tassel Three-awn | Disturbed, overgrazed or farmed land. Increaser II grass | 1 | | 1 | |
| <i>Chloris virgata</i> | Feather-top Chloris | Disturbed, moist areas, mostly clay soils and on edge of pans. Increaser II | | 1 | | |
| <i>Cynodon dactylon</i> | Couch grass | Most soils, usually in disturbed areas. Increaser II grass, palatable | 1 | 1 | 1 | |
| <i>Digitaria eriantha</i> | Finger Grass | Sandy, rocky soil in arid areas or next to rivers/vlei's in areas with higher rainfall. Planted for pasture | 1 | | | |

| Species | Common name | Habitat notes | Secondary grasslands | Moist grasslands | | |
|-------------------------------|------------------------|---|-------------------------------------|---------------------|-----------------|---------------------------|
| | | | <i>Eragrostis-Cynodon</i> dominated | <i>P. australis</i> | <i>E. plana</i> | <i>Andropogon eucomis</i> |
| <i>Eragrostis curvula</i> | Weeping Love Grass | Mostly occurs in disturbed areas / sown as pasture. Increaser II grass | 1 | | | |
| <i>Eragrostis gummiflua</i> | Gum Grass | Subclimax grass, disturbed areas and often in moist soils. Increaser II grass | | | 1 | 1 |
| <i>Eragrostis lehmanniana</i> | Lehmann's Grass | Sandy soil, mostly in disturbed land. Increaser II grass | | | | |
| <i>Eragrostis plana</i> | Tough Love Grass | Disturbed areas, mostly in moist patches. Increaser II grass | 1 | 1 | 1 | |
| <i>Eragrostis rigidior</i> | Broad Curly Leaf | Disturbed areas such as old fields and overgrazed land. Increaser II grass | | | | |
| <i>Hyparrhenia hirta</i> | Common Thatching Grass | Well drained, rocky soil in open grassland and disturbed areas. Increaser I grass | 1 | | 1 | |
| <i>Imperata cylindrica</i> | Cotton Wool Grass | Mostly in moist soils | | 1 | | 1 |
| <i>Melinis repens</i> | Natal Red Top | Disturbed grassland. Increaser II grass. | 1 | | | 1 |
| <i>Paspalum dilatatum</i> | Dallis Grass | Introduced grass, moist areas in vleis and close to rivers. Sometimes planted for pasture | 1 | 1 | 1 | |
| <i>Phragmites australis</i> | Common Reed | Grows close to water sources such as rivers and wetlands. | | 1 | | |
| <i>Setaria pallida-fusca</i> | Garden Bristle Grass | Disturbed areas e.g. next to roads and where rainwater collect | | | 1 | 1 |

| Species | Common name | Habitat notes | Secondary grasslands | Moist grasslands | | |
|--------------------------------------|-----------------|--|-------------------------------------|---------------------|-----------------|---------------------------|
| | | | <i>Eragrostis-Cynodon</i> dominated | <i>P. australis</i> | <i>E. plana</i> | <i>Andropogon eucomis</i> |
| <i>Urochloa panicoides</i> | Garden Urochloa | Disturbed areas, farmed land and moist areas. | 1 | | | |
| Minimum number of grass species = 18 | | | 10 | 6 | 7 | 5 |
| Small shrubs / Forbs / succulents | | | | | | |
| <i>Berkheya cf rigida</i> | Disseldoring | Spiny plant that becomes problematic in overgrazed veld | 1 | 1 | | |
| <i>Berkheya radula</i> | Boesmanrietjie | Moist grassland and vleis | | 1 | 1 | |
| <i>Conyza podocephala</i> | | Roadsides and disturbed grasslands | 1 | 1 | | |
| <i>Felicia muricata</i> | | Grassland, proliferating in overgrazed/disturbed places | 1 | | | |
| <i>Gazania krebsiana</i> | Botterblom | Grassland, widespread in other habitats | 1 | | | |
| <i>Gomphocarpus fruticosus</i> | milkweed | Grassland, often along roadsides and abandoned cultivated fields, disturbed areas. | 1 | | | 1 |
| <i>Habenaria schimperiana</i> (P) | | Moist grassland | 1 Alternative site only | 1 | | |
| <i>Helichrysum nudifolium</i> (M) | Hottentot's tea | Grassland | 1 | | | |
| <i>Helichrysum rugulosum</i> (M) | | Grassland, often in vleis or patches in disturbed areas | 1 | | | |

| Species | Common name | Habitat notes | Secondary grasslands | Moist grasslands | | |
|---------------------------------------|----------------------------------|---|-------------------------------------|---------------------|-----------------|---------------------------|
| | | | <i>Eragrostis-Cynodon</i> dominated | <i>P. australis</i> | <i>E. plana</i> | <i>Andropogon eucomis</i> |
| <i>Hermannia depressa</i> | Rooi-opslag / Creeping Hermannia | Grassland, also in trampled and overgrazed areas | 1 | | | |
| <i>Hilliardiella oligocephala</i> (M) | Bitterbossie | Grassland | 1 | | | |
| <i>Nemesia fructicans</i> | Wildeleeubekkie | Shallow soils on exposed rock, also in disturbed areas | | | | |
| <i>Nidorella anomala</i> | | Grassland, often occurring in groups in moist areas. | | | 1 | |
| <i>Oxalis obliquifolia</i> (M) | Sorrel | Grassland and rock crevices, often in moist places | | | | 1 |
| <i>Polygala hottentotta</i> | Small Purple Broom | Common in grassland, often in damp places | 1 | | | |
| <i>Senecio erubescens</i> | | Grassland, often along streams and marshes | | | 1 | |
| <i>Senecio gregatus</i> | | Grassland, often in moist places | | | 1 | 1 |
| <i>Senecio cf innornatus</i> | | Grassland often in moist places | | | 1 | |
| <i>Stoebe plumosa</i> | Bankruptbush | Grassland, often proliferating in overgrazed areas. | 1 | | 1 | |
| <i>Solanum panduriforme</i> | Poison Apple | Disturbed places, often under trees (probably an indigenous specie) | 1 | | | |

| Species | Common name | Habitat notes | Secondary grasslands | Moist grasslands | | |
|---|---------------|---|-------------------------------------|---------------------|-----------------|---------------------------|
| | | | <i>Eragrostis-Cynodon</i> dominated | <i>P. australis</i> | <i>E. plana</i> | <i>Andropogon eucomis</i> |
| <i>Wahlenbergia caledonica</i> | | Grassland, rocky or seasonally moist places | 1 | | 1 | |
| Number of forb species recorded = 21 | | | 14 | 4 | 6 | 3 |
| <i>Cyperus congestus</i> | | Depressions in grassland, damp and temporary wet areas, ditches | | | | |
| <i>Cyperus esculentus</i> | | Weedy exotic in marshy or ploughed areas | 1 | | | 1 |
| <i>Juncus effusus</i> | Soft Rush | Wetland, swampy areas and streambeds | | 1 | | |
| <i>Pycreus macranthus</i> | | Marshes, vleis, grassland floodplains, seasonal depressions | | | | 1 |
| <i>Typha capensis</i> * | Bulrush | Grows in marshy areas and along watercourses. | | 1 | | |
| Number of sedge species recorded= 5 | | | 1 | 2 | 0 | 2 |
| Alien / Invasive Species | | | | | | |
| <i>Acacia dealbata/decurrens</i> * | Wattle | Invader of grassland and riverbanks, Category 2 | | 1 | 1 | |
| <i>Arundo donax</i> | Giant Reed | Category 1b | 1 | 1 | | |
| <i>Cosmos bipinnatus (Bidens formosa)</i> | Cosmos | Weed in disturbed places | 1 | | | |
| <i>Bidens pilosa</i> | Blackjack | Widespread, naturalised weed. | 1 | | 1 | |
| <i>Campuloclinium macrocephalum</i> | Pom-Pom Weed | Invasive weed, Category 1b | 1 | | | |
| <i>Conyza albida</i> | Tall Fleabane | Weed | 1 | | | |

| Species | Common name | Habitat notes | Secondary grasslands | Moist grasslands | | |
|---|------------------------|---|-------------------------------------|---------------------|-----------------|---------------------------|
| | | | <i>Eragrostis-Cynodon</i> dominated | <i>P. australis</i> | <i>E. plana</i> | <i>Andropogon eucomis</i> |
| <i>Datura stramonium</i> (M) | Thorn-apple / Olieboom | Category 1b | 1 | | | |
| <i>Eucalyptes</i> species | Bluegums | Category 1b | 1 | 1 | | |
| <i>Hibiscus trionum</i> | Bladderweed | Invasive weed in disturbed places. | | 1 | | |
| <i>Plantago lanceolata</i> | Narrow-leaved Plantain | Introduced weed, usually in disturbed places | 1 | | | |
| <i>Plantago major</i> (M) | Broadleaved Ribwort | Weed in moist areas, used medicinally. | 1 | | | |
| <i>Rumex crispus</i> | Curly Dock | Invades ditches and moist, waste places | | 1 | 1 | |
| <i>Schkuhria pinnata</i> | Dwarf Marigold | Weedy annual herb from S America | 1 | | 1 | |
| <i>Tagetes minuta</i> | Khaki Weed | Weed in disturbed places. Has become naturalised and due to the vast amount of seed set, difficult to control | 1 | | | |
| <i>Tamarix ramosissima</i> | Pink tamarisk | Category 1b | | | | 1 |
| <i>Verbena aristegera</i> (= <i>V. tenuisecta</i>) | Fine-leaved Verbena | Garden escape, now naturalised along roadsides and disturbed areas | 1 | | | 1 |
| <i>Verbena bonariensis</i> | | Common weed of disturbed and moist places, declared category 1b invader | 1 | 1 | 1 | 1 |
| Number of alien and invasive species recorded= 25 | | | 13 | 5 | 4 | 3 |

APPENDIX C: 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 | Flowering period | Occurrence on site / Suitable habitat |
|-------------------------------|--|--|------------------|--|
| <i>Boophone distichia</i> | Declining (reclassified to LC nationally) | Rocky grassland | Oct-Jan | Suitable habitat is present in the degraded rocky grassland to the south-west of Prt 183 of the Farm Witpoortje. This area is outside of the PAOI but was sampled during Phase 1 of this project. The plant was not recorded here during previous surveys and if present, unlikely to be impacted on. |
| <i>Crinum bulbispermum</i> | Declining (reclassified to LC nationally) | Occurs near rivers, streams, seasonal pans and in damp depressions. | Sept-Nov | Suitable habitat is present along the tributaries of the Withokspruit. The plant was not recorded here during previous surveys and if present, unlikely to be impacted on as the proposed layout of panels on the preferred site are outside of the moist grassland areas. |
| <i>Hypoxis hemerocallidea</i> | 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. | Sept-March | Suitable habitat is present in the secondary grassland; however, this species was not recorded during any of the site visits. The degraded rocky grassland to the south-west of Prt 183 of the Farm Witpoortje and north of Prt 9 of the Farm Withok. This area is outside of the PAOI but was sampled during Phase 1 of this project. The plant was not recorded here during previous surveys and if present, unlikely to be impacted on. |

| Species | Conservation Status | Habitat notes | Flowering period | Occurrence on site / Suitable habitat |
|-------------------------------|---|--|------------------|---|
| <i>Gunnera perpensa</i> | Declining (reclassified nationally as Least Concern) | Damp marshy area and vleis from coast to 2400m. | Oct-March | Suitable habitat is present along the tributaries of the Withokspruit. The plant was not recorded here during previous surveys and the <i>Phragmites australis</i> grows too dense for this species to survive within the dense <i>P australis</i> stands. |
| <i>Eucomis autumnalis</i> | Declining (reclassified nationally as Least Concern) | Damp, open grassland and sheltered places between rocks. Up to 2450m. | Nov-April | Suitable habitat is present in moist grasslands and along the tributaries to the Withokspruit. This species was not recorded during any of the field surveys and are unlikely to occur. |
| <i>Argyrolobium campicola</i> | Near threatened | Highveld grassland. | Nov-Feb | Suitable habitat is present in the degraded rocky grassland to the south-west of Prt 183 of the Farm Witpoortje. This area is outside of the PAOI but was sampled during Phase 1 of this project. The plant was not recorded here during previous surveys and if present, unlikely to be impacted on as the panels are positioned outside of the moist grassland areas. |
| <i>Habenaria bicolor</i> | Near Threatened | Terrestrial in drained grassland, recorded from about 1600m. | Jan-April | Suitable habitat is present in the degraded rocky grassland to the south-west of Prt 183 of the Farm Witpoortje. This area is outside of the PAOI but was sampled during Phase 1 of this project. The plant was not recorded here during previous surveys and are unlikely to be present. |
| <i>Kniphofia typhoides</i> | Near Threatened | Heavy, black clay soil, climax <i>Themeda triandra</i> grassland, low lying marshy ground - pans or vleis. | Feb-March | Suitable habitat is present along the tributaries of the Withokspruit. The plant was not recorded here during previous surveys and if present, unlikely to be impacted on as the proposed |

| Species | Conservation Status | Habitat notes | Flowering period | Occurrence on site / Suitable habitat |
|---|---------------------|---|------------------|---|
| | | | | layout of panels on the preferred site are outside of the moist grassland areas. |
| <i>Lithops lesliei</i> subsp. <i>lesliei</i> | 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. | March-June | Suitable habitat is present in the degraded rocky grassland to the south-west of Prt 183 of the Farm Witpoortje and north of portion 9 of the Farm Withok. This area is outside of the PAOI but was sampled during Phase 1 of this project. The plant was not recorded here during previous surveys and if present, unlikely to be impacted on. |
| <i>Khadia beswickii</i> | Vulnerable | Open shallow soil over rocks in grassland. | Jul-April | Suitable habitat is present in the degraded rocky grassland to the south-west of Prt 183 of the Farm Witpoortje and north of Prt 9 of the Farm Withok. This area is outside of the PAOI but was sampled during Phase 1 of this project. The plant was not recorded here during previous surveys and if present, unlikely to be impacted on. |

APPENDIX D: 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

Sept 2006: Environmental Education, BGCI Conference, Oxford England

Selected Project Experience (2011 onwards)

1. Provincial Environmental Outlook Reports

2017-2018: Vegetation input: Gauteng Outlook Report

in process: Vegetation input: North-West Outlook Report

2. Open Space Planning

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)

Dec 2014: 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: Schmidtsdrift, Northern Cape Vegetation Assessment for Solar Panels (Nuleaf)

Aug 2015: Proposed Construction of A 75mw Solar Energy Facility Project, Limpopo Tshikova 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