

Proposed Oliphant Estate Township Development on the Remainder of Portion 18 of Roode Pan 70, Kimberley, Northern Cape Province

Terrestrial Vegetation Compliance Report and Habitat Assessment

Date: January 2022

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Declaration of independence:

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

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Dimela Eco Consulting undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

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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_____2021.03.02_____
Date

EXECUTIVE SUMMARY

Oliphants Housing Estate (Pty) Ltd is proposing the construction of a mixed-use residential development on the Remainder of Portion 18 of the Farm Roode Pan 70 in Kimberley within the Sol Plaatjie Local Municipality, Northern Cape Province. The property lies approximately 10km to the north of Kimberley between the Kamfers Dam and the Midlands Road, the total study area proposed for development is approximately 150 hectares.

The Oliphant Estate Township Development entails the construction of the 2886 housing units on the above-mentioned property consisting of 175 freehold units and 2711 sectional title units consisting of High Density Residential, Lower Density Residential Nodes and a Business Node. The overarching objective for the Oliphant Estate Township Development is to drive economic growth within the northern section of Kimberley while minimising social and environmental impacts. The current housing backlog in the Sol Plaatjie Local Municipality is estimated at 4 000 units.

The site is bounded by the Transnet Railway line in the east and by the Midlands Road to the west. To the south the site is restricted by the unnamed stream that discharges into the Kamfers Dam. The full number of units will be provided with surfaced access roads, a metered water supply and waterborne sewerage. The following associated infrastructure will also be constructed to provide basic services to the development:

- Construction of internal access roads to serve the entire development.
- Public open spaces.
- Storm water management systems.

Dimela Eco Consulting was asked to verify the vegetation on the site and surrounds against a 2018 ecological assessment undertaken by Eco Agent (Eco Agent, 2018).

The DEA Screening Tool classifies the eastern extent of the site as being within an area of high terrestrial biodiversity value, as it falls within a Critical Biodiversity Area (CBA), as well as an Ecological Support Area (ESA). Much of the eastern extent of the site is also classified as being of medium sensitivity based on the potential habitat of one plant species of concern (sensitive species). This indicates that suitable habitat may be present for the species, but no confirmed accounts for such species were previously recorded on the site.

Therefore, the vegetation assessment should include a terrestrial vegetation assessment, as well as a terrestrial plant species assessment, as published in the Government Gazette No 43855 on 30 October 2020 in terms of sections 24(5)(a) and 25 (5)(h) of NEMA. However, the historic ecological report of the site, undertaken in 2018 (Eco Agent, 2018) found that most of the vegetation on the site is degraded and of low vegetation sensitivity. This report was used as a reference for the state of vegetation.

This report therefore entails a site verification of the larger site assessed in 2018, including limited vegetation sampling within walked transects, verification of the vegetation description as per Eco

Agent (2018) and a habitat assessment for the plant species of conservation concern as listed in the screening tool, to comply with the Protocols for terrestrial vegetation and plant species assessments published in 2020.

The terms of reference were as follows:

Complete a terrestrial vegetation compliance / assessment in line with the terrestrial biodiversity protocols, including

- Literature review including an existing ecological report of the site undertaken in the year 2018;
- Supply background information on the site relating to conservation plans and threatened ecosystems;
- Field survey to verify the vegetation results of the 2018 report;
- Map indicating ecologically sensitive vegetation groupings (if any); and
- Recommendation to mitigate potential impacts.

Included in the above a plant species compliance report.

- Write a compliance statement to verify that no SCC were recorded or suitable habitat for such species. OR
- Report and map the habitat for plant species of conservation concern for which suitable habitat is present on the site or were confirmed to occur. If the general habitat survey for plant species of conservation concern indicates suitable habitat or the presence of a SCC, a Plant Species Assessment may be recommended.

The following limitations are applicable, although not considered fatal flaws to the study:

- Vegetation studies should be conducted during the growing season of all plant species that may potentially occur. This may require more than one season's survey with two visits undertaken preferably during November and February. This report relied on a single site visit undertaken on 6th of January 2022 after good summer rains commenced.
- The development layout was not available at the time of writing this report. It is assumed that most of the site is proposed for the development, except wetland areas.
- It is assumed that the proposed development will not impact beyond the railway line that forms the eastern boundary of the site and no assessment was undertaken onto surrounding private properties.
- Due to good rains, the vegetation was lush and could have obscured smaller species.

Baseline information

The proposed site is situated on Portion 18 of the Farm Roode Pan 70, within the town of Kimberley in the Northern Cape Province. The site is directly west of the Kamfers Dam and within the Roodepan urban area. A railway line forms the eastern boundary and Midlands Road the western boundary. The highest natural elevation of the area assessed is about 1196m in its western extend (west of Midlands Road). The site slopes generally south- eastward. Several drainage lines, mostly highly disturbed, drain from the higher lying areas towards the Kamfers Dam. A wetland area associated with the Kamfers Dam occurs in the south-eastern corner of the site.

The site is situated within the historical extent of the Kimberley thornveld and the Vaalbos Rocky Shrubland. Neither of these vegetation types are currently of conservation concern. The Kamfers Dam in the south-eastern portion of the site comprises a Critical Biodiversity Area 1 (CBA1) as this is the habitat of the lesser flamingo and great numbers of other water birds. The north-eastern section of the Portion 18 is classified as a CBA2, which is the best option for meeting biodiversity targets, while avoiding conflict with other land uses. According to the Northern Cape Critical Biodiversity Area Map, these areas should remain natural, with only low impact development considered. The remainder of the site falls within 'Other Natural Areas' that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.

Historical aerial images show that the site and surrounds has been impacted on my mining, excavations, compaction, vegetation clearing (including cultivation) and dumping.

The assessment undertaken in March 2018 found that the vegetation units on the site assessed were disturbed, degraded, and transformed and only the wetland areas were considered as being sensitive to development. Eight (8) vegetation units that were delineated in the year 2018 along with its ecological sensitivity. Six (6) of these vegetation units is present on Portion 18, on which the development is now proposed.

Vegetation groups and Site Ecological Sensitivity

This assessment concurs with the sensitivity analysis of 2018 in that most of the site is developable, bar the wetland areas and associated buffer areas as recommended by the wetland and fauna specialist.

The table below list the vegetation on the site and its Site Ecological Importance. The vegetation printed in bold is present on Portion 18.

Broad vegetation community	Site Ecological Importance (SEI) – mitigation
Degraded / secondary <i>Vachellia tortilis</i> Thornveld	Low (Minimise & Restore)
Highly transformed	Very Low (Minimise)
Disturbed Open Shrubveld	Low (Minimise & Restore)
Old Fields, Secondary grassland	Very Low (Minimise)
Degraded <i>Prosopis</i> Area	Very Low (Minimise)
Mine Dump	Very Low (Minimise)
Wetlands	High (Avoid & Minimise)
Artificial wetlands	Medium (Minimise & Restore)

Concluding statement

The site verification undertaken on 6 January 2022 confirmed the findings of the Eco Agent (2018) assessment in that most of the area assessed is of low vegetation sensitivity and suitable for development. The vegetation map of 2018 was found to be valid with minimal changes such as an increase in the tree layer in some areas noted. However, additional wetland areas were recorded during the 2022 verification, albeit north of Portion 18 that is proposed for the development.

The wetland areas, and associated buffer zones on and around the site should be regarded as undevelopable as per the recommendations of the wetland specialists (Limosella, 2022), while buffer areas to threatened avifauna species must also be adhered to (Kasl, 2022).

The vegetation within Portion 18 was degraded or secondary in nature and of little conservation importance. However, the vegetation has a functional role as open space, habitat, and ground water recharge zones, which should be mitigated by creating or maintaining indigenous open space that will serve as ground water recharge zones. In addition, the vegetation within the wetland is important for the health and functioning thereof. Due to the increase in hardened surfaces associated with developments, it likely that cumulative impacts can affect the sensitive wetland community adversely should no mitigatory measures be applied.

The greatest threat to the rehabilitation of the land disturbed by construction, is the potential of invasive plant species rapidly establishing on the disturbed soil and spreading into adjacent natural areas. If remedial measures and monitoring are properly implemented, the vegetation that will be disturbed during construction could rehabilitate well over time, and long-term impacts on vegetation and faunal habitats could thus be minimal. Once in use, the pipelines have relatively contained impacts on the vegetation and can successfully be mitigated to limit or even negate the negative impacts

Furthermore, the presence of proximate access roads and dirt roads as well as the presence of several smaller tracks and existing road servitudes in the area, will greatly reduce the impacts of the proposed development.

With regards to plant species of conservation concern: Six species have been short-listed to have a possibility of occurring, including a Vulnerable species for which the habitat assessment was undertaken. The wetland areas and associated buffers are the only potential habitat for two species short-listed. Neither of these species were recorded and the likelihood of occurring is considered medium to low, particularly as the 2018 assessment also did not record any of these species. No further plant species of conservation concern assessments are thought to be needed.

Protocol summary

The following table summarises the 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
<p>Conservation Plan Category:</p>	<p>The Kamfers Dam in the south-eastern portion of the site comprises a Critical Biodiversity Area 1 (CBA1) as this is the habitat of the lesser flamingo and great numbers of other water birds. The north-eastern section of the Portion 18 is classified as a CBA2, which is the best option for meeting biodiversity targets, while avoiding conflict with other land uses. According to the Northern Cape Critical Biodiversity Area Map, these areas should remain natural, with only low impact development considered.</p> <p>An Ecological Support Area (ESA) is present west of the site. The remainder of the site falls within 'Other Natural Areas' that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.</p> <p>Impact on the CBAs The CBA1 comprises a watercourse which along with the buffer as recommend by a wetland specialist, must be protected from the development. The vegetation within the CBA2 were degraded, however, much of the CBA2 also includes wetland areas which should be protected along with recommended buffers.</p> <p>Impact on the species composition and structure of vegetation The development will destroy secondary and degraded vegetation within the CBA2, while the CBA1 should not be developed at all. As much of the CBA2 as possible should be managed as natural open space.</p> <p>Impact on ecosystem threat status None expected.</p>
<p>Protected Areas</p>	<p>No protected areas will be directly affected</p>
<p>SWSA</p>	<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, as well as water quality.</p> <p>Impacts of the proposed development on the SWSA water quality and quantity Erosion, sedimentation and pollution caused by clearing of vegetation for the development, could impact on the downstream water quality temporarily (e.g. during construction). Once indigenous vegetation has re-established or recovered, the impact will be negligible, provided that impermeable surfaces are limited.</p>
<p>NFEPA</p>	<p>Refer to wetland assessment</p>
<p>Ecological Corridors</p>	<p>The vegetation on site (excluding wetland areas) are species poor. However, it may contribute as movement corridors to small faunal species such as rodents through the area. The main corridor through the site is likely along wetland areas, which should be protected from the development.</p>
<p>Sensitive Areas and No go areas</p>	<p>Although much of the site is situated in a CBA2, the terrestrial vegetation is largely modified and of a secondary nature. Other than a buffer to the CBA1, the vegetation is of low conservation importance.</p>

Biodiversity (vegetation) aspect	Result
	<p>However, the CBA 1 area comprises wetland areas, and along with all other wetlands and associated buffer zones as recommended by the wetland-and fauna specialists, must be regarded as sensitive and no-go areas.</p>
<p>Plant species of conservation concern</p>	<p>Six species have been short-listed to have a possibility of occurring, including a Vulnerable species for which the habitat assessment was undertaken. The wetland areas and associated buffers are the only potential habitat for two species short-listed. Neither of these species were recorded and the likelihood of occurring is considered medium to low, particularly as the 2018 assessment also did not record any of these species.</p> <p>No further plant species of conservation concern assessments are thought to be needed.</p>
<p>Main impacts:</p>	<p>The main impacts expected are as follows:</p> <ul style="list-style-type: none"> • Edge effects into the watercourse • Reduction of open space and indigenous vegetation • Potential increase in invasive vegetation
<p>Cumulative impacts:</p>	<ul style="list-style-type: none"> • Potential increase in development pressure around Kamfers Dam • Reduction of open space and indigenous vegetation
<p>Residual impacts:</p>	<ul style="list-style-type: none"> • Trampling and edge effects during construction. • Operational impacts such as pollution and litter within the wetlands • Increase in alien and invasive plant species

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1 INTRODUCTION

Oliphants Housing Estate (Pty) Ltd is proposing the construction of a mixed-use residential development on the Remainder of Portion 18 of the Farm Roode Pan 70 in Kimberley within the Sol Plaatjie Local Municipality, Northern Cape Province. The property lies approximately 10km to the north of Kimberley between the Kamfers Dam and the Midlands Road, the total study area proposed for development is approximately 150 hectares.

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The DEA Screening Tool classifies the eastern extent of the site as being within an area of high terrestrial biodiversity value, as it falls within a Critical Biodiversity Area (CBA), as well as an Ecological Support Area (ESA). Much of the eastern extent of the site is also classified as being of medium sensitivity based on the potential habitat of one plant species of concern (sensitive species). This indicates that suitable habitat may be present for the species, but no confirmed accounts for such species were previously recorded on the site.

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This report therefore entails a site verification of the larger site assessed in 2018, including limited vegetation sampling within walked transects, verification of the vegetation description as per Eco

Agent (2018) and a habitat assessment for the plant species of conservation concern as listed in the screening tool, to comply with the Protocols for terrestrial vegetation and plant species assessments published in 2020.

1.1 Locality

The proposed site is situated on Portion 18 of the Farm Roode Pan 70, within the town of Kimberley in the Northern Cape Province (Figure 1). The site is directly west of the Kamfers Dam and within the Roodepan urban area. A railway line forms the eastern boundary and Midlands Road the western boundary. The original vegetation assessment undertaken in 2018, assessed a larger area that includes the vegetation to the west of Midlands Road and to the north of portion 18 (Figure 2). The site falls within the quarter degree square (qds) 2824DA.

1.2 Terms of reference

The terms of reference were as follows:

Complete a terrestrial vegetation compliance / assessment in line with the terrestrial biodiversity protocols, including

- Literature review including an existing ecological report of the site undertaken in the year 2018 (Eco Agent, 2018)
- Supply background information on the site relating to conservation plans and threatened ecosystems;
- Field survey to verify the vegetation results of the 2018 report;
- Map indicating ecologically sensitive vegetation groupings (if any); and
- Recommendation to mitigate potential impacts.

Included in the above a plant species compliance report.

- Write a compliance statement to verify that no SCC were recorded or suitable habitat for such species. OR
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1.3 Assumptions and limitations

The following limitations are applicable, although not considered fatal flaws to the study:

- Vegetation studies should be conducted during the growing season of all plant species that may potentially occur. This may require more than one season's survey with two visits undertaken preferably during November and February. This report relied on a single site visit undertaken on 6th of January 2022 after good summer rains commenced.
- The development layout was not available at the time of writing this report. It is assumed that most of the site is proposed for the development, except wetland areas.

- It is assumed that the proposed development will not impact beyond the railway line that forms the eastern boundary of the site and no assessment was undertaken onto surrounding private properties.
- Due to good rains, the vegetation was lush and could have obscured smaller species.



Figure 1: Locality of The Proposed Oliphant Estate Township Development on the Remainder of Portion 18 of the Farm Roode Pan 70

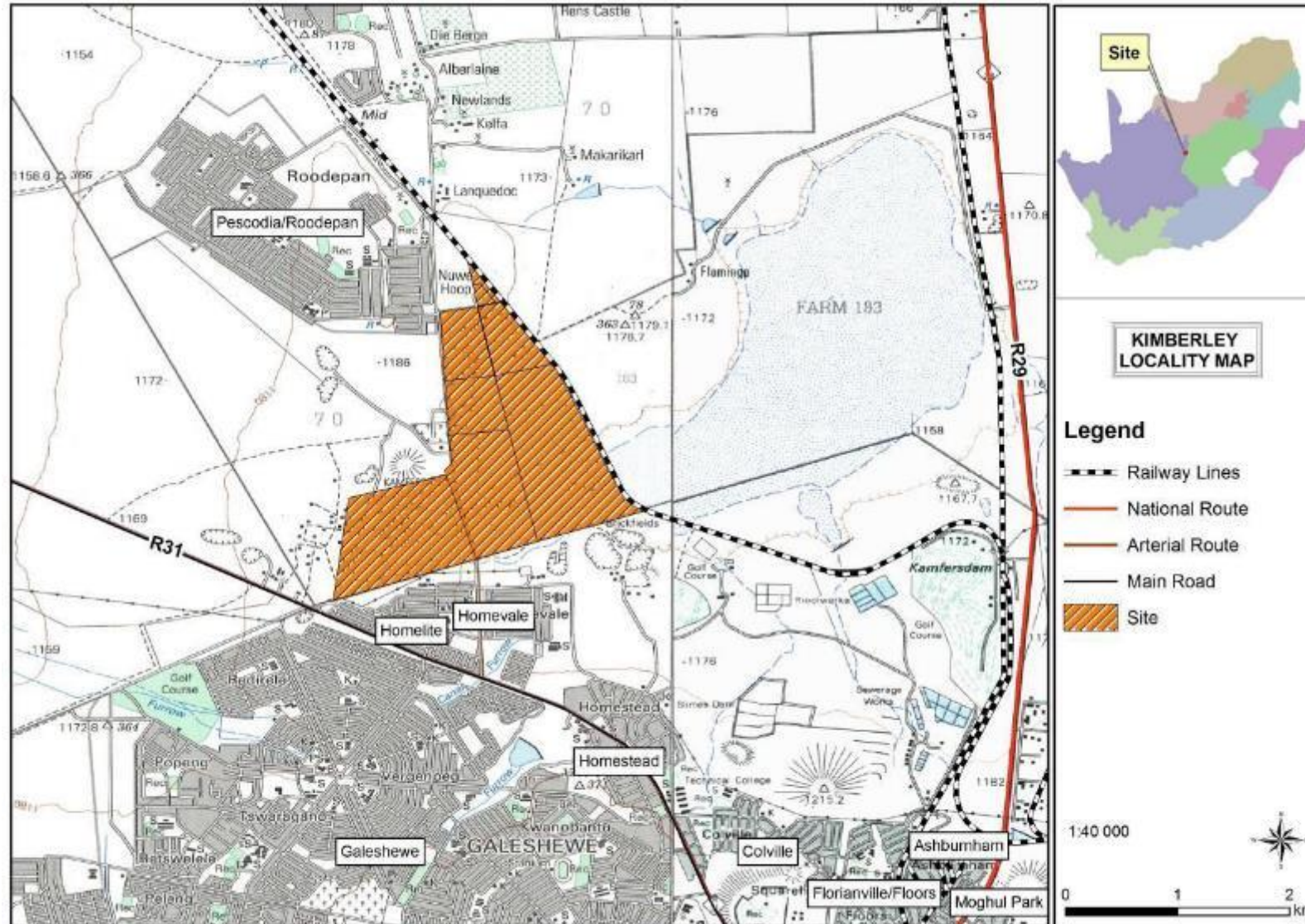


Figure 2: Site locality as assessed in 2018 and verified during this assessment

2 METHODOLOGY

The assessment entailed a literature review, a site survey 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).

Data and literature consulted:

- The Northern Cape Critical Biodiversity Areas (CBA) Map.
- 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 Citizen Science websites such as iNaturalist.org.
- A short list of plant species of conservation concern was derived from the above and 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) and the most recent National Biodiversity Assessment (NBA) of 2018 (Skowno *et al*, 2019).
- An existing ecological assessment for the site undertaken in the year 2018 (Eco Agent, 2018).
- 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 Field survey

Timing and intensity

The site verification was undertaken on the 6th of January 2022, after good summer rainfall. A sampling and track map is given in Appendix A. At the time of the site verification, the specialist was not aware that only Portion 18 is currently considered for the development, and the larger area, as per the 2018 report about were assessed (Figure 2 & 3; Appendix A).

Method

Prior to the site visit, the vegetation was delineated into homogenous units using currently available Google Earth imagery. The field survey focussed on identifying natural and untransformed vegetation, unique features that could indicate local sensitivities such as threatened and protected plants, as well as sensitive ecological features such as wetlands and rocky areas. Transects were walked through the site. At several sites along the transects, a survey of total visible floristic

composition was undertaken. Plant identification and vegetation description relied on species recorded in the sampling points along the walked transects.

2.3 Mapping

Mapping was done by comparing georeferenced ground survey data to the visual inspection of available Google-Earth Imagery and in that way extrapolating survey reference points to the entire study area. Delineations are therefore approximate, and due to the intricate mosaics and often gradual mergers of vegetation associations, generalisations had to be made. Mapped associations will thus show where a certain vegetation unit is predominant, but smaller inclusions of another vegetation association in this area do exist but have not been mapped separately.

2.4 Project Area of Influence (PAOI)

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

At the time of the site verification, the specialist was not aware that only Portion 18 is currently considered for the development, and the larger area, as per the 2018 report about (292ha) were assessed (Figure 2 & 3; Appendix A). Therefore, an area much larger than Portion 18 was verified as the secondary PAOI. It is unlikely that project impacts will extent further than the railway line that forms the eastern boundary of the site, or into residential areas surrounding the site. Some open space to the north and south could be impacted on. Several drainage lines flow eastwards through the site towards Kamfers Dam and indirect impacts (e.g. spillages) can be expected downstream. The extent of impact will depend on the activity and waterflow at the time of the impact, and the area indicated in Figure 3 is only illustrative of the possible impact area.



Figure 3: Project area of influence (PAOI)

2.5 Site Ecological Importance (sensitivity)

Supplementary to the existing vegetation sensitivity analysis of Eco Agent (2018), the Site Ecological Importance in terms of vegetation is discussed as per the requirements of the recent Species Environmental Assessment Guideline (SANBI, 2020). The assessment criteria and matrices are detailed in Table 1, Table 2, and Table 3.

SEI is 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 species (CR, EN, VU) listed under A criterion only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU 	<ul style="list-style-type: none"> Medium (>5 ha but <20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network 	<ul style="list-style-type: none"> Recovers slowly (>10 years for >70 % of the original species composition and functionality) Species moderately likely to remain at site during impact. Species moderately likely to return to site once impact ceases.

Classification	Conservation Importance	Functional Integrity	Receptor Resilience
	<ul style="list-style-type: none"> • Presence of range-restricted species • More than 50 % of receptor contains natural habitat with potential to support SCC 	<p>between intact habitat patches</p> <ul style="list-style-type: none"> • 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 	
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
	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 is described in Table 4 below. This table is a supplemented version of that which appears in the Species Environmental Assessment Guideline (SANBI, 2020).

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. Impacts must be avoided or managed by an ecological management plan
Medium	Minimization & restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities <ul style="list-style-type: none"> Development within these areas could proceed, limiting impact to sensitive vegetation, provided that appropriate mitigation measures are taken.

SEI	Interpretation in relation to proposed development activities (SANBI, 2020), with mitigation added by the specialist
	<ul style="list-style-type: none"> • <i>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.</i>
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"> • <i>Developable areas that are connected to sensitive features.</i> • <i>Edge effects must be prevented.</i>
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"> • <i>Most types of development can proceed within these areas with little to no impact on conservation worthy vegetation.</i> • <i>Edge effects to other proximate sensitivity classes must be mitigated / prevented.</i>

3 BASELINE DESCRIPTION OF THE SITE

The table below shortly summarises the background info to the site.

Table 5: Background information to the site

Province	Northern Cape
Quarter Degree Grid Square	2824DA
Protected areas	No protected areas are present within 10km of the site. The closest protected area is the Mokala National Park about 35km south-west of the site
Topography and Hydrology (Figure 4):	<p>The highest natural elevation of the area assessed is about 1196m in its western extend (west of Midlands Road). The site slopes generally south-eastward. Several drainage lines, mostly highly disturbed, drain from the higher lying areas towards the Kamfers Dam (Eco Agent, 2018). Eco Agent found that some of these drainage lines are not natural but were man-induced in historical times (Eco Agent, 2018). A wetland area associated with the Kamfers Dam occurs in the south-eastern corner of the site. Culverts under the railway line connects this wetland area to the Kamfers Dam.</p> <p>The site verification found that a valve on a pipeline (likely sewerage) that traverses the site in a north-south direction, was spewing water and contributes to the wetland areas recorded.</p>
Strategic Water Source Areas (SWSA)	The site is not situated within a SWSA.
Vegetation (Mucina and Rutherford, 2006) (Figure 5):	<p>The western extent of the site is situated within the Kimberley Thornveld. In its natural state, this vegetation unit comprises an open grass layer, with much uncovered soils. The tree layer is dominated by thorny species of the <i>Vachellia</i> genus and a well-developed shrub layer. The remainder of the site comprises Vaalbos Rocky Shrubland occurs about 500m north of the site. This vegetation occurs on slopes and elevated hills and ridges within the plains of the Kimberley Thornveld.</p> <p>According to the 2018 ecological report, it was found during the site visit that the entire site falls within Kimberley Thornveld. Both vegetation units are classified as Least Threatened and not in immediate threat.</p>
Northern Cape Critical Biodiversity Areas (CBA) Map: (Figure 6)	<p>The Kamfers Dam in the south-eastern portion of the site comprises a Critical Biodiversity Area 1 (CBA1) as this is the habitat of the lesser flamingo and great numbers of other water birds. The north-eastern section of the Portion 18 is classified as a CBA2, which is the best option for meeting biodiversity targets, while avoiding conflict with other land uses. According to the Northern Cape Critical Biodiversity Area Map, these areas should remain natural, with only low impact development considered.</p> <p>An Ecological Support Area (ESA) is present west of the site. The remainder of the site falls within 'Other Natural Areas' that have not been identified as</p>

	a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.
Threatened ecosystem:	None on the site or surrounds.
Ecological drivers and processes in savanna	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 the urbanised environment that the site is situated in, the vegetation structure degrades, and alien species could eventually dominate the natural vegetation. This will also lead to a decrease in species diversity as species adapted to fire and grazing will eventually decrease or die-off.



Figure 4: Hydrology of the site and surrounds

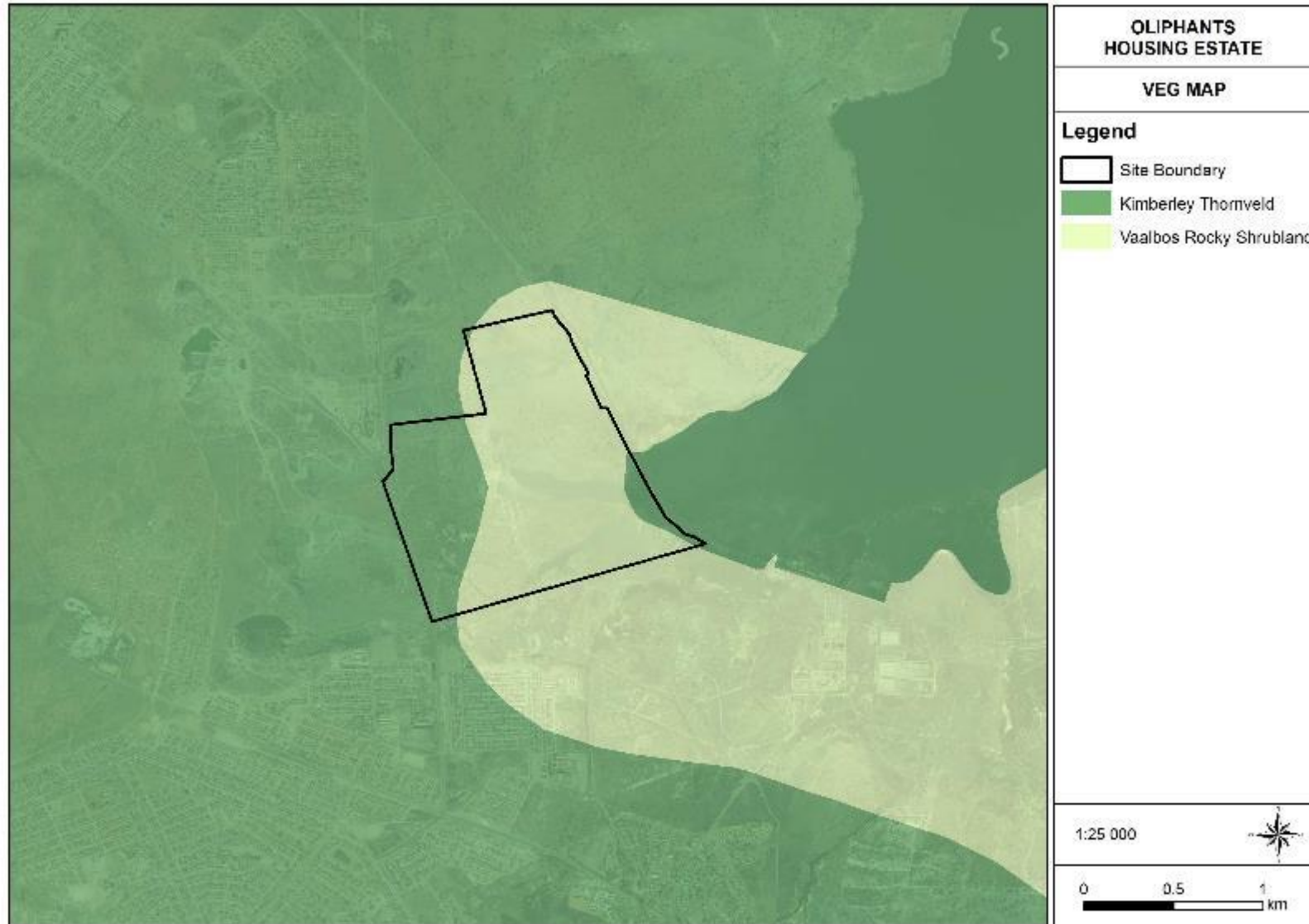


Figure 5: Vegetation as per the national vegetation assessment (Mucina and Rutherford, 2006).

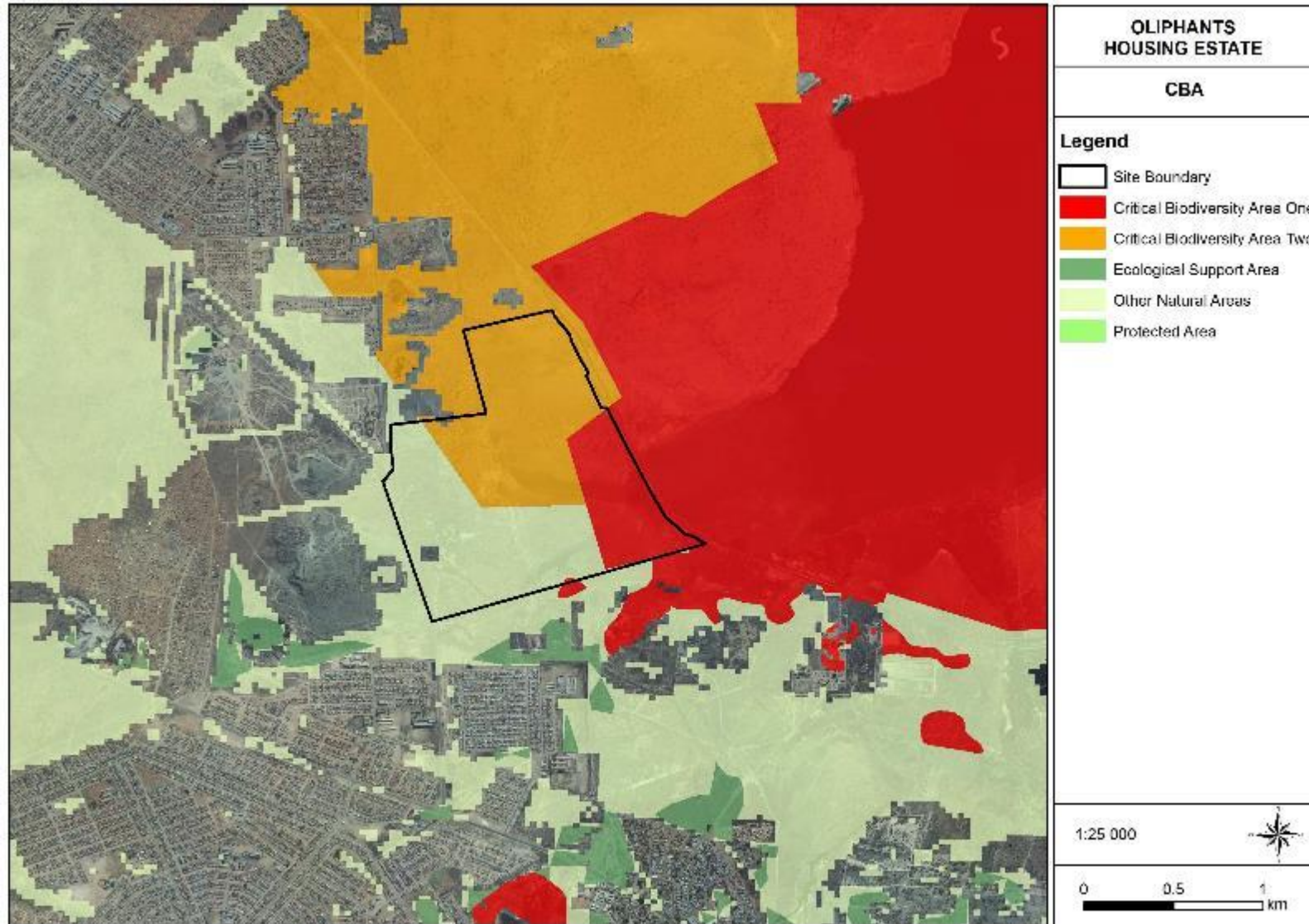


Figure 6: The site in relation to the Northern Cape Critical Biodiversity Map.

4 RESULTS

4.1 Land use and land cover on and around the site

An historic aerial image dated 1940 shows the drainage lines on the site draining south-eastward, as well as the existing mine on the far western section of the site (Figure 7). An image dated 1975, shows that a portion has been cultivated historically, while additional excavations or mining took place at the origins of the drainage lines (Figure 8 and 9).

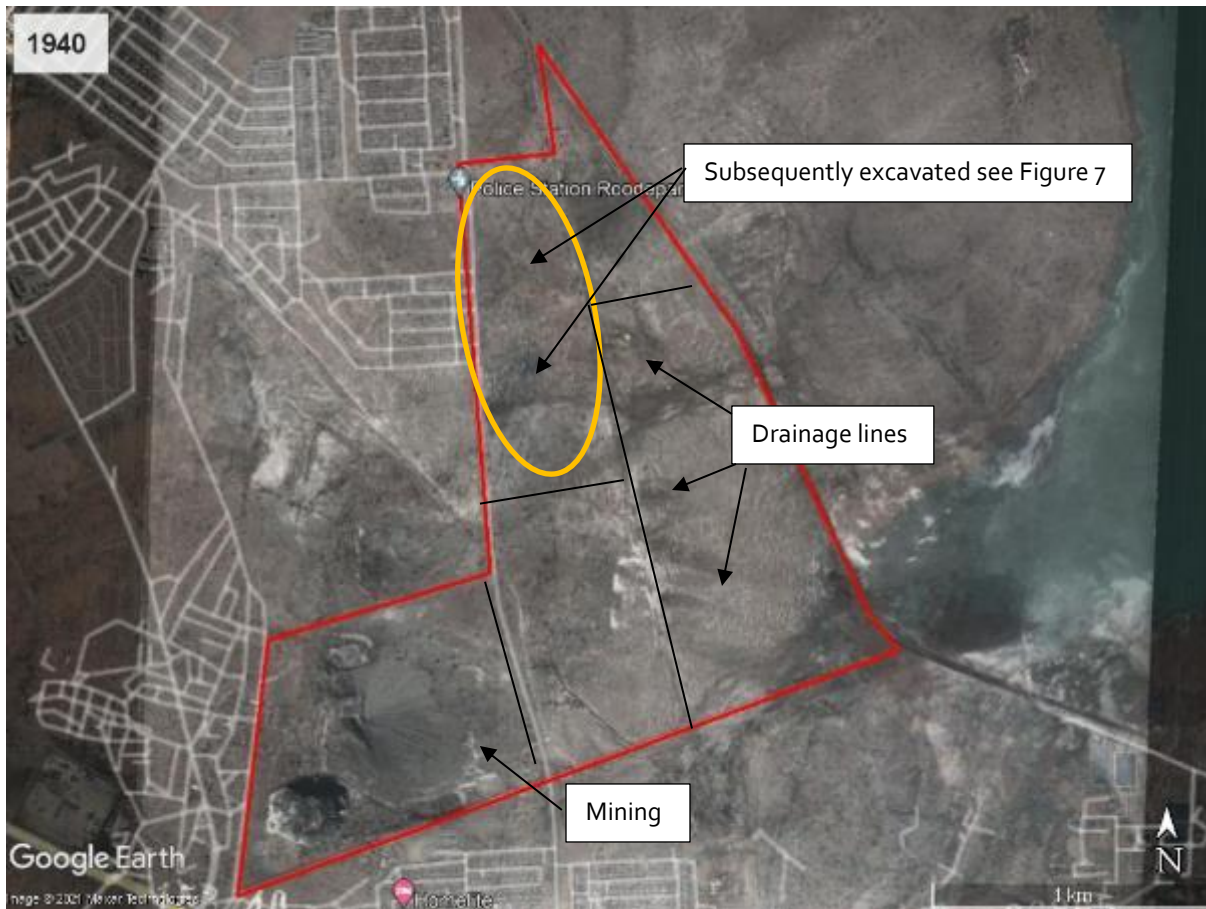


Figure 7: Aerial imagery of the secondary PAOI, dated 1940 superimposed on Google Earth for geo-referencing purposes (image sourced from Chief Directorate National Geospatial Information Geospatial Portal)



Figure 8: Aerial imagery of the secondary PAOI dated 1975 superimposed on Google Earth for geo-referencing purposes (image sourced from Chief Directorate National Geospatial Information Geospatial Portal)



Figure 9: A 2005 Google Earth satellite imagery with a closeup of the excavations and structures east of Midlands Road. Structures has since been demolished

Both historical, and the most recent Google Earth satellite imagery show a line traversing the site in a north-south direction (Figure 10). The site verification found that this line comprises powerlines, derelict access roads and a pipeline (presumably a sewerage pipe). There has been an increase in development around the site. All mining activities on and around the site have ceased and excavations were filled with water.

The land is currently used for grazing cattle and horses, while at least three homesteads were noted on and around the site, east of Midlands Road (Photograph 1). Dumping was noted in several areas, an informal soccer field and various soil disturbances due to historical excavations and related activities are present to the north and north-west of the Portion 18.



Figure 10: Google Earth Satellite Imagery of the site dated July 2021, with photographs taken on 6 January 2022



Photograph 1: a-d) Leaking pipes, dumping, soil disturbances and homesteads on and around Portion 18 and e & f) unrehabilitated mining area and dumping, west of Midlands Road

4.2 **Vegetation units as delineated in historical report of Eco Agent (2018)**

The assessment undertaken in March 2018 found that the vegetation units on the site assessed were disturbed, degraded, and transformed and only the wetland areas were considered as being sensitive to development. The table below lists the eight (8) vegetation units that were delineated in the year 2018 along with its ecological sensitivity. Six of these vegetation units is present on Portion 18, on which the development is now proposed. This vegetation and ecological sensitivity are geographically represented in Figure 11 and Figure 12 (Eco Agent, 2018).

Despite being in a CBA₂, the 2018 assessment indicated that due to decades of intensive disturbance by the mining operation and related activities, the vegetation became degraded, even locally transformed. The sensitivity in terms of biodiversity were awarded a Medium-Low and Low sensitivity (Eco Agent, 2018).

Thus, according to the historic report, the site is developable, bar wetland and associated buffer areas.

Table 6: List of mapping units with ecological sensitivity as delineated in 2018 (Eco Agent, 2018) and verified during the January 2022 site verification

Vegetation mapping unit	Sensitivity analysis result
<p>1. Disturbed <i>Vachellia tortilis</i> Thornveld A disturbed relict of the Kimberley Thornveld, or even secondary vegetation that developed on degraded sites. This plant community occurs as isolated patches in the northern and south-eastern parts of the study site. The dominant tree is <i>Vachellia tortilis</i>, though the invasive <i>Prosopis glandulosa</i> is often also present.</p>	Medium-low
<p>2. Highly Transformed Area Areas that are totally transformed by previous mining operations, buildings (rubble from ruins of previous infrastructure and current buildings,), a football field and other degraded areas surrounding old quarries or mining pits and old roads. The soil is extremely disturbed. The dominant shrub/tree is <i>Vachellia tortilis</i>, though the alien invasive <i>Prosopis glandulosa</i> is often dominant. The herbaceous vegetation scanty. Some forbs occur in the area, several being weed species.</p>	Low
<p>3. Disturbed Open Shrubveld Historically disturbed, and bare patches, similar to the Highly Transformed Areas occur scattered throughout this area. The plant species composition is also very similar to that of the Highly Transformed Areas, but the Disturbed Open Shrubveld is in a somewhat better condition. The bare patches are locally dominated by the invasive <i>Prosopis glandulosa</i> though particularly better grass cover of typical <i>Vachellia tortilis</i> Thornveld is also present.</p>	Low
<p>4. Old Fields Secondary Grassland Secondary grassland that established on historically cultivated fields in the central part of the study site. The grass layer is dominant, dominated by <i>Eragrostis lehmanniana</i>. Trees are rare but <i>Vachellia karroo</i> and dwarf shrubs are present.</p>	Low

Vegetation mapping unit	Sensitivity analysis result
<p>5. Degraded <i>Prosopis</i> Area <i>Prosopis glandulosa</i>, an alien invader plant species, occur on bare and somewhat sodic soils mainly along drainage lines and flooded areas. Very few other plant species occur in this area, and those that are present often indicate sodic conditions. The area is prone to erosion.</p>	<p>Low</p>
<p>6. Mine Dump The mine dump west of Midlands Road is bare, with scanty vegetation limited to the eastern side of the dump, around an excavation, currently filled with water. The plant species are limited to a few trees and shrubs of <i>Vachellia tortilis</i> and the alien <i>Prosopis glandulosa</i>. Scanty grass includes <i>Eragrostis lehmanniana</i> and <i>Chloris virgata</i>.</p>	<p>Low</p>
<p>7. Wetlands The dominant species in most of the wetland unit is grass species and no trees are present apart from the invasive <i>Prosopis</i> species and <i>Tamarix</i> species on the outer edges of some of the wetland units. The vegetation on site fairly typical of wetland conditions. Most of the areas dominated by <i>Typha capensis</i>, <i>Phragmites australis</i>, <i>Cyperus eragrostis</i> and <i>Cyperus congestus</i> appears to be artificial wetland area or appear to receive additional water from artificial sources. The vegetation is dominated by <i>Phragmites australis</i> where the wetland unit enters the pan.</p>	<p>Medium high to high</p>
<p>8. Quarries and Mining Pits Artificial wetlands where water are accumulates in the bottom of the excavations. Although wetland conditions are present in the excavations, these conditions are artificial</p>	<p>Low</p>

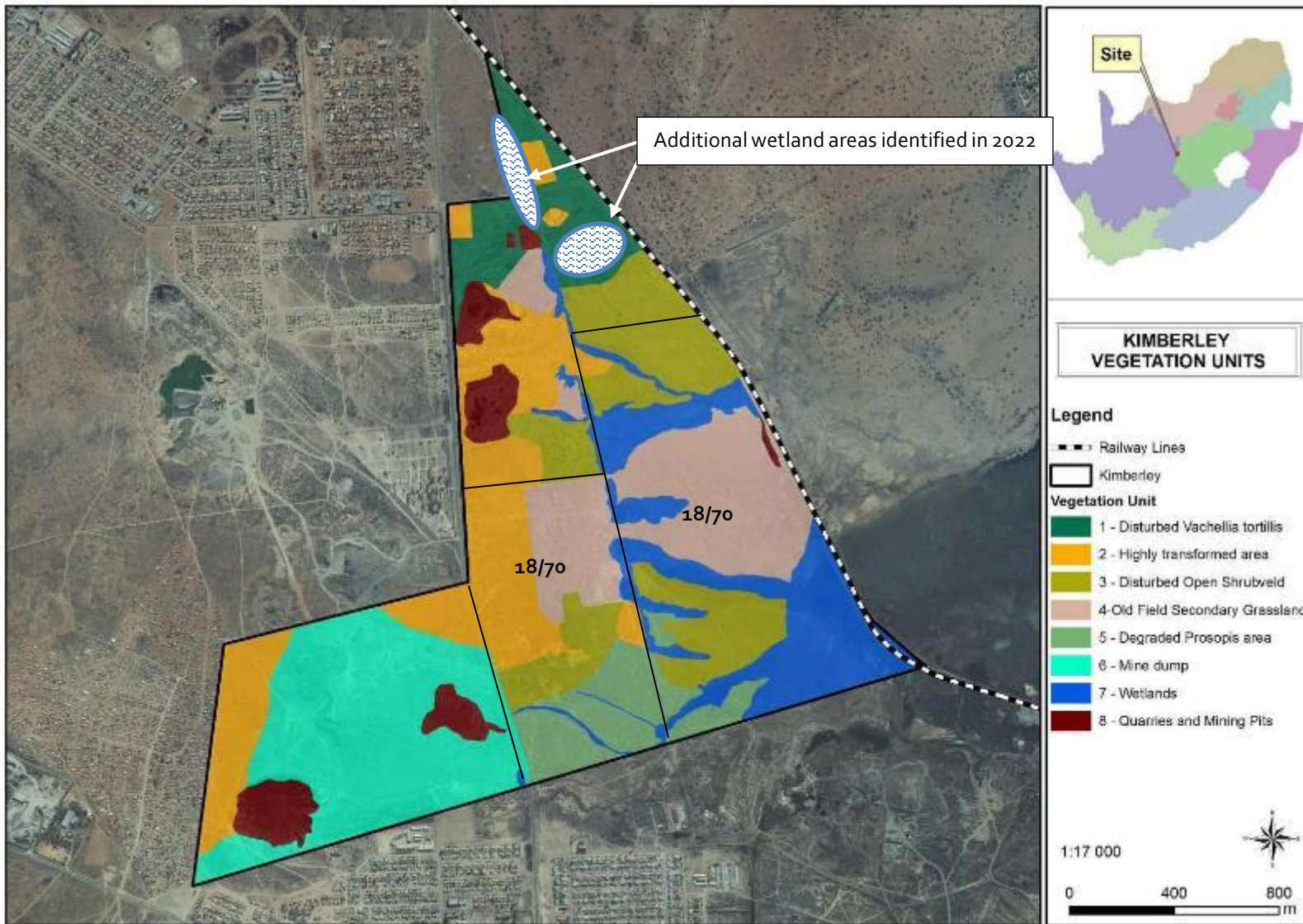


Figure 11: Vegetation units on the site as per Eco Agent (2018) and verified during the January 2022 site verification

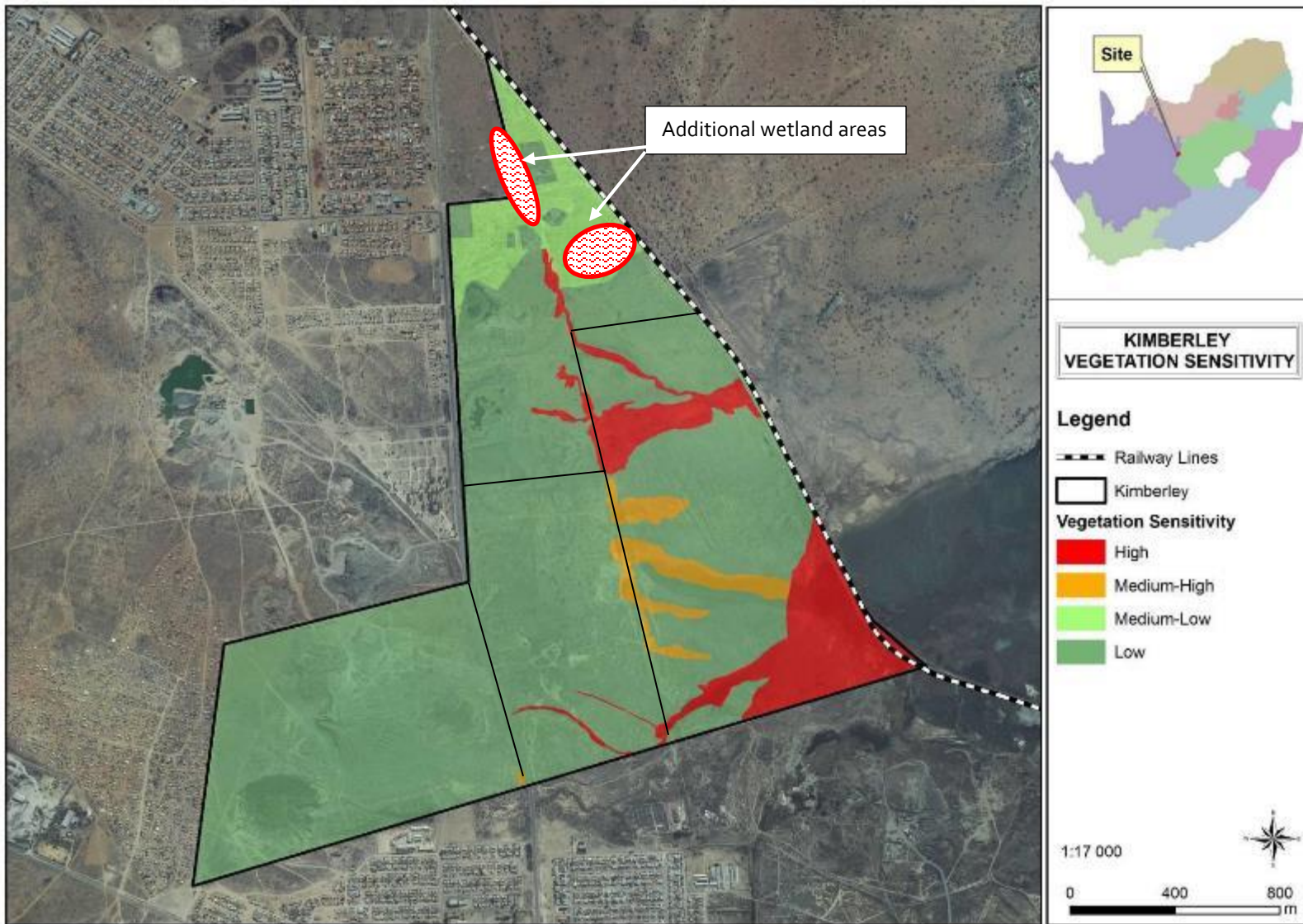


Figure 12: Ecological sensitivity of the site as delineated in 2018 (Eco Agent, 2018)

4.3 Vegetation verification in January 2022

The site verification undertaken on 6 January 2022 confirmed the findings of the Eco Agent (2018) assessment in that most of the area assessed is of low vegetation sensitivity and suitable for development. The vegetation map of 2018 was found to be valid with minimal changes such as an increase in the tree layer in some areas noted. However, additional wetland areas were recorded during the 2022 verification, albeit north of Portion 18 that is proposed for the development. This site verification was undertaken during exceptionally good rainfall period for 2021-2022. This could have resulted in the additional wetland areas being overlooked in the 2018 assessment.

The wetland areas, and associated buffer zones on and around the site should be regarded as undevelopable as per the recommendations of the wetland specialists (Limosella, 2022), while buffer areas to threatened avifauna species must also be adhered to (Kasl, 2022).

The state of the vegetation at the time of the site verification is shortly discussed below (Figure 13), along with photographic evidence. The plant species identified, together with those identified in 2018, are listed in Appendix B.

4.3.1 Disturbed *Vachellia tortilis* Thornveld

This vegetation unit is present north of Portion 18 (Figure 11). Recent rain resulted in a good show of flowering forb species (Photograph 2). Additional species recorded to the 2018 assessment include dominant patches of the grass *Eragrostis echinochloidea* (tick grass), and forbs such as *Sesamum capense*, *Indigastrum niveum*, *Heliotropium nelsonii*, *Arctotis venusta* and *Crotalaria lotoides* (Appendix B).

The vegetation has been disturbed and degraded and was regarded as modified from the reference state of Kimberley Thornveld (Photograph 3). No plant species of conservation concern were recorded, and the vegetation is in a secondary state.

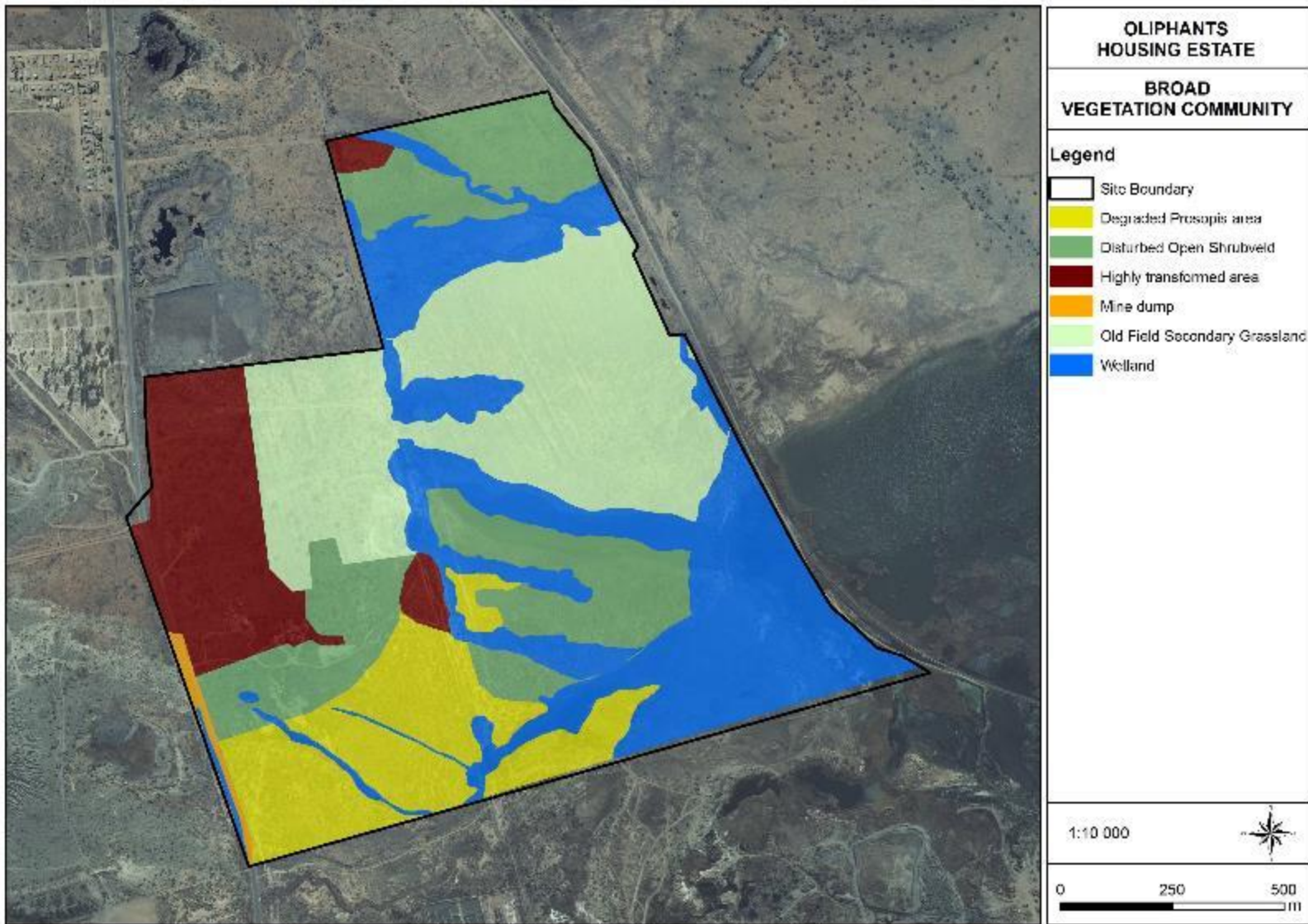


Figure 13: Vegetation as delineated in 2018 and verified in 2022, cropped to Portion 18



Photograph 2: Disturbed and secondary *Vachellia tortillis* Thornveld on the northern extent of the secondary PAOI, as photographed on 6 January 2022



Photograph 3: Semi-natural to natural Kimberley Thornveld on the private property east of the railway line. Here the tree layer is dominated by various *Vachellia* species with a well-developed shrub layer

4.3.2 Highly Transformed Area

A portion of highly transformed vegetation is present on the north-western extent of Portion 18 (Figure 11 & 13; Photograph 4). The soil is severely compacted by historic activities and the basal cover, particularly north of Portion 18, was low.

The transformed areas on Portion 18 were less compacted and supported more grass and forb species. The tree diversity included *Ziziphus mucronata* and *Searsia lancea*, while the grass and forb layer were dominated by pioneers such as grasses *Eragrostis echinochloidea*, *E. obtusa*, *E. lehmanniana* and forbs *Felicia muricata*, *Cleome angustifolia* and *Geigeria filifolia*. The shrubby *Mesembreanthemum (Psilocalulon) coriarium* was prominent north of Portion 18.

No plant species of conservation concern were recorded, and none were expected to be present. The provincially protected *Ammocharis coranica*, as well as *Aloe grandidentata* occurred sporadically.



Photograph 4: Highly transformed areas just north of Portion 18 (top images) and on Portion 18 (bottom images), as photographed on 6 January 2022. Despite good rains, the basal cover was low, and the soil compacted. The thorny *Senegalia melifera* subsp *ditensis* dominated along with *Vachellia tortilis*.



Photograph 5: Highly transformed areas west of Portion 18 and Midlands Road (6 Jan 2022)

4.3.3 Disturbed Open Shrubveld

This vegetation unit is present through the mid- and northern section of Portion 18 (Figure 11 & 13; Photograph 6). The area was historically disturbed or degraded and the composition ranges between the Transformed vegetation and that of the Disturbed /Secondary *Vachellia tortilis* Thornveld. The tree layer has seemingly increased to the western extent of Portion 18. The shrubs *Lycium*, *Atriplex lindleyi*, *Pentzia globosa* and *Zygophyllum cf lichtensteinianum* was prominent, as well as saplings of *Vachellia* species. The forb *Nidorella anomala* was abundant

Other than the provincially protected *Aloe grandidentata*, no plant species of conservation concern were recorded.



Photograph 6: Photographs taken on 6 January 2022, within the area historically classified as Disturbed Open Shrubveld. The tree layer seems to be higher in the western extent of this vegetation group than during the 2018 assessment and the vegetation is likely progressing towards a secondary *Vachellia tortilis* state.

4.3.4 Old Fields, Secondary Grassland

The secondary grassland that established in the historically cultivated areas are entirely embedded in Portion 18 (Figure 11 & 13; Photograph 7). Few shrubs were present (e.g., *Lycium*, *Pentzia* and *Salsola kalli*), some saplings of *Vachellia karroo* and *V. tortilis* and small forbs such as *Nidorella anomala* and *Tribulus terrestris*. The geophyte *Albuca cf setosa* was abundant.

Due to the historic cultivation, no plant species of conservation concern were expected, and none were recorded.



Photograph 7: Secondary grassland in the Old Fields as photographed on 6 January 2022. The tree layer was still sparse

4.3.5 Degraded *Prosopis glandulosa* Area

The south-eastern section of Portion 18 includes degraded drainage lines and floodplains that was colonised and dominated by the invasive *Prosopis glandulosa* (honey mesquite) (Figure 11 & 13; Photograph 8). The basal cover was seemingly higher at the time of the site verification in January 2022 than during the March 2018 assessment, although the historic disturbances and bare soils were evident (Photograph 8).

The grass layer included various pioneers such as *Urochloa mosambicensis*, *Fingerhuthia africana* and *Sporobolus iocladius* were noted and the forbs *Geigeria filifolia*, *Helichrysum zeyheri*, *Heliotropium nelsonii*, and *Jamesbrittenia aurantiaca* (Appendix B).



Photograph 8: Degraded *Prosopis* area as photographed on 6 January 2022. The invasive *Prosopis glandulosa* trees colonised the disturbed drainage lines and prevents further succession.

4.3.6 Mine Dump

The mine dump is situated to the west of Portion 18 and Midlands Road (Figure 11; Photograph 9). The dump includes some indigenous pioneer species, however, the vegetation is severely modified from the reference state. No plant species of conservation concern were recorded or are expected to persist here.



Photograph 9: The mine dump area in January 2022

4.3.7 Wetlands

Several wetland areas were delineated in the 2018 assessment (Figure 11). Limosella Consulting verified the wetland areas in January 2022 and two (2) additional wetland areas were recorded north of Portion 18 (Figure 14, numbered 1 and 2).

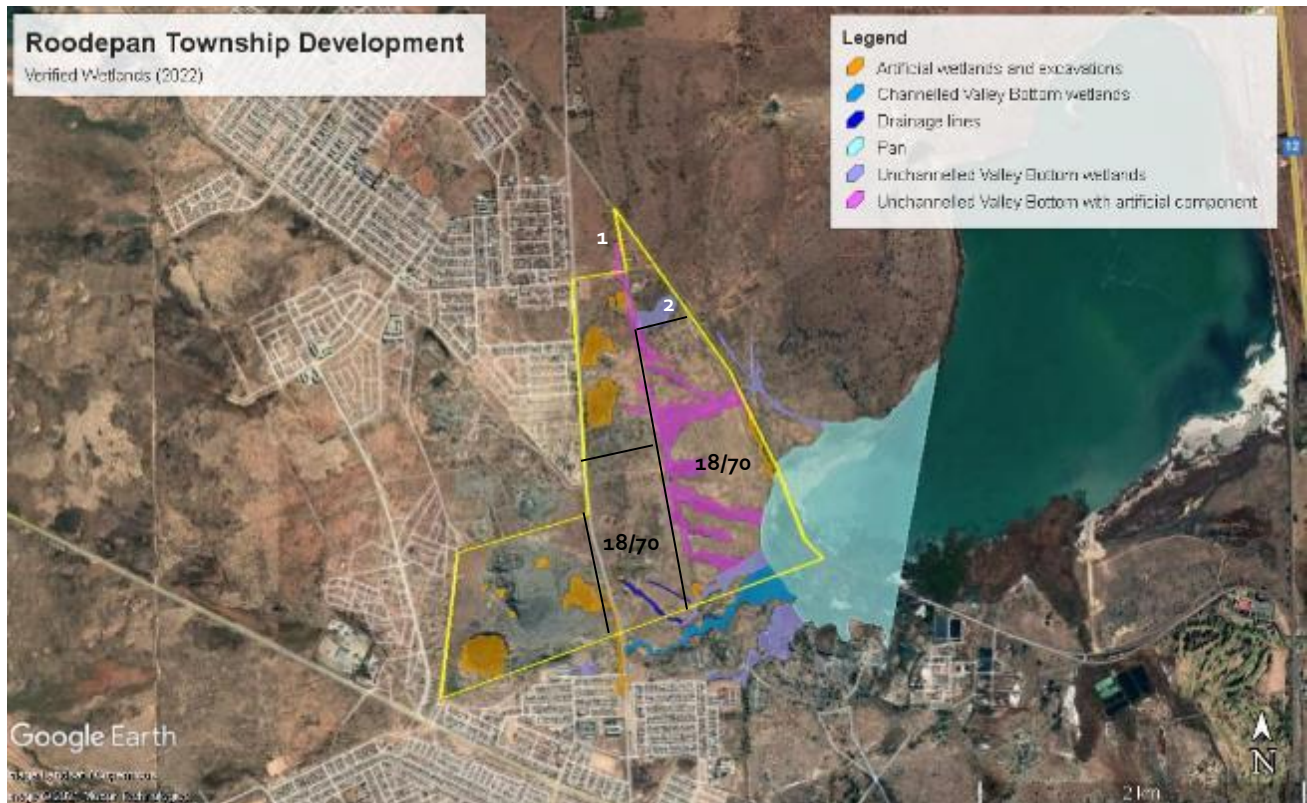


Figure 14: Verified wetlands as received from and delineated by Limosella Consulting, 2022

Most of the wetlands that drains south, and south-eastward has some input from leaking pipelines (likely sewerage and freshwater). These unchanneled valley bottom systems were mostly dominated by *Typha capensis* and *Cyperus cf congestus* (Photograph 11). The unchanneled valley bottom directly north of the site (marked 2) were dominated by *Cyperus congestus* and *Scirpoides dioecus* (Photograph 11).

The pan was vegetated with *Typha capensis*, *Phragmites australis* and weedy species such as *Tamarix cf ramosissima* was common (Photograph 12). The drainage lines were dominated by *Prosopis glandulosa* as discussed in 4.3.5 above.

The wetland areas and particularly the area around Kamfers Dam could provide suitable habitat to a Vulnerable species (see Appendix C). This plant was not recorded in walked transects, however, the suitable habitat should be regarded as sensitive as it will fall within wetland areas and its associated buffers.



Photograph 10: A collage of images of the wetland areas with an artificial component on and north of Portion 18 (6 January 2022)



Photograph 11: The unchanneled valley bottom wetland area directly north of the north-eastern corner of Portion 18, dominated by sedges and a *Helichrysum* species



Photograph 12: Vegetation within the pan (Kamfers Dam) and the channelled valley bottom south and south-east of Portion 18

4.3.8 Quarries and mining pits (Artificial wetland areas)

Water accumulates in the bottom of the derelict excavations and mine pits and form artificial wetlands (Photograph 13). Although wetland conditions are present in the excavations, these conditions are artificial (Limosella Consulting, 2022). These artificial wetlands are mostly around the site, with smaller excavations present on Portion 18 (see Figure 13). These areas were dominated by *Typha capensis* and the tall growing grass *Phragmites australis*.

Due to the artificial nature of these wetland areas, no plant species of conservation concern were expected, and none were recorded. however, such species could colonise suitable habitat in artificial wetland and associated grassland areas over time.



Photograph 13: Artificial wetlands in excavations north and to the west of Portion 18 (top images) and within a depression under the powerline in the mid-southern section of the site (bottom image).

4.4 Plant Species of Conservation Concern

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 and Rare (Figure 15). 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.

A list of plants of conservation concern was compiled using information from the South African National Biodiversity Institute’s (SANBI) checklist (SANBI, 2009b), Raimondo *et al*, (2009), information gathered from the Plants of Southern Africa website (POSA) for the area the site is situated in, the historical report for the site (Eco Agent, 2018), and information received from the South African National Biodiversity Institute (SANBI) on sensitive species.

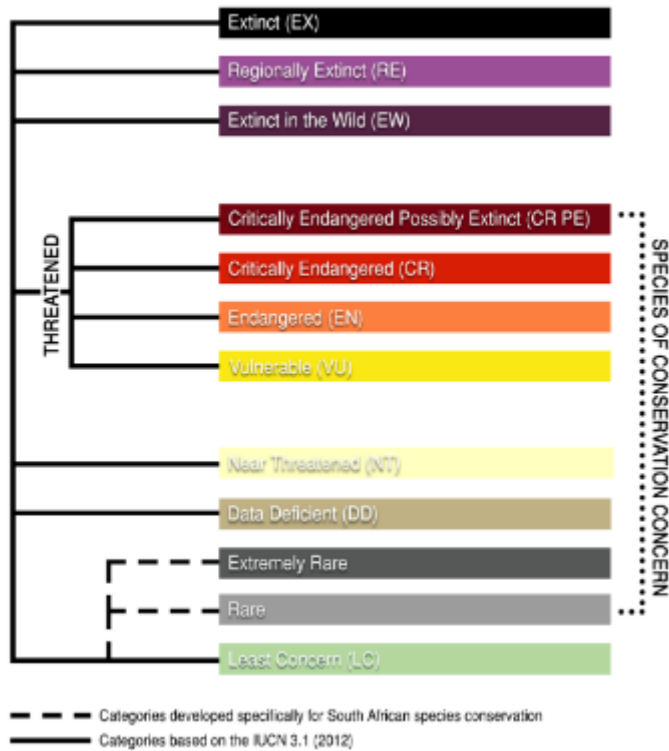


Figure 15: Categories of species of conservation concern (SCC) modified from the IUCN's extinction risk categories (reproduced in part from IUCN, 2012).

4.4.1 Historic assessment of 2018

The 2018 assessment did not record any threatened species. Although the plant species listed in that report may occur in the vicinity, they were not found on the study site, probably due to the long-term disturbance, degradation and transformation caused by long term human occupation and the mining operations (Eco Agent, 2018).

The wetland section of the Eco Agent report (2018), list that a *Nerine* species was recorded in wetland conditions. Several *Nerine* species are threatened, however, none with a distribution around Kimberley.

4.4.2 Current habitat assessment and plant species compliance statement

Appendix C list species that has been short-listed to have a possibility of occurring, including a Vulnerable species for which the habitat assessment was undertaken. The wetland areas and associated buffers are the only potential habitat for two species listed in Appendix C. Neither of these species were recorded and the likelihood of occurring is considered medium to low, particularly as the 2018 assessment also did not record any of these species (Eco Agent, 2018). No further plant species of conservation concern assessments are thought to be needed.

4.5 Protected plants

4.5.1 NEMBA Threatened or Protected Plant Species (TOPS)

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

- Critically endangered species: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- Endangered species: any indigenous species facing a high risk of extinction in the wild in the near future, 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.

At the time of this assessment, no TOPS listed species were recorded within the proposed development footprint.

4.5.2 Provincially Protected Plants

Several plants are provincially protected by the Northern Cape Nature Conservation Act No.9 of 2009. The removal or pruning of these plants will require a permit from the Northern Cape Department of Environment and Nature Conservation.

The 2018 assessment recorded three (3) provincially protected plant species on the site, namely large populations of the geophyte *Ammocharis coranica*, the succulent *Aloe grandidentata* and a few individuals of the succulent *Orbea lutea*.

At the time of this assessment, only *Ammocharis carinica* and *Aloe grandidentata* were recorded. It is likely that a denser grass layer obscured the small *Orbea lutea* and it is highly likely to still be present on the

larger Secondary PAOI. All three these plant species can easily be transplanted and relocated to suitable habitat outside the development footprint on the site.

4.5.3 National protected trees

The National Forest Act, 1998 (Act No. 84 of 1998) enforces the protection of several indigenous trees. The removal, thinning or relocation of protected trees will require a permit from the Department of Agriculture, Land Reform and Rural Development (DALRD, formerly Agriculture, Forestry and Fisheries) ((Notice of the List of Protected Tree Species under the National Forests Act, 1998 (ACT NO 84 OF 1998), Notice 536 of 2018, Government Gazette, 7 September 2018).

Of these trees, *Vachellia erioloba* (camel thorn), occurs abundantly in the Kimberly area. However, this tree was not noted on the site and no other protected trees were expected to be present. Some tree stumps were recorded, and it is assumed that trees are harvested for firewood. This tree makes excellent firewood and could have been harvested if it was historically present. The likelihood of being present on Portion 18 is low.

4.6 Alien Invasive Plant Species

The National Environmental Management: Biodiversity Act (NEMBA) is the most recent legislation pertaining to alien invasive plant species. On 18 September 2020, the list of Alien Invasive Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 43726 of 2020). The Alien and Invasive Species Regulations were published in the Government Gazette No. 43735, 25 September 2020. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within close proximity to a watercourse. Below is a brief explanation of the three categories in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA):

Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.

Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.

Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.

Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

The alien plant species identified on the study site are listed in Appendix B. Note that according to the regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- (a) notify the competent authority in writing
- (b) take steps to manage the listed invasive species in compliance with
 - (i) section 75 of the Act;
 - (ii) the relevant invasive species management programme developed in terms of regulation 4; and
 - (iii) any directive issued in terms of section 73(3) of the Act.

The following category 1b plants were observed within the site

Table 7: Category 1b invasive plant species and the vegetation group(s) it was recorded in.

Species	Common name	Vegetation groups
<i>Cirsium vulgare</i>	Scotch Thistle	Wetland areas
<i>Flaveria bidentis</i>	Smeltersbush	Wetland areas and sporadically across the site
<i>Tamarix ramosissima</i>	Pink tamarisk	Wetland areas, highly transformed areas

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 Species Environmental Assessment Guideline (SANBI, 2020) and detailed in the methodology section (Section 2.5) (Figure 16).

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 site and its resilience to impacts as follows:

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

Wherein **BI** in turn is:

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

Table 8: Scoring of vegetation that occurs within the secondary PAOI. The vegetation printed in bold is present on Portion 18

Broad vegetation community	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) – mitigation
Degraded / secondary <i>Vachellia tortilis</i> Thornveld	Low ¹	Medium-high ²	Medium	High	Low (Minimise & Restore)
Highly transformed	Low¹	Low³	Low	High	Very Low (Minimise)
Disturbed Open Shrubveld	Low ¹	Medium-high²	Medium	High	Low (Minimise & Restore)
Old Fields, Secondary grassland	Low ¹	Low ³	Low	High	Very Low (Minimise)
Degraded <i>Prosopis</i> Area	Low ¹	Medium⁴	Low	Medium	Very Low (Minimise)
Mine Dump	Low ¹	Low ³	Low	High	Very Low (Minimise)
Wetlands	Low ¹	High⁵	Medium	Low	High (Avoid & Minimise)
Artificial wetlands	Low ¹	Medium⁴	Low	Low	Medium (Minimise & Restore)

¹ No confirmed or highly likely SCC / range-restricted species. Less than 50 % contains natural habitat with limited potential to support SCC.

² Large (>20 ha but <100 ha) intact area for any conservation status of ecosystem type, Good habitat connectivity with potentially functional ecological corridors, Mostly minor current negative ecological impacts with some major historical impacts

³ Several minor and major ecological impacts, modified vegetation

⁴ Historical impacts, currently has an ecological function or comprise drainage / hydrology function

⁵ Intact area for any conservation status of ecosystem type, good habitat connectivity, good rehabilitation potential

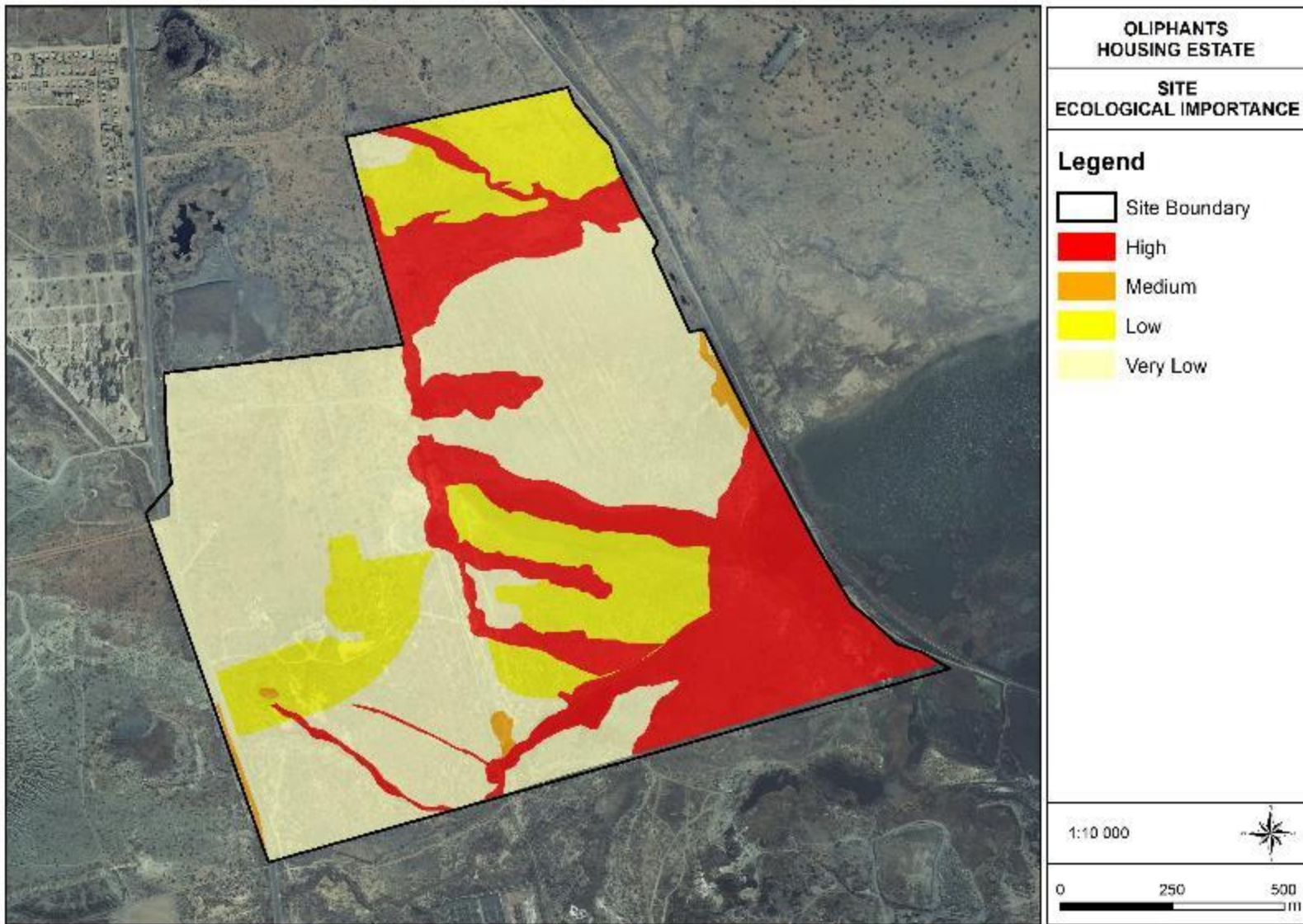


Figure 16: Site Ecological Sensitivity

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 16). This map must be considered along with the fauna sensitivity map and wetland map (where applicable) to obtain an overall sensitivity map.

This assessment concurs with the sensitivity analysis of 2018 (Eco Agent, 2018) in that most of the site is developable, bar the wetland areas and associated buffer areas as recommended by the wetland and fauna specialist.

5.2.1 Very low SEI

The vegetation that was historically cleared and highly disturbed rated as very-low SEI. These modified vegetation units are not in a natural state. No plant species of conservation concern were recorded, and it is highly unlikely that such species are present.

Development activities of medium to high impact are acceptable. Most types of development can proceed within low SEI with little to no impact on conservation worthy vegetation. However, edge effects to other proximate sensitivity classes must be prevented, and buffers to watercourses must be respected. The Degraded Prosopis Area must be managed in accordance with the wetland specialists recommendation as it comprises drainage lines.

5.2.2 Low SEI

Degraded and some secondary vegetation comprised good basal cover and can readily rehabilitate. It further has good habitat connectivity with mostly minor current negative ecological impacts with some major historical impacts.

These are developable areas that are connected to or in proximity to sensitive features and open spaces. Edge effects must be prevented.

5.2.3 Medium and High SEI

The artificial wetland and wetland areas rated medium and high SEI respectively. The vegetation is typical of wetland areas. The vegetation rated as Medium and High SEI were in natural to semi-natural state, with good habitat connectivity, minimal current impacts and a potential to support plant species of conservation concern.

The moist areas play a role in the health and functioning, as well a water quality of watercourses in the area. These watercourses are essential to maintain ecological corridors for the movement and survival of species within a landscape fragmented by mining, urbanisation, and cultivation. In addition, the hydrological processes associated with these ecological features are strongly associated with the intactness of the vegetation within and surrounding these areas. The vegetation plays an important role

in flood attenuation, prevent soil erosion and sedimentation of wetlands and pans, and promote the uptake of toxins from the water.

In medium SEI vegetation, development activities of medium impact are acceptable. Minimization & restoration mitigation must be implemented followed by appropriate restoration activities. In high SEI, impacts must be avoided. Development within these areas is undesirable and impacts are difficult to mitigate, if at all. Impacts must be avoided or managed in accordance with the wetland specialists recommendations.

6 IMPACT ASSESSMENT AND MITIGATION

The impact assessment of 2018 (Eco Agent, 2018) remains valid and the assessment below is a summary of the findings.

7.1 Impact Statement

The vegetation within Portion 18 was degraded or secondary in nature and of little conservation importance. However, the vegetation has a functional role as open space, habitat, and ground water recharge zones, which should be mitigated by creating or maintaining indigenous open space that will serve as ground water recharge zones. In addition, the vegetation within the wetland is important for the health and functioning thereof. Due to the increase in hardened surfaces associated with developments, it likely that cumulative impacts can affect the sensitive wetland community adversely should no mitigatory measures be applied.

The greatest threat to the rehabilitation of the land disturbed by construction, is the potential of invasive plant species rapidly establishing on the disturbed soil and spreading into adjacent natural areas. If remedial measures and monitoring are properly implemented, the vegetation that will be disturbed during construction could rehabilitate well over time, and long-term impacts on vegetation and faunal habitats could thus be minimal. Once in use, the pipelines have relatively contained impacts on the vegetation and can successfully be mitigated to limit or even negate the negative impacts

Furthermore, the presence of proximate access roads and dirt roads as well as the presence of several smaller tracks and existing road servitudes in the area, will greatly reduce the impacts of the proposed development.

7.2 Impact Ranking Criteria

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

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

- I. The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- II. The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- III. The **duration**, wherein it will be indicated whether
 - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - medium-term (5–15 years) – assigned a score of 3;
 - long term (> 15 years) - assigned a score of 4; or
 - permanent - assigned a score of 5;
- IV. The **consequences (magnitude)**, quantified on a scale from 0-10, where
 - 0 is small and will have no effect on the environment,
 - 2 is minor and will not result in an impact on processes,
 - 4 is low and will cause a slight impact on processes,
 - 6 is moderate and will result in processes continuing but in a modified way,
 - 8 is high (processes are altered to the extent that they temporarily cease), and
 - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- V. The **probability** of occurrence, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where
 - 1 is very improbable (probably will not happen),
 - 2 is improbable (some possibility, but low likelihood),
 - 3 is probable (distinct possibility),
 - 4 is highly probable (most likely) and
 - 5 is definite (impact will occur regardless of any prevention measures).
- VI. The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- VII. The **status**, which will be described as either positive, negative or neutral.
- VIII. The degree to which the impact can be reversed.
- IX. The degree to which the impact may cause irreplaceable loss of resources.
- X. The degree to which the impact can be mitigated.

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

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

7.3 Impact Assessments

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

7.3.1 Destruction of vegetation

Nature: The development will require the removal of vegetation, although most of the vegetation comprise degraded or secondary vegetation. The development will decrease open space and ecological corridors. Although degraded, the vegetation plays a functional role in protecting soil, mitigating floods and allowing the movement of water through the site.

The sources of this impact include:

- Clearing of and damage to vegetation in the 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;
- Storage of equipment within adjacent vegetation.

If some open space remain, operational activities and maintenance activities can impact on vegetation that was not impacted on during the construction. This will lead to the destruction of vegetation and compaction of soils and subsequent erosion or colonization by alien invasive plant species

	Without mitigation	With mitigation
CONSTRUCTION PHASE		
Probability	Definite (5)	Definite (5)
Duration	Permanent (5)	Long term (4)
Extent	Limited to Site (1)	Limited to site (1)
Magnitude	Low (4)	Minor (2)
Significance	50 (medium)	35 (medium)
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE - impact on vegetation within wetland areas and buffers / open space and adjacent vegetation		
Probability	Probable (3)	Improbable (3)
Duration	Short term (2)	Very short term (1)

Extent	Limited to Site (1)	Limited to the Site (1)
Magnitude	Moderate (6)	Low (4)
Significance	27 (Low)	24 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Moderate	Low
Can impacts be mitigated?	Yes.	

Mitigation:

Planning:

- No development may take place within areas designated as wetland or wetland buffer zones as delineated by the wetland specialist. Development in such areas is subject to a WUL and mitigation as set out by the wetland assessment.
- Plan open space areas to remain in a natural state, planted with species naturally occurring in the area.

Construction:

- Category 1b invasive species should be removed from the site prior to earthworks. This will limit the spread of such species downstream and into disturbed soils.

An independent Ecological Control Officer (ECO) should be appointed to oversee construction.

- Keep the development footprint, including site camps, as small as possible
- A temporary fence or demarcation must be erected around the construction area (include the actual footprint, as well as areas where material is stored and needed for e.g. trenching) to prevent access to adjacent vegetation.
- 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.
- Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas.
- Introduce adequate sedimentation control measures at watercourse crossings and when excavation or disturbance within moist grasslands takes place.
- Limit clearing of indigenous vegetation to only the development footprint.
- 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
 - 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.

Operational:

- 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.
- Areas that will remain open space should be rehabilitated / landscape using indigenous species naturally occurring in the Kimberley thornveld. Do not use artificial fertilizers as it could have an impact on the water quality in the Kamfers Dam.
- No operational activities may impact negatively on remaining natural vegetation within wetlands.

<ul style="list-style-type: none"> 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.
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> Reducing open space and CBA in proximity to Kamfers Dam. Increase in development pressure around Kamfers Dam.
<p>Residual Risks:</p> <ul style="list-style-type: none"> The colonisation of the disturbance footprint by alien invasive plant species.

7.3.2 Exposure to erosion and subsequent sedimentation or pollution of proximate moist grassland (watercourse)

Nature: The removal of surface vegetation will expose the soils, which in rainy events would wash into the wetlands causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive plant species can spread easily into these eroded soils. After construction, a lack of rehabilitation or failed rehabilitation will result in bare soils that are susceptible to erosion. Furthermore, maintenance vehicles could disturb rehabilitated areas which could lead to soil erosion, habitat modification, trampling of vegetation as well as the destruction of protected plants and plants of conservation concern. The sources of this impact include:

- Removal of vegetation in proximity to the moist grassland, without proper rehabilitation or failure of rehabilitation;
- Access roads, especially on slopes, channels rainfall and causes erosion;
- Lack of rehabilitation or failed rehabilitation;
- Maintenance vehicles disturbing rehabilitated areas;
- Spillages of construction material and harmful chemicals; and
- Failure of rehabilitation of the construction footprint.

	Without mitigation	With mitigation
CONSTRUCTION PHASE		
Probability	Highly Probable (4)	Probable (3)
Duration	Medium-term (3)	Short-term (2)
Extent	Limited to Local Area (2)	Limited to site (1)
Magnitude	High (8)	Low (4)
Significance	52 (medium)	21 (low)
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
Probability	Probable (3)	Improbable (2)
Duration	Medium term (3)	Short term (2)
Extent	Limited to Local Area (2)	Limited to the Site (1)
Magnitude	Moderate(6)	Low (4)
Significance	33 (medium)	14 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

- No construction / activities should be undertaken within the wetlands as per the wetland report recommendations
- Compile a stormwater management plan that will safeguard the wetlands from construction and operational impacts.
- The development must make use of permeable paving and incorporate open spaces and gardens to ensure that water infiltrates into the soils and not runoff towards the wetlands.

Construction:

- Do not allow erosion to develop on a large scale 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.
- Ensure that runoff from compacted or sealed surfaces is slowed down and dispersed sufficiently to prevent accelerated erosion from being initiated (erosion management plan required)
- 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.

Operational:

- Do not disturb soil unnecessarily during maintenance. Ensure that 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.
- Monitor rehabilitation and delay the re-introduction of livestock (where applicable) to all rehabilitated areas until an acceptable level of re-vegetation has been reached.
- Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.

Cumulative impacts:

- Erosion of the development footprint upslope from the wetlands could increase sedimentation in already degraded watercourses of the area. However, this could be mitigated. Possible erosion of areas lower than

construction and the subsequent housing development, 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 Risks:
<ul style="list-style-type: none"> A risk that heavy rain and flooding could alter the flow of water through the wetlands and the development or the subsequent removal or destruction of the vegetation by other resulting land uses do remain.

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

Nature: The construction could result in the removal of plant species of conservation concern, impact on their habitat, pollinators and inevitably the persistence of these species. This could put further strain on the already declining populations.		
No such species are expected to be present, however, suitable habitat around the wetland areas should be protected nonetheless. Provincially protected species could also be destroyed.		
	Without mitigation	With mitigation
CONSTRUCTION PHASE		
Probability	Probable (3)	Improbable (2)
Duration	Permanent (4)	Short-term (2)
Extent	Limited to site (1)	Limited to site (1)
Magnitude	Moderate (6)	Minor (2) Only if plants are relocated or used in landscaping
Significance	55 (medium)	25 (low)
Status (positive or negative)	Negative	-
OPERATIONAL PHASE -assuming the plants have been relocated to open space / landscaped areas		
Probability	Probable (3)	Improbable (2)
Duration	Medium term (3)	Short term (2)
Extent	Limited to Site (1)	Limited to the Site (1)
Magnitude	Low (4)	Low (4)
Significance	24 (low)	14 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
Mitigation:		
<i>Planning:</i>		
<ul style="list-style-type: none"> Ensure that the ROD makes provision for the removal of provincially protected plants. Ideally these plants, where removed, must be housed in a nursery facility, and used to rehabilitate disturbed areas. A local nurseryman / botanist should advise. No development should take place within natural wetlands and wetland buffers. 		
<i>Construction:</i>		

<ul style="list-style-type: none"> An Eco should take note of all bulbous and succulent species unearthed and consult with the specialist / botanist for identification. Such species should be collected and used in the landscaping / rehabilitation of open spaces. <p><i>Operational:</i></p> <ul style="list-style-type: none"> Monitor replanted species for survival for the first three years. 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.
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> If mitigation measures are adequately implemented, no cumulative impacts are expected.
<p>Residual Risks:</p> <ul style="list-style-type: none"> Species removed and relocated as part of rehabilitation could die due to transplantation shock or damage during replanting.

7.3.4 Potential increase in invasive vegetation

Nature: 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 are unsuccessful or is not enforced, exotic and invasive vegetation may further invade the area.

	Without mitigation	With mitigation
CONSTRUCTION PHASE		
Probability	Highly probable (4)	Probable (3)
Duration	Long-term (4)	Short-term (2)
Extent	Local Area (2)	Site bound (1)
Magnitude	High (8)	Low (4)
Significance	56 (medium)	21 (low)
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
Probability	Probable (3)	Improbable (2)
Duration	Long term (4)	Short term (2)
Extent	Limited to Local Area (2)	Limited to the Site (1)
Magnitude	Low (4)	Minor (2)
Significance	30 (medium)	10 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
<p>Mitigation:</p> <p><i>Construction:</i></p> <ul style="list-style-type: none"> Alien invasive species, in particular category 1b species that were identified within the study area, should be removed from the development footprint and immediate surrounds, prior to construction or soil 		

<p>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.</p> <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>Maintenance:</i></p> <ul style="list-style-type: none"> • No alien and invasive plant species as listed on 18 September 2020 in the list of Alien Invasive Species published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 43726 of 2020) may be planted within the development. • Only use indigenous species naturally occurring on the site for rehabilitation or landscaping.
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> • None
<p>Residual Risks:</p> <ul style="list-style-type: none"> • Reinfestation or introduction of additional weeds during construction or landscaping that could spread towards the CBA area

7 CONCLUSION

The site verification undertaken on 6 January 2022 confirmed the findings of the Eco Agent (2018) assessment in that most of the area assessed is of low vegetation sensitivity and suitable for development. The vegetation map of 2018 was found to be valid with minimal changes such as an increase in the tree layer in some areas noted. However, additional wetland areas were recorded during the 2022 verification, albeit north of Portion 18 that is proposed for the development.

The wetland areas, and associated buffer zones on and around the site should be regarded as undevelopable as per the recommendations of the wetland specialists (Limosella, 2022), while buffer areas to threatened avifauna species must also be adhered to (Kasl, 2022).

The vegetation within Portion 18 was degraded or secondary in nature and of little conservation importance. However, the vegetation has a functional role as open space, habitat, and ground water recharge zones, which should be mitigated by creating or maintaining indigenous open space that will serve as ground water recharge zones. In addition, the vegetation within the wetland is important for the health and functioning thereof. Due to the increase in hardened surfaces associated with developments, it likely that cumulative impacts can affect the sensitive wetland community adversely should no mitigatory measures be applied.

The greatest threat to the rehabilitation of the land disturbed by construction, is the potential of invasive plant species rapidly establishing on the disturbed soil and spreading into adjacent natural areas. If

remedial measures and monitoring are properly implemented, the vegetation that will be disturbed during construction could rehabilitate well over time, and long-term impacts on vegetation and faunal habitats could thus be minimal. Once in use, the pipelines have relatively contained impacts on the vegetation and can successfully be mitigated to limit or even negate the negative impacts

Furthermore, the presence of proximate access roads and dirt roads as well as the presence of several smaller tracks and existing road servitudes in the area, will greatly reduce the impacts of the proposed development.

With regards to plant species of conservation concern: Six species have been short-listed to have a possibility of occurring, including a Vulnerable species for which the habitat assessment was undertaken. The wetland areas and associated buffers are the only potential habitat for two species short-listed. Neither of these species were recorded and the likelihood of occurring is considered medium to low, particularly as the 2018 assessment also did not record any of these species. No further plant species of conservation concern assessments are thought to be needed.

8 PROTOCOL SUMMARY

For ease of reference, the following table summaries 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 9: Summary of the main terrestrial (vegetation) biodiversity findings

Biodiversity (vegetation) aspect	Result
<p>Conservation Plan Category:</p>	<p>The Kamfers Dam in the south-eastern portion of the site comprises a Critical Biodiversity Area 1 (CBA1) as this is the habitat of the lesser flamingo and great numbers of other water birds. The north-eastern section of the Portion 18 is classified as a CBA2, which is the best option for meeting biodiversity targets, while avoiding conflict with other land uses. According to the Northern Cape Critical Biodiversity Area Map, these areas should remain natural, with only low impact development considered.</p> <p>An Ecological Support Area (ESA) is present west of the site. The remainder of the site falls within 'Other Natural Areas' that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions.</p> <p>Impact on the CBAs</p>

Biodiversity (vegetation) aspect	Result
	<p>The CBA₁ comprises a watercourse which along with the buffer as recommended by a wetland specialist, must be protected from the development. The vegetation within the CBA₂ were degraded, however, much of the CBA₂ also includes wetland areas which should be protected along with recommended buffers.</p> <p>Impact on the species composition and structure of vegetation The development will destroy secondary and degraded vegetation within the CBA₂, while the CBA₁ should not be developed at all. As much of the CBA₂ as possible should be managed as natural open space.</p> <p>Impact on ecosystem threat status None expected.</p>
Protected Areas	No protected areas will be directly affected
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, as well as water quality.</p> <p>Impacts of the proposed development on the SWSA water quality and quantity Erosion, sedimentation and pollution caused by clearing of vegetation for the development, could impact on the downstream water quality temporarily (e.g. during construction). Once indigenous vegetation has re-established or recovered, the impact will be negligible, provided that impermeable surfaces are limited.</p>
NFEPA	Refer to wetland assessment
Ecological Corridors	The vegetation on site (excluding wetland areas) are species poor. However, it may contribute as movement corridors to small faunal species such as rodents through the area. The main corridor through the site is likely along wetland areas, which should be protected from the development.
Sensitive Areas and No go areas	<p>Although much of the site is situated in a CBA₂, the terrestrial vegetation is largely modified and of a secondary nature. Other than a buffer to the CBA₁, the vegetation is of low conservation importance.</p> <p>However, the CBA₁ area comprises wetland areas, and along with all other wetlands and associated buffer zones as recommended by the wetland- and fauna specialists, must be regarded as sensitive and no-go areas.</p>
Plant species of conservation concern	Six species have been short-listed to have a possibility of occurring, including a Vulnerable species for which the habitat assessment was undertaken. The wetland areas and associated buffers are the only potential habitat for two species short-listed. Neither of these species were recorded and the likelihood of occurring is considered medium to low, particularly as the 2018 assessment also did not record any of these species.

Biodiversity (vegetation) aspect	Result
	No further plant species of conservation concern assessments are thought to be needed.
Main impacts:	The main impacts expected are as follows: <ul style="list-style-type: none"> • Edge effects into the watercourse • Reduction of open space and indigenous vegetation • Potential increase in invasive vegetation
Cumulative impacts:	<ul style="list-style-type: none"> • Potential increase in development pressure around Kamfers Dam • Reduction of open space and indigenous vegetation
Residual impacts:	<ul style="list-style-type: none"> • Trampling and edge effects during construction. • Operational impacts such as pollution and litter within the wetlands • Increase in alien and invasive plant species

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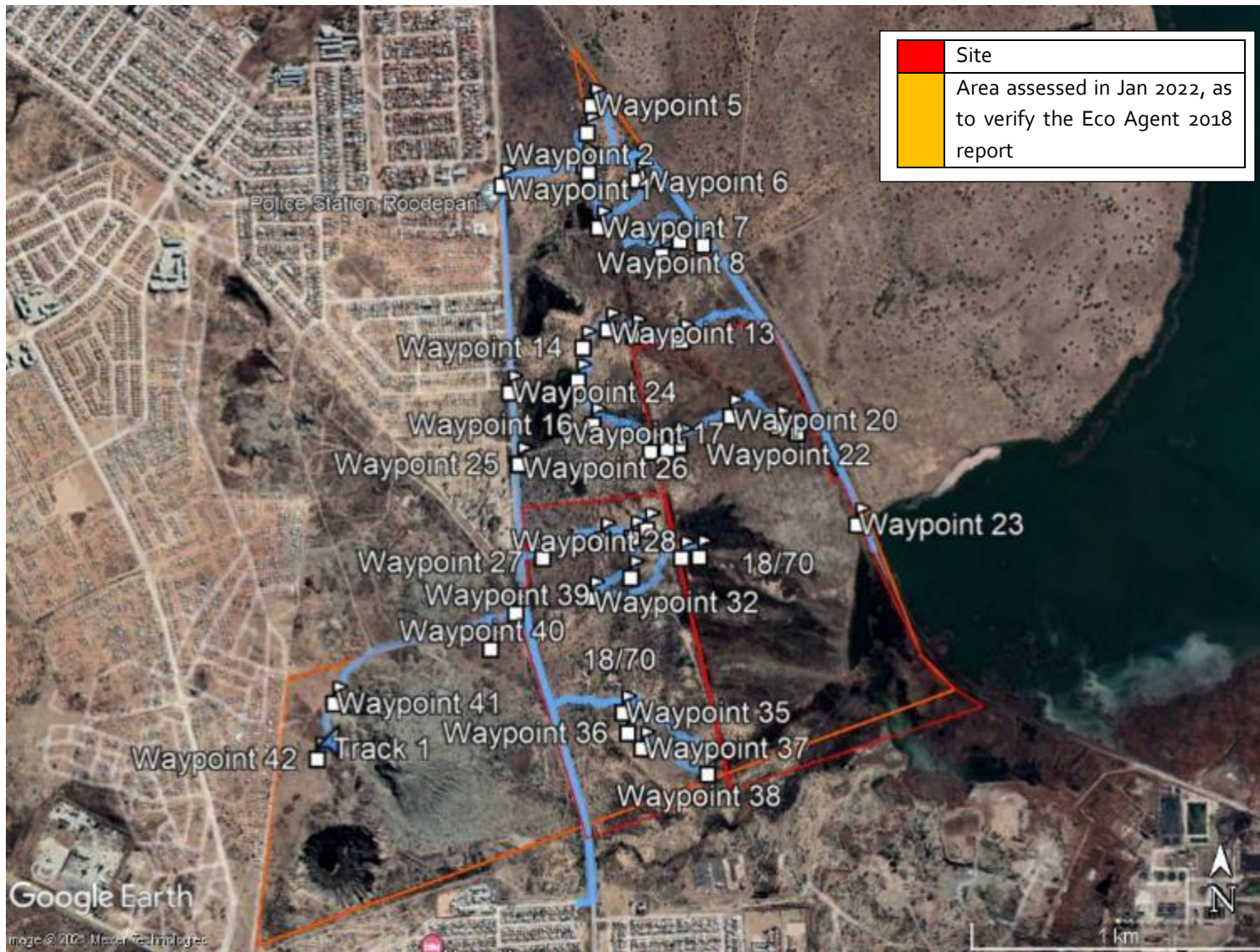
10 GLOSSARY

Alien species	Plant taxa in a given area, whose presence there, is due to the intentional or accidental introduction as a result of human activity
Azonal	Water-logged and salt-laden habitats require specially adapted plants to survive in these habitats. Consequently the vegetation deviates from the typical surrounding zonal vegetation and are considered to be of azonal character (Mucina & Rutherford, 2006)
Biodiversity	Biodiversity is the variability among living organisms from all sources including inter alia terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems
Biome	A major biotic unit consisting of plant and animal communities having similarities in form and environmental conditions, but not including the abiotic portion of the environment.
Buffer zone	A collar of land that filters edge effects.
Conservation	The management of the biosphere so that it may yield the greatest sustainable benefit to present generation while maintaining its potential to meet the needs and aspirations of future generations. The wise use of natural resources to prevent loss of ecosystems function and integrity.
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.
Conservation status	An indicator of the likelihood of that species remaining <u>extant</u> either in the present day or the near future. Many factors are taken into account when assessing the conservation status of a species: not simply the number remaining, but the overall increase or decrease in the population over time, breeding success rates, known threats, and so on
Conservation Importance	The importance of a site for supporting biodiversity features of conservation concern present e.g. populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.
Community	Assemblage of populations living in a prescribed area or physical habitat, inhabiting some common environment.
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).
Ecological Corridors	Corridors are roadways of natural habitat providing connectivity of various patches of native habitats along or through which faunal species may travel without any obstructions where other solutions are not feasible
Ecosystem	Organisms together with their abiotic environment, forming an interacting system, inhabiting an identifiable space
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
Endemic	Naturally only found in a particular and usually restricted geographic area or region
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	An herbaceous plant other than grasses.
Habitat	Type of environment in which plants and animals live
Indigenous	Any species of plant, shrub or tree that occurs naturally in South Africa
In Situ	"In the place" In Situ conservation refers to on-site conservation of a plant species where it occurs. It is the process of protecting an endangered plant or animal species in its natural habitat. The plant(s) are not removed, but conserved as they are. Removal and relocation could kill the plant and therefore in situ conservation is preferred/ enforced.
Invasive species	Naturalised alien plants that have the ability to reproduce, often in large numbers. Aggressive invaders can spread and invade large areas
Mitigation	The implementation of practical measures to reduce adverse Impacts
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).
Plant Community	A collection of plant species within a designated geographical unit, which forms a relatively uniform patch, distinguishable from neighbouring patches of different vegetation types. The components of each plant community are influenced by soil type, topography, climate and human disturbance. In many cases there are several soil types within a given plant community (Gobbat <i>et al</i> , 2004)
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.
Threatened	Species that have naturally small populations, and species which have been reduced to small (often unsustainable) population by man's activities

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>
Species diversity	A measure of the number and relative abundance of species
Species richness	The number of species in an area or habitat
Suffrutex	Low-growing woody shrub or perennial with woody base, sometimes referred to as underground trees
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)
Transformation	The removal or radical disturbance of natural vegetation, for example by crop agriculture, plantation forestry, mining or urban development. Transformation mostly results in a serious and permanent loss of biodiversity and fragmentation of ecosystems, which in turn lead to the failure of ecological processes. Remnants of biodiversity may survive in transformed landscapes
Vegetation Association	A complex of plant communities ecologically and historically (both in spatial and temporal terms) occupying habitat complexes at the landscape scale. Mucina and Rutherford (2006) state: "Our vegetation units are the obvious vegetation complexes that share some general ecological properties such as position on major ecological gradients and nutrient levels and appear similar in vegetation structure and especially floristic composition".
Vulnerable	A taxon is Vulnerable when it is not Critically Endangered or Endangered but meets any of the five IUCN criteria for Vulnerable and are therefore facing a high risk of extinction in the wild in the future (Raimondo <i>et al</i> , 2009)

APPENDIX A: SAMPLE POINT AND TRACK MAP



APPENDIX B: SPECIES RECORDED DURING THE FIELD SURVEY

1 = species recorded in broad vegetation group

M = Medicinal

P= Protected by provincial legislation

D=Declining

Species	Common name	Habitat notes	Disturbed V tortilis	Highly transform	Dist open shrubveld	Old fields, sec grassl	Propopis Area	Mine dump	Wetlands	Artificial wetlands
Trees										
<i>Vachellia hebeclada</i> subsp <i>hebeclada</i>	Trassiedoring / Candle Thorn	Low spreading shrub/ small tree. Dry grassland and bushveld	1							
<i>Acacia (Vachellia) karroo (M)</i>	Sweet Thorn	Widespread, often proliferate in overgrazed areas	1	1	1			1	1	
<i>Senegalia mellifera</i> subsp <i>detinens</i>	Black Thorn	Very thorny shrub to small tree occurring in bushveld and semi-desert areas, often on Kalahari sand and forming impenetrable thickets		1						
<i>Acacia (Vachellia) tortilis</i>	Umbrella Thorn	Bushveld and grassland.	1	1	1	1	1	1		1
<i>Searsia lancea</i>	Sour Karee	Grassland and bushveld	1	1				1	1	1
<i>Ziziphus mucronata</i>	Buffalo-thorn	Widespread, in various habitats	1	1					1	1
Number of indigenous tree species recorded = 6			5	5	2	1	1	3	3	3
Grasses										
<i>Aristida canescens</i>	Pale Three-awn	Disturbed, eroded soil	1	1	1		1			
<i>Aristida congesta</i>	Tassel Three-awn	Disturbed, overgrazed or farmed land. Increaser II grass	1	1	1	1				

Species	Common name	Habitat notes	Disturbed V tortilis	Highly transform	Dist open shrubveld	Old fields, sec grassl	Propopis Area	Mine dump	Wetlands	Artificial wetlands
<i>Cenchrus ciliaris</i>	Foxtail Buffalo Grass	Grows in dry areas and is an excellent grazing grass. However difficult to establish.	1	1	1	1	1			
<i>Chloris virgata</i>	Feather-top Chloris	Disturbed, moist areas, mostly clay soils and on edge of pans. Increaser II	1	1	1	1	1	1		
<i>Cynodon dactylon</i>	Couch grass	Most soils, usually in disturbed areas. Increaser II grass, palatable	1	1		1	1	1		
<i>Eragrostis echinochloidea</i>	Tick Grass	Occurs mainly in disturbed areas, in shallow calcareous soils, also around pans	1	1		1	1	1		1
<i>Eragrostis lehmanniana</i>	Lehmann's Grass	Sandy soil, mostly in disturbed land. Increaser II grass	1	1	1	1				
<i>Eragrostis obtusa</i>	Dew Grass	Disturbed areas such as road reserves and trampled veld.	1	1	1	1				
<i>Eragrostis superba</i>	saw-tooth love grass	Disturbed areas next to roads. Increaser II	1		1				1	
<i>Eragrostis trichophora</i>	Hairy Love Grass	Disturbed areas, mostly in shallow and rocky soil, but also where rainwater accumulates	1		1	1	1		1	1
<i>Fingerhuthia africana</i>	thimble grass	Rocky areas, eroded soils, riverbeds and warm sunny areas. Important climax to sub-climax grass in eroded soils - stabilises soil	1	1	1	1	1	1		
<i>Heteropogon contortus</i>	Spear Grass	Rocky, sloped land and common on disturbed road reserves. Increaser II grass. Palatable in early summer	1		1	1				

Species	Common name	Habitat notes	Disturbed V tortilis	Highly transform	Dist open shrubveld	Old fields, sec grassl	Propopis Area	Mine dump	Wetlands	Artificial wetlands
<i>Hyparrhenia hirta</i>	Common Thatching Grass	Well drained, rocky soil in open grassland and disturbed areas. Increaser I grass	1			1				1
<i>Panicum coloratum</i>	Small Buffalo Grass	Mostly found in clay soils, especially moist areas.	1		1		1		1	1
<i>Setaria sphacelata</i> var. <i>sericea</i>	Golden Bristle Grass	Moist areas, clay soils					1		1	1
<i>Sporobolus africanus</i>	Ratstail Dropseed	Disturbed places close to water or in road verges. Compacted, damp soils. Increaser III grass		1		1		1	1	
<i>Sporobolus iocladius</i>	Pan Dropseed	Ephemeral pans and disturbed area					1	1	1	1
<i>Tragus berteronianus</i>	Carrot Seed Grass	Disturbed, bare patches and compacted soils.	1				1			
<i>Urochloa mosambicensis</i>	Bushveld Signal Grass	Disturbed areas such as farmland, also in compacted soils. Good grazing grass. Increaser II	1	1		1	1	1		
Minimum number of indigenous grass species = 28			16	11	11	13	12	7	6	6
Small shrubs / Forbs / succulents										
<i>Albuca cf setosa</i>	Fibrous Slime Lily / Slangkop	Plains, rocky areas			1	1				
<i>Aloe grandidentata</i>	Bold Aloe	Rocky areas, hills	1	1	1		1			
<i>Ammocharis coranica</i> (P)	Groundlily	Widespread in hot, dry and flat areas.	1	1						
<i>Aptosimum procumbens</i>	Carpet Flower	Floodplains, plains and disturbed areas		1	1	1				

Species	Common name	Habitat notes	Disturbed V tortilis	Highly transform	Dist open shrubveld	Old fields, sec grassl	Propopsis Area	Mine dump	Wetlands	Artificial wetlands
<i>Arctotis venusta</i>	Free State Daisy / Karoo Gousblom	Dryer grasslands in summer rainfall regions. Usually disturbed areas	1	1	1					
<i>Asparagus africanus</i>	Bush or African Asparagus / Haakdoring	Wide range of habitats	1		1		1			
<i>Atriplex lindleyi</i>	Saltbush	Disturbed areas			1		1	1		
<i>Barleria macrostegia</i>	Tongklapper	Rocky grassland	1							
<i>Berkheya cf rigida</i>	Disseldoring	Spiny plant that becomes problematic in overgrazed veld	1	1		1	1			
<i>Bulbine narcissifolia</i>	Strap-leaved Bulbine	Poor soils in grassland, proliferation an indication of overgrazing.	1		1					
<i>Cleome angustifolia</i>		Dry woodland, sometimes weedy	1	1				1		
<i>Crotalaria lotoides</i>	mealie crotalaria	Bushveld	1							
<i>Dipcadi viride</i>	grootslymuin tjie	Grassland, often in vleis							1	
<i>Felicia muricata</i>		Grassland, proliferating in overgrazed/disturbed places	1	1	1	1	1	1		
<i>Gazania krebsiana</i>	Botterblom	Grassland, widespread in other habitats		1						
<i>Geigeria filifolia</i>	Vermeerbos	Common in overgrazed areas	1	1	1		1			
<i>Helichrysum zeyheri</i>	Grey mountain helichrysum	Hills and mountains. Sandy and stony soils					1		1	
<i>Heliotropium nelsonii</i>	String of stars	Common in disturbed areas	1	1		1	1			
<i>Hermannia comosa</i>	Doll's Rose	Sandy areas	1							

Species	Common name	Habitat notes	Disturbed V tortilis	Highly transform	Dist open shrubveld	Old fields, sec grassl	Propopis Area	Mine dump	Wetlands	Artificial wetlands
<i>Hibiscus trionum</i> *	Bladderweed	Grassland and disturbed places	1		1	1				
<i>Indigastrium niveum (argyraeum)</i>	seeroogbossie	Wide distribution	1							
<i>Indigofera daleoides</i>		Grassland, often in disturbed places	1							
<i>Jamesbrittenia aurantiaca</i>	Cape Saffron	Grassland, moist places	1				1			
<i>Kalanchoe paniculata</i>	hassieoor	Grows in shallow soils overlaying rock.		1	1					
<i>Lobelia thermalis</i>		Permanent to seasonally moist places							1	
<i>Lycium cinereum</i>	Krie doring	Wide distribution in arid areas	1	1	1	1				
<i>Lycium pilifolium</i>	Bok doring	Dry woodland	1							
<i>Nidorella anomala</i>		Grassland, often occurring in groups in moist areas.	1	1	1	1	1		1	1
<i>Orbea cf lutea</i>	Yellow carrion flower	Often in shade of woody plants, grassland	1				1			
<i>Pentzia globosa</i>	Vaalkaroo	Grassland, in large numbers indicative of overgrazing	1	1	1	1	1			
<i>Mesembreanthemum (Psilocaulon) coriarium</i>	Asbos	Seasonal streams, floodplains and disturbed areas		1			1			
<i>Radyera urens</i>	Wildekalkbas	Flats and disturbed areas	1							
<i>Salvia runcinata</i>	Wildesalie	Grassland, under trees, often in disturbed areas or even vlei's		1	1		1		1	1
<i>Selago densiflora</i>		Grassland and bushveld.	1							
<i>Seriocoma avolans</i>	Gras-bo-bas- onder / katstert	Drier, arid areas, resembles a grass					1			
<i>Sesamum capense</i>	Aprilbaadjie	Usually in disturbed areas	1							

Species	Common name	Habitat notes	Disturbed V tortilis	Highly transform	Dist open shrubveld	Old fields, sec grassl	Propopis Area	Mine dump	Wetlands	Artificial wetlands
<i>Solanum panduriforme</i>	Poison Apple	Disturbed places, often under trees (probably an indigenous specie)	1	1		1				
<i>Tribulus terrestris</i>	Common Devil's Thorn / Dubbeltjie	Spreading weed in disturbed places	1	1	1	1	1	1		
<i>Trichodiadema pomeridianum (P)</i>	Stervygjie	Arid areas	1		1					
<i>Tripteris aghillana var aghillana (Osteospermum scariosum)</i>		Grassland, sandveld	1		1					
<i>Veronica anagallis-aquatica</i>	water speedwell	Damp places							1	
<i>Wahlenbergia androsacea</i>		Thornveld	1							
<i>Zygophyllum lichtensteinianum</i>	Skilpadbos	Flats, ridges and seasonally moist areas	1	1	1		1			
Minimum number of indigenous forb species recorded = 43			31	19	19	11	17	4	6	2
Alien / Invasive Species										
<i>Agave sisalana</i>	Sisal / hemp	Category 2								
<i>Cirsium vulgare</i>	Scotch Thistle	Category 1b (NEMBA) Biennial							1	1
<i>Erigeron (Conyza) albida</i>	Tall Fleabane	Weed	1		1	1		1	1	
<i>Flaveria bidentis</i>	Smeltersbush	Grassland, usually in moist areas. Declared Category 1b invader (NEMBA)	1		1	1		1		

Species	Common name	Habitat notes	Disturbed V tortilis	Highly transform	Dist open shrubveld	Old fields, sec grassl	Propopis Area	Mine dump	Wetlands	Artificial wetlands
<i>Plantago lanceolata</i>	Narrow-leaved Plantain	Introduced weed, usually in disturbed places				1			1	
<i>Prosopis glandulosa</i>	Honey Mesquite	Category 3 in Northern Cape. 1b in Eastern Cape, Free State, North-West and Western Cape.	1	1	1		1	1	1	1
<i>Schkuhria pinnata</i>	Dwarf Marigold	Weedy annual herb from S America		1						
<i>Shinus molle</i>	Pepper Tree	Not listed		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	1						
<i>Tamarix ramosissima</i>	pink tamarisk	Category 1b							1	1
Number of alien and invasive species recorded= 10			4	4	3	3	1	3	5	4
Minimum indigenous species per vegetation group			52	36	32	25	30	14	15	11

APPENDIX C: PLANTS OF CONSERVATION CONCERN (CONFIDENTIAL -NOT FOR PUBLICATION)

The species listed below have previously been recorded in the area that the proposed site is situated in and are the most likely to occur on or around the site. Species printed in **bold** were recorded. **Data for sensitive species is available from SANBI and may not be published.**

Specie	Conservation status (SA)	Habitat notes	Suitable habitat on site	Flowering period
<i>Antimima lawsonii</i>	Rare	Kimberly area in limestone soils	Most of the soil on the site were clayey with sandier soils in the higher lying areas. Parts of the site was cultivated, while others transformed or degraded by historical activities. Limestone not recorded and therefore the <u>likelihood of occurring on Portion 18 is considered low.</u>	Around late winter-Sept
<i>Crinum bulbispermum</i>	Reclassified from Declining to Least Concern, however, population numbers are declining.	This bulb occurs near rivers, streams, seasonal pans and in damp depressions. Suitable habitat exists in the moist areas on the site along the canal, however, it is more likely that these moist areas are temporary and will thus not sustain this species.	Suitable habitat is repent on the site around natural wetland areas. this plant was not recorded during the 2018 or 2022 assessment. However, if it does occur, its habitat will be protected by wetland buffers.	Sept-Nov
<i>Drimia sanguinea</i>	Near threatened	Open veld and scrubby woodland in a variety of soil types.	Suitable habitat is present; however, this species was not recorded during the 2018 or 2022 assessment. <u>The likelihood of occurrence on Portion 18 is considered medium to low</u> due to historical disturbance on much of the site.	Aug-Dec
<i>Lithops lesliei</i> subsp <i>burchelii</i>	Near Threatened	Calcareous, well drained soil in the Kimberley area	Most of the soil on the site were clayey with sandier soils in the higher lying areas. Parts of the site was cultivated, while others transformed or degraded by historical activities. Calcareous soils not recorded and therefore the <u>likelihood of occurring is considered low.</u>	March-June

Specie	Conservation status (SA)	Habitat notes	Suitable habitat on site	Flowering period
<i>Vachellia (Acacia) erioloba</i>	Declining-reclassified to Least Concern, however, population numbers are declining.	Widespread in the drier areas of the northern provinces of South Africa, deep sandy soils and drainage lines	Suitable habitat is present. However, this tree was not recorded during the 2018 or 2022 assessment. Some tree stumps were recorded, and it is assumed that trees are harvested for firewood. This tree makes excellent firewood and could have been harvested if it was historically present. The likelihood of being present on Portion 18 is low.	Late winter to summer
Sensitive species 257	Vulnerable	Alluvial soils and large, shallow pans in grassland. Kimberley to Vryburg and Bloemfontein.	The wetland areas and particularly the area around Kamfers Dam could provide suitable habitat to this species. It was not recorded in walked transects, however, the suitable habitat should be regarded as sensitive as it will fall within wetland areas and its associated buffers. <u>The likelihood of occurring is medium to low.</u>	Unknown

APPENDIX D: SPECIALIST CV

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 Tshikovha Environmental and Communication Consulting

6. Mining

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

7. Other Development

- Dec 2013: Marekele Bush camp – vegetation & fauna assessments (NuLeaf)
- May 2013: Komati Power Station – Coal stockyard (Enviroolution)
- 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

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
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