



Terrestrial Biodiversity and Plant Species Assessment:

Shoprite Checkers Freshmark Distribution Centre, Wells Estate, Nelson Mandela Bay Municipality, Eastern Cape

Report v. 1.1
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Declaration

In terms of Chapter 5 of the National Environmental Management Act of 1998, specialists involved in Impact Assessment processes must declare their independence and include an abbreviated Curriculum Vitae.

I, Barend Adriaan Grobler, do hereby declare that I am financially and otherwise independent of the client and their consultants, and that all opinions expressed in this document are substantially my own.

B. Adriaan Grobler

The author believes that the information presented in this report complies with the Protocols for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (Government Gazette 43110 20 March 2020) and Plant Species (Government Gazette 43855 of 30 October 2020).



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1. Introduction

This Terrestrial Biodiversity and Plant Species Assessment report was commissioned to inform the Basic Assessment process being undertaken for the expansion the existing Freshmark Shoprite Checkers Distribution Centre on Erf 8741 at the Markman industrial area near Wells Estate, Nelson Mandela Bay Municipality, Eastern Cape (Figure 1). Erf 8741 covers an area of approximately 58 ha of which about 6 ha has been developed to accommodate the existing distribution centre; the remaining 52 ha is currently undeveloped. The proposed development will entail the expansion of the existing facility (expansion footprint < 20 ha) as well as the installation of additional subsurface diesel storage containers (combined volume of new containers < 500 kℓ).



2. Terms of Reference

The terms of reference for this assessment were as follows:

- A desktop assessment of available literature to identify and describe the mapped status of the vegetation on site, in terms of applicable local and regional conservation planning frameworks (e.g., Vegetation Map of South Africa, National Biodiversity Assessment, Eastern Cape Biodiversity Conservation Plan, Nelson Mandela Bay Municipality Bioregional Plan).
 - Include the identification and evaluation of Critical Biodiversity Areas, Ecologically Sensitive Areas and Biodiversity Corridors mapped on site, if any.
- Field survey to identify, map and describe the current state of the vegetation on site, supported by relevant photographs.
- Determine appropriate buffer zones for sensitive areas, as well as No-Go areas on site.
 - Identify and assess impacts on sensitive areas and No-Go areas on the site and where necessary, establish appropriate buffer areas.
 - Include the designation of areas to be set aside for conservation (biodiversity target areas), in terms of the relevant planning frameworks for the area.
 - Identify and determine the relative abundance of Species of Special Concern (Vulnerable, Endangered or Critically Endangered) within the site.
 - Identify and determine the presence and distribution of alien vegetation on site, if any, and the potential for post-removal recovery of indigenous vegetation on site.
 - Provide a detailed vegetation sensitivity map of the site.
 - Provide a detailed disturbance and transformation map of the vegetation on site.
- Identify and map sensitive or specialized habitats.
- Identify and assess potential project related impacts (both positive and negative) for the construction and operational phases of the project, using the prescribed methodology. Where feasible, include the assessment of cumulative impacts.

- Outline any legislative requirements (i.e. licences and permits) that need to be met for the proposed development to proceed.
- Outline mitigatory measures for the future management of potential project related impacts.
- Outline management recommendations for the construction and operational phases of the project.

3. Methodology and Limitations

3.1 Desktop Study

An understanding of regional conservation priority areas was informed by the Nelson Mandela Bay Municipality Bioregional Plan (NMBM BP; Stewart, 2014) and by the 2017 National Protected Areas Expansion Strategy (NPAES; Government of South Africa, 2016). Note that the NMBM BP (Stewart, 2014) supersedes the Eastern Cape Biodiversity Conservation Plan (EC BCP; Eastern Cape Department: Economic Development, Environmental Affairs and Tourism, 2020) and that the municipal area was therefore not assessed in the 2019 iteration of the EC BCP.

To gain an understanding of broader vegetation patterns in the surrounding landscape, reference was made to the Vegetation Map of South Africa, Lesotho and Swaziland 2018 version (VEGMAP) (SANBI, 2006–2018, 2018a), which reflects important recent updates for the region under study (Dayaram et al., 2019). Conservation status and targets for vegetation types were identified from the National Biodiversity Assessment 2018 (SANBI, 2018b; Skowno et al., 2019).

A list of plant species of conservation concern (SCC) that could potentially occur at the site were identified from the following sources:

- The National Web-based Environmental Screening Tool (<https://screening.environment.gov.za>);
- The online Red List of South African Plants v. 2020 (SANBI, 2012–2020) (<http://redlist.sanbi.org>).
- The Custodians of Rare and Endangered Wildflowers (CREW) Eastern Cape database (V. Zikishe, pers. comm.);
- Observations submitted to the iNaturalist online biodiversity database (<https://www.inaturalist.org>).
- The Botanical Database of Southern Africa (<http://newposa.sanbi.org/>).

3.2 Field Survey

Fieldwork for this study was conducted on 11 November 2021 during early summer. As the site falls in the coastal, temperate climate, year-round rainfall zone, seasonality is muted and thus the phenology of plants and vegetation is also muted in comparison with more seasonal regions. The early-summer sampling is considered appropriate as most plant species were identifiable, including SCC. Early summer is also the optimal season for plant sampling in the local bioregion (SANBI, 2020).

A total of six hours were spent surveying the 52 ha of undeveloped land at the site. Areas of suspected intact habitat, previously identified using Google Earth, were the focus of the survey as these areas were most likely to harbour SCC. However, care was taken to survey representative portions of all suspected habitats on site. During the survey, vegetation units and other habitat types were mapped and assessed for their ecological condition. Vegetation units were further surveyed for their dominant and typical component species. Any associations with specific soils, underlying geology, or landforms were noted. The locations of any SCC subpopulations were recorded using a GPS, while the estimated size of subpopulations and apparent threats to subpopulations were also recorded.

3.3 Assessment of Site Ecological Importance

The Site Ecological Importance (SEI) was evaluated according to the protocol outlined in the Species Environmental Assessment Guideline (SANBI, 2020). This protocol produces a standardised metric for identifying site-based ecological importance for species in relation to a proposed project. The SEI is a function of the biodiversity importance of a specific receptor (e.g., vegetation unit or SCC) and its resilience to environmental impacts. The biodiversity importance is, in turn, a function of the conservation importance and functional integrity of the specific receptor.



Figure 1: Location of Erf 8741 (red outline) in the Markman industrial area of Nelson Mandela Bay Municipality where the proposed expansion of the Freshmark Shoprite Checkers Distribution Centre is planned. The site covers an area of approximately 58 ha, of which 3.1 ha has been developed for the existing distribution centre.



4. Terrestrial Biodiversity

4.1 Bioregional Context

The site falls within the Albany Centre of Floristic Endemism (Van Wyk & Smith, 2001), which constitutes the southwestern portion of the Maputaland–Pondoland–Albany Biodiversity Hotspot (Mittermeier et al., 2011). This hotspot is considered the second richest floristic region in southern Africa (after the Cape Floristic Region) and the second richest floristic region in Africa, relative to its size (CEPF, 2010). The site forms part of the Subtropical Thicket Biome (Rutherford et al., 2006). The vegetation of this biome, in a general sense, is dense a dense, woody, semi-succulent and thorny shrubland with an average height of 2–3 m (Vlok et al., 2003; Hoare et al., 2006). Within the Subtropical Thicket Biome, primary drainage basins act as regional biogeographic units (Potts et al., 2013), and so the thicket vegetation in the study area, which is associated with the broader Algoa Basin (comprising the Sundays, Coega and Swartkops basins), belongs to the Sundays Thicket regional unit (Vlok et al., 2003).

The site also forms part of geologically youthful coastal landscapes of the Cape Floristic Region (CFR) that harbour a diverse array of calcicolous plant species (Grobler and Cowling, 2021). These species are intimately associated with coastal dunes and limestones and have evolved in the region over the past five million years. While not as rich in localized calcicolous species as the Agulhas and Riversdale coastal plains in the western CFR, the Coega–Grassridge area supports several species restricted to limestone substrata, many of which are endemic to the area (Grobler and Cowling, 2021). The Coega–Grassridge coastal plain also harbours limestone-endemic species with marked longitudinal disjunctions in their distributions and forms the easternmost range limit for many of these species.

4.2 Bioregional Conservation Planning

The NMBM BP (Stewart, 2014) does not identify the site as a Critical Biodiversity Area (CBA) or a Critical Ecosystem Support Area (CESA) (Figure 2). According to the most recent NPAES (Government of South Africa, 2016), no protected areas or priority focus areas for protected area expansion occur within 1 km of the site (Figure 3).

4.3 Regional-Scale Vegetation Patterns

VEGMAP (Dayaram et al., 2019; SANBI, 2006–2018, 2018a) identifies a single vegetation type historically occurring in the study area, namely AT 39 Grassridge Bontveld (Figure 4). This vegetation is restricted to the lower Algoa Basin where it occurs on moderately undulating plains above the lower reaches of the Swartkops, Coega and Sundays rivers. Grassridge Bontveld is associated with shallow, lime-rich soils overlying limestones (calcarenites) of the Alexandria and Nanaga geological formations. It comprises a mosaic of low (2–3 m) thicket bushclumps of variable size embedded in a matrix of low (0.2–0.8 m) grassy dwarf-shrubland (Grobler et al., 2018). The species present in the shrubland are a mixture of Fynbos, Grassland and Karroid elements.

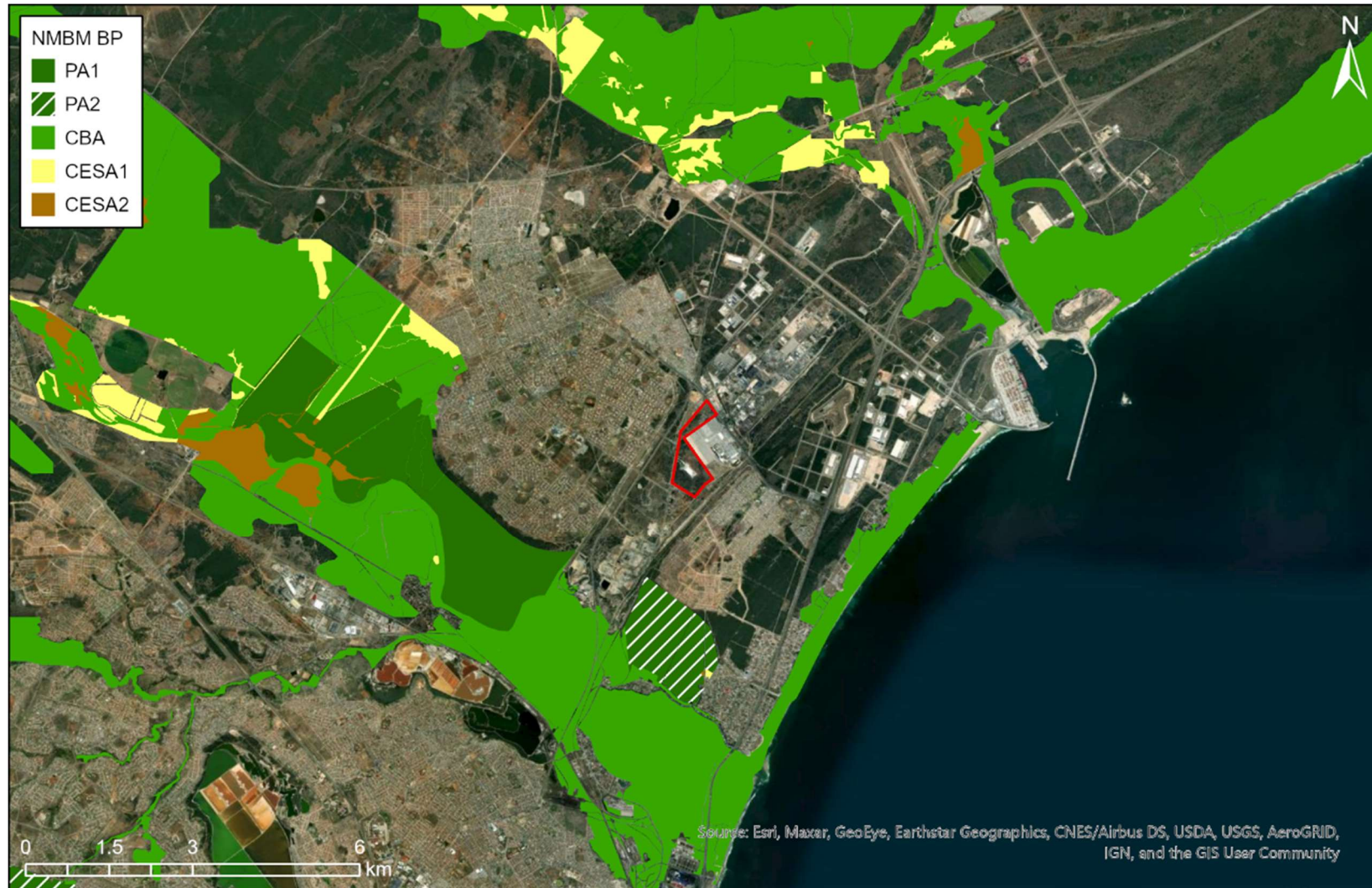


Figure 2: The conservation network identified by the Nelson Mandela Bay Municipality Bioregional Plan (NMBM BP) in the landscapes surrounding the proposed development site (red outline). Note that most of the land surrounding the site has been developed as residential and industrial areas, and that no Critical Biodiversity Area (CBA) or Critical Ecological Support Area (CESA) occur within 1 km of the site.



Figure 3: Important conservation areas identified by the 2017 National Protected Area Expansion Strategy (Government of South Africa, 2016) occurring in the landscapes surrounding the proposed development site (red outline). Note that no Protected Areas or Priority Focus Areas for protected area expansion occur within 1 km of the site.



Figure 4: The historical distribution of vegetation types in the landscapes surrounding the site (red outline) as classified by the Vegetation Map of South Africa, Lesotho and Swaziland Version 2018 (SANBI 2006–2018, 2018a).

Thicket bushclumps are typically dominated by the small trees *Schotia afra* and *Sideroxylon inerme*, as well as the tall shrubs *Carissa bispinosa*, *Colpoon compressum*, *Euclea racemosa*, *Euclea undulata*, *Pterocelastrus tricuspidatus*, *Putterlickia pyracantha* and *Searsia pterota* (Grobler et al., 2018). Climbers are common components of bushclumps, especially *Asparagus aethiopicus*, *Cynanchum viminale*, *Jasminum angulare*, *Kedrostis nana* and *Pelargonium peltatum*. The tree succulent *Aloe africana* can also be found emerging above the thicket canopy.

The grassy shrubland component of Grassridge Bontveld is dominated by low and dwarf shrubs, especially *Achyranthemum recurvatum*, *Acmadenia obtusata*, *Agathosma capensis*, *Disparago tortilis*, *Helichrysum anomalum*, *Jamesbrittenia microphylla*, *Lobostemon trigonus*, *Muraltia squarrosa*, *Passerina rubra* and *Wahlenbergia tenella* (Grobler et al., 2018). The well-developed grass layer comprises several species but is typically dominated by *Aristida diffusa*, *Cynodon dactylon*, *Eustachys paspaloides*, *Heteropogon contortus*, *Setaria sphacelata*, *Tenaxia disticha* and *Themeda triandra*. The sedge *Ficinia truncata* is also a common graminoid component of this vegetation type. Dwarf succulents are abundant and include species like *Crassula expansa*, *Crassula capitella*, *Crassula ericoides*, *Crassula tetragona*, *Carpobrotus edulis*, *Euphorbia globosa* and *Rhombophyllum rhomboideum*. The leaf-succulent shrub *Zygophyllum divaricatum* is also a typical component of Grassridge Bontveld but is not abundant.

Grassridge Bontveld is moderately protected, with approximately 10% of its original extent lost to cultivation, mining, urban development, and road building; as such, the vegetation type is assigned a threat status of Least Concern (SANBI, 2018b, 2019; Skowno et al., 2019). The conservation target for Grassridge Bontveld is 19% of the ecosystem's original extent.

4.4 Local-Scale Vegetation Patterns

The extant, local-scale vegetation patterns in the study area (Figure 5) appear to largely be driven by historical (anthropogenic) disturbance, and to a lesser extent by variations in soil conditions. The composition and structure of remnant vegetation at the site, as well as the physiography and geology of the surrounding landscape, suggest that the site historically supported Grassridge Bontveld, in accordance with VEGMAP (Dayaram et al., 2019; SANBI, 2006–2018, 2018a).

4.4.1 Grassridge Bontveld

Extant portions of Grassridge Bontveld predominantly occur in the southern portion of the site where it surrounds the existing distribution centre (Figure 5). As described in Section 4.3, this is a mosaic-type vegetation consisting of thicket clumps in a matrix of low shrubland. Here, the focus will be on the shrubland component of Grassridge Bontveld, while the thicket-clump component is described in the following subsection (§ 4.4.2).

Intact areas of Grassridge Bontveld shrubland generally occur in the southeast of the site (Figure 5) where historical disturbances (e.g., vegetation clearing, topsoil disturbance, rubble dumping, alien plant invasion) have been limited. This vegetation unit generally occurs on shallow, lime-rich sandy soils overlying limestone, although certain localized plant communities occur on skeletal soils of limestone outcrops, while others occur on deeper, sandy clay soils with scattered surface gravels (note that these communities occur at too fine a scale to practically map and harbour few plant species that do not also occur in the remainder of the Grassridge Bontveld shrubland).



Figure 5: Vegetation units and landcover types at the site that were identified during a rapid field survey of the area as part of the current study. Six terrestrial vegetation units were recognized.

The shrubland component of Grassridge Bontveld (Plate 1) is dominated by woody dwarf and low shrubs (0.2–0.8 m tall) with mixed affinity, but Karoo and Fynbos elements are most abundant. Dominant and commonly occurring shrubs include *Passerina rubra*, *Disparago tortilis*, *Lobostemon trigonus*, *Wahlenbergia tenella*, *Eriocephalus ericoides*, *Chrysocoma rigidula*, *Euryops algoensis*, *Berkheya heterophylla* var. *heterophylla*, *Pteronia incana*, *Helichrysum rosum*. *Aspalathus subtingens*, *Elytropappus rhinocerotis* and *Indigofera denudata* are locally dominant in deeper sandy clay soils, while *Jamesbrittenia microphylla*, together with the sedge *Ficinia truncata*, is dominant on exposed limestones. *Selago zeyheri* (Vulnerable) occurs sporadically in the Grassridge Bontveld shrubland.



Plate 1: Intact Grassridge Bontveld, comprising a shrubland matrix (foreground) and thicket clumps (background).

Grassridge Bontveld has a well-developed succulent component comprising both dwarf succulents and low succulent shrubs. While they are never dominant, succulent shrubs that are locally common include *Crassula ericoides* subsp. *ericoides*, *Crassula tetragona*, *Bulbine frutescens*, *Delosperma gratiae*, *Delosperma litorale*, *Lampranthus algoensis*, *Ruschia recurva*, *Ruschia congesta*, *Ruschia cymbifolia*, *Ruschia orientalis* and *Pachypodium succulentum*. Dwarf succulents are abundant among the shrubs, with species like *Aloe humilis*, *Crassula capitella*, *Crassula cotyledonis*, *Crassula haemispherica*, *Crassula muscosa*, *Curio radicans*, *Duvalia caespitosa*, *Euphorbia procumbens*, and *Trichodiadema intonsum* being relatively common and widespread, while others are more localized and endemic to the surrounding area, for example *Bergeranthus addoensis* (Near Threatened), *Corpuscularia lehmannii* (Critically Endangered) and *Rhombophyllum rhomboideum* (Endangered).

Grasses are abundant in the shrubland component of Grassridge Bontveld and can be locally common in areas of richer soils or in areas subjected to disturbance. The most common and abundant grass species include *Cynodon dactylon*, *Chloris guyana*, *Cymbopogon marginatus*, *Ehrharta calycina*, *Eragrostis curvula*, *Eragrostis obtusa*, *Melica racemosa*, *Panicum maximum*, *Themeda triandra* and *Tribolium uniolae*.

Grassridge Bontveld also hosts a rich geophyte flora, with most of these species occurring in more open areas among grasses and shrubs. Geophytes encountered on site include *Acrolophia cochlearis*, *Albuca setosa*, *Babiana sambucina*, *Boophone disticha*, *Brunsvigia gregaria*, *Bulbine narcissifolia*, *Chlorophytum crispum*, *Freesia corymbosa*, *Haemanthus coccineus*, *Hypoxis stellipilis*, *Ledebouria revoluta*, *Ornithogalum dubium* and *Tulbaghia violacea*.

Areas of degraded Grassridge Bontveld shrubland (Plate 2) occur along especially the southwestern boundary of the site, as well as around rubble dumps in the west of the site (Figure 5). These areas were previously covered by dense alien invasive vegetation, presumably comprising mainly *Acacia cyclops* and *Acacia saligna*. These areas of the site have a relatively long invasion history (> 20 years) and were only cleared of alien species recently, starting in 2019. Prior to the southern portion of the site being fenced, these degraded areas were also impacted by illegal dumping, starting in 2006. The extant plant community in these areas consists primarily of the grass component of Grassridge Bontveld, with few of the typical shrub and succulent species remaining here. *Acacia saligna* saplings have also established in these areas.



Plate 2: Degraded Grassridge Bontveld dominated by indigenous grasses with scattered invasive *Acacia cyclops*.

4.4.2 Thicket Clumps

Thicket clumps are scattered throughout the Grassridge Bontveld shrubland but are concentrated in the intact areas of this vegetation type (Figure 5). These clumps are typically found on deeper soils that accumulate in dolines that form in the underlying limestone. The thicket canopy is dominated by small trees and shrubs (2–3 m tall), with *Euclea undulata*, *Mystroxydon aethiopicum*, *Pterocelastrus tricuspidatus*, *Sideroxylon inerme* and *Schotia afra* being the dominant overstorey species, while the tree succulent *Aloe africana* can be found emerging above the canopy (Plate 3). Hedge-forming and often spinescent shrubs typically occupy the fringes of thicket clumps, including the species *Azima tetracantha*, *Capparis sepiaria* var. *citrifolia*, *Carissa haematocarpa*, *Dovyalis rotundifolia*, *Ehretia rigida*, *Gymnosporia polyacantha* and *Searsia pterota*. The succulent shrub *Euphorbia caerulescens* occurs along the fringes of larger thicket clumps found on deeper, richer clay soils. Climbers and creepers are common in the thicket, especially *Asparagus africanus*, *Cynanchum viminale* and *Pelargonium peltatum*. The ground layer of thicket clumps is poorly developed, but certain succulent species enjoy the sheltering effect of thicket shrubs, including *Euphorbia clava*, *Euphorbia meloformis* (Near Threatened), *Stapelia grandiflora* and occasionally *Rhombophyllum rhomboideum* (Endangered).



Plate 3: A well-developed Thicket Clump occurring on deeper, richer clay soils.

4.4.3 Secondary Grassland

Secondary Grassland occurs in the southern portion of the site around the existing distribution centre (Figure 5). This grassland became established after the clearing of Grassridge Bontveld vegetation and apparently significant disturbance to the topsoil. A few indigenous grass species like *Cynodon dactylon* and *Melica racemosa* are dominant in this vegetation unit while scattered woody shrubs, for example *Helichrysum rosum*, *Berkheya heterophylla* var. *heterophylla* and *Lycium cinereum*, have also re-established in these disturbed areas. This vegetation unit also hosts several exotic ruderal species, with *Atriplex semibaccata* and *Plantago lanceolata* being most abundant.



Plate 4: Secondary grassland in disturbed areas dominated by *Cynodon dactylon* and *Melica racemosa*. The shrub in the foreground is *Helichrysum rosum*.

4.4.4 Grazing Lawn

Grazing Lawn occurs in the northern portion of the site where there has been a relatively long history of livestock farming. Kraals and homesteads were established here at least 15 years ago (but these have since been removed), although these areas were likely used as browsing and grazing grounds prior to this. As the area is unfenced, these practices likely continue. The intense herbivory has led to severe degradation of historically occurring Grassridge Bontveld, with the species-rich shrubland now replaced by a species-depauperate grassland dominated by *Cynodon dactylon*. Very few typical shrub species remain here, and it is mostly resilient, spinescent thicket shrubs like *Asparagus burchellii*, *Euphorbia mauritanica* and *Lycium cinereum* that persist in the grazing lawn. Several ruderal species,

including *Atriplex semibaccata*, *Drosanthemum hispidum*, *Felicia muricata*, *Mesembryanthemum aitonis* and *Oncosiphon pilulifera* proliferate here.



Plate 5: Species-depauperate Grazing Lawn, dominated by *Cynodon dactylon* with scattered spinescent shrubs.

4.4.5 Alien Invasive Vegetation

A small area of invasive alien vegetation occurs along the eastern boundary in the northern section of the site (Figure 5). This vegetation is dominated by the invasive shrubs *Acacia cyclops* and *Acacia saligna*, with some ruderal indigenous species (e.g., *Aizoon pubescens*, *Mesembryanthemum aitonis*) occurring in the ground layer (Plate 6). Note that this vegetation can also be found scattered throughout areas mapped as 'Rubble' (Figure 5).



Plate 6: Alien Invasive Vegetation occurring on highly disturbed ground on the site. Dominant species are *Acacia cyclops* and *Acacia saligna*.

5. Plant Species

5.1 Species of Conservation Concern

Of the 13 plant species of conservation concern (SCC) identified as potentially occurring in the study area, five were confirmed to occur on site, three of which are threatened species (Table 1). All SCC were associated with intact Grassridge Bontveld (both the shrubland and thicket components), while threatened species were concentrated in the southern portion of the site (Figure 6). As recommended by Raimondo et al. (2009), a buffer area of 200 m comprising natural or semi-natural areas should be maintained around subpopulations of threatened species (Figure 6). All other SCC that could potentially occur on site were assessed to have a low likelihood of occurrence, based primarily on the lack of suitable habitat in the study area (four species) and the high sampling effort during the field survey for this study, specifically in intact areas of suitable habitat for these species (Table 1). The following subsections provide details of the five SCC that were recorded during the field survey.

Table 1: Plant species of conservation concern (SCC) that are associated with Grassridge Bontveld in the landscapes surrounding the site. Conservation status is from the Red List of South African Plants v. 2020 (SANBI, 2012–2020) (<http://redlist.sanbi.org>). Status: NT, Near Threatened; VU, Vulnerable; EN, Endangered; CR, Critically Endangered.

Family	Species	Common name	Status	Habitat	Likelihood	Justification
Acanthaceae	<i>Justicia orchioides</i> subsp. <i>orchioides</i>	Ribbokbos	VU	Open sandy areas, often in lime-rich soils.	Low	High sampling effort in suitable habitats without detection.
Aizoaceae	<i>Bergeranthus addoensis</i>	–	NT	Open patches between thicket on deep, lime-rich sand and clay loams.	Confirmed	–
Aizoaceae	<i>Corpuscularia lehmannii</i>	–	CR	Sandstone outcrops and pebbly clay soils.	Confirmed	–
Aizoaceae	<i>Rhombophyllum rhomboideum</i>	–	EN	Open patches between thicket in shallow, lime-rich soils.	Confirmed	–
Asteraceae	Sensitive species 91	–	EN	Open areas in lime-rich soils overlying limestones on coastal flats.	Low	High sampling effort in suitable habitats without detection.
Asteraceae	<i>Achyranthemum recurvatum</i>	–	EN	Open areas in shallow, lime-rich soils overlying limestones.	Low	High sampling effort in suitable habitats without detection.
Crassulaceae	<i>Cotyledon adscendens</i>	–	EN	Thicket vegetation on dunes within 1 km of the coast.	Low	No suitable habitat present.
Euphorbiaceae	<i>Euphorbia meloformis</i>	Bobbejaankos	NT	Coastal plains and higher lying plateaus, among surface limestones in short open grassland and openings in thicket.	Confirmed	–
Hyacinthaceae	<i>Ledebouria coriacea</i>	–	CR	Alluvial sand and fine gravel underlain by calcrete. Plants occur in shaded places under <i>Pteronia</i> shrubs.	Low	No suitable habitat present.
Myrsinaceae	<i>Rapanea gilliana</i>	Dwarf Cape Beech	EN	Fynbos–thicket mosaics on coastal dunes.	Low	No suitable habitat present.
Plumbaginaceae	<i>Limonium linifolium</i>	–	NT	Coastal saline pans and estuaries.	Low	No suitable habitat present.
Scrophulariaceae	<i>Selago zeyheri</i>	–	VU	Dry stony flats and lower slopes in grassy vegetation.	Confirmed	–
Zygophyllaceae	<i>Zygophyllum divaricatum</i>	–	EN	Open areas in lime-rich sandy loam or sandy clay soils overlying limestones.	Low	High sampling effort in suitable habitats without detection.



Figure 6: The location of three threatened plant species of conservation concern (SCC) at the site. Buffer areas of 200 m (recommended by Raimondo et al., 2009), comprising intact and restorable habitat areas, are indicated. Conservation status: CR, Critically Endangered; EN, Endangered; VU, Vulnerable.

5.1.1 *Corpuscularia lehmannii*

Corpuscularia lehmannii (Aizoaceae) is a low, trailing to clump-forming succulent (Plate 7 A, B). This species is endemic to Nelson Mandela Bay where it is restricted to sandstone outcrops and shallow, sandy clay soils with surface gravels. It has an extent of occurrence (EOO) of 70 km² and is known from less than ten locations (Raimondo and Helme, 2006). Due to its restricted occurrence and historical loss of habitat areas, *C. lehmannii* is assigned a conservation status of Critically Endangered.

Only a single individual of this SCC was recorded on site where it was located in intact Grassridge Bontveld in the southern portion of the study area (Figure 6). Here, the species grew in association with two other SCC, namely *Bergeranthus addoensis* and *Rhombophyllum rhomboideum*.

5.1.2 *Rhombophyllum rhomboideum*

Rhombophyllum rhomboideum (Aizoaceae) is a clump-forming dwarf succulent (Plate 7 C, D). This species is endemic to the Coega–Grassridge area where it occurs in open patches between thicket in shallow, lime-rich soils. It has an EOO of 102 km² and is known from less than ten locations (Raimondo and Dold, 2008). Due to the rapid transformation of this its habitat in recent years, this species is assigned a conservation status of Endangered.

Two subpopulations of *R. rhomboideum* were recorded in the southern portion of the site, often accompanied by *Bergeranthus addoensis*, where they occurred on relatively shallow soils in open areas between thicket clumps and along the fringes of thicket in intact Grassridge Bontveld (Figure 6). The population size of this species occurring on site is estimated at 150–200 individuals.

5.1.3 *Selago zeyheri*

Selago zeyheri (Scrophulariaceae) is a low (0.4 m tall), densely leafy shrublet (Plate 7 E, F). This species has a restricted distribution from south of the Zuurberg Mountains coastward to the Coega area, typically occurring on dry stony flats in grassy vegetation. It has an EOO of 601 km² and is known from less than ten locations (von Staden, 2016). Much of this species's habitat has been transformed, especially along the Sundays River (agriculture) and in the area between Gqeberha and Coega (urban and industrial expansion), and it has been assessed as Vulnerable to extinction.

A few scattered individuals (estimated population size of 10 individuals) were recorded in intact Grassridge Bontveld near the southern boundary of the site (Figure 6).



Plate 7: Threatened plant species of conservation concern (SCC) recorded at the site, including: (A, B) the Endangered *Rhombophyllum rhomboideum* (Aizoaceae); (C, D) the Critically Endangered *Corpuscularia lehmannii* (Aizoaceae); the Vulnerable *Selago zeyheri* (E, F). Photos of non-flowering plants in the left column (A, C, E) were taken on site during the survey, while photos of flowering plants in the right column (B, D, F) were taken on previous occasions in the surrounding landscapes (i.e., not on site). Photo credits: B.A. Grobler, (A–C, E); L. Strydom (D); C. Weatherall-Thomas (F).

5.1.4 *Bergeranthus addoensis*

Bergeranthus addoensis (Aizoaceae) is a clump-forming dwarf succulent (Plate 8 A, B). This species occurs between Gqeberha, Kariega, Kirkwood and Darlington Dam in the southern Eastern Cape where it grows on lime-rich sand and clay loams in thicket-biome vegetation. It is assigned a conservation status of Near Threatened due to habitat loss around Nelson Mandela Bay. Subpopulations of *B. addoensis* occurred together with *R. rhomboideum* in the southern portion of the site, with an estimated 100 individuals occurring here.

5.1.5 *Euphorbia meloformis*

Euphorbia meloformis (Euphorbiaceae) is a low-growing stem succulent (Plate 8 C, D). This species occurs between Gqeberha, Grahamstown and Peddie, typically in short open grasslands and openings in succulent thicket in soils overlying limestone. It is assigned a conservation status of Near Threatened, especially due to habitat loss around Nelson Mandela Bay. About 20–30 individuals of this species were recorded in a remnant thicket clump in the northern portion of the site.



Plate 8: Currently non-threatened plant species of conservation concern (SCC) recorded at the site, including: (A, B) the Near Threatened *Bergeranthus addoensis* (Aizoaceae); (C, D) the Near Threatened *Euphorbia meloformis* (Euphorbiaceae). Photo credits: B.A. Grobler.

5.2 Alien Invasive Species

Ten alien invasive plant species were recorded on the site (Table 2). The most abundant species were *Acacia cyclops* and *Acacia saligna*, which were concentrated in highly disturbed areas ('Alien Invasive Vegetation' and 'Rubble', Figure 5; Plate 6). However, saplings of *A. cyclops* have also re-established in areas that were recently cleared of alien invasive vegetation ('Grassridge Bontveld – degraded', Figure 5). Other alien invasive species occurred at lower abundances and were more localized, for example:

- *Agave sisalana* was largely restricted to areas covered with rubble;
- *Cortaderia selloana* was restricted to the banks of the wetland;
- *Lantana camara*, *Nicotiana glauca* and *Xanthium spinosum* occurred sporadically in Grassridge Bontveld;
- *Opuntia ficus-indica* was largely restricted to fragmented Thicket Clumps;
- *Opuntia stricta* and *Solanum elaeagnifolium* occurred sporadically in the Grazing Lawn.

Of these species, *Acacia cyclops* and *A. saligna* are the most significant threat to the local flora and terrestrial biodiversity as they easily invade areas subjected to disturbance, after which they outshade and outcompete indigenous species associated with the shrubland component of Grassridge Bontveld.

Table 2: Alien invasive plant species, listed in terms of the Conservation of Agricultural Resources Act (1983) and National Environmental Management: Biodiversity Act (2004), that were recorded on the site.

Species	Common name	CARA category	NEMBA category	Abundance
<i>Acacia cyclops</i>	Rooikrans	2	1b	Moderate
<i>Acacia saligna</i>	Port Jackson	2	1b	Moderate
<i>Agave sisalana</i>	Sisal	2	2	Low
<i>Cortaderia selloana</i>	Pampas grass	1	1b	Low
<i>Lantana camara</i>	Lantana	1	1b	Low
<i>Nicotiana glauca</i>	Wild tobacco	1	1b	Low
<i>Opuntia ficus-indica</i>	Sweet prickly pear	1	1b	Low
<i>Opuntia stricta</i>	Pest pear of Australia	1	1b	Low
<i>Solanum elaeagnifolium</i>	Silver-leaf bitter apple	1	1b	Low
<i>Xanthium spinosum</i>	Spiny cocklebur	1	1b	Low

6. Site Ecological Importance

The proposed development has an undetermined footprint within a proposed development area of approximately 20 ha, situated in the Wells Estate industrial area. The proposed development area is situated entirely in the Grassridge Bontveld vegetation type (Figure 4; Dayaram et al., 2019; SANBI, 2006–2018, 2018a), which is a non-threatened ecosystem type (SANBI, 2018b, 2019; Skowno et al., 2019). The site contains six terrestrial vegetation units and four other habitat types relevant to flora (Figure 5), with three of these representing relatively undisturbed natural habitat of importance for plants, namely intact Grassridge Bontveld, degraded Bontveld and Thicket Clumps.

Subpopulations of one Critically Endangered, one Endangered and one Vulnerable species were recorded during the field survey for this study (Table 1; Plate 7). All these threatened species occur in intact Grassridge Bontveld, particularly in the southwestern portion of the site (Figure 6). Additionally, subpopulations of two Near Threatened species were located in intact Grassridge Bontveld (associated with threatened species) and a Thicket Clump in the northern portion of the site, respectively (Table 1; Plate 8).

The proposed development area comprises terrestrial habitats of very low, low and medium Site Ecological Importance (SEI; Table 3; Figure 7). The recommended mitigation measure for these SEI classes involve minimisation and restoration of environmental impacts associated with development activities (SANBI, 2020); specific recommendations are as follows:

- **Medium** – development of medium impact acceptable, followed by appropriate restoration activities.
- **Low** – development activities of medium to high impact are acceptable, followed by appropriate restoration activities.
- **Very Low** – development activities of medium to high impact acceptable without the need for restoration activities.

Table 3: Evaluation of Site Ecological Importance (SEI) of vegetation units and other habitats in the study area. See Figure 7 for spatial distribution of SEI.

Habitat	Conservation Importance	Functional Integrity	Receptor Resilience	Site Ecological Importance
Grassridge Bontveld – intact (including embedded thicket clumps)	High Confirmed occurrence of one CR, one EN and one VU species with EOO > 10 km ²	Medium Medium intact area (5–20 ha) of non-threatened ecosystem type	Medium Slow recovery (> 10 yrs) to restore > 75% of species composition	Medium BI = Medium RR = Medium
Grassridge Bontveld – degraded (in 200 m SCC buffer)	High Semi-intact suitable habitat in 200 m SCC buffer	Medium Medium semi-intact area (5–20 ha) of non-threatened ecosystem type	High Relatively quick recovery (5–10 yrs) to restore > 75% of species composition	Low BI = Medium RR = High
Grassridge Bontveld – degraded (outside 200 m SCC buffer)	Low No confirmed or likely SCC populations	Medium Medium semi-intact area (5–20 ha) of non-threatened ecosystem type	High Relatively quick recovery (5–10 yrs) to restore > 75% of species composition	Very Low BI = Medium RR = High
Secondary Grassland (in 200 m SCC buffer)	High Semi-natural habitat in 200 m SCC buffer	Low Historical disturbance to topsoil limits rehabilitation potential	High Relatively quick recovery (5–10 yrs) to restore > 75% of species composition	Low BI = Low RR = High
Secondary Grassland (outside 200 m SCC buffer)	Very Low Not representative of original ecosystem	Low Historical disturbance to topsoil limits rehabilitation potential	High Relatively quick recovery (5–10 yrs) to restore > 75% of species composition	Very Low BI = Very Low RR = High
Thicket Clumps (embedded in grazing lawn, confirmed SCC)	Medium Confirmed occurrence of one NT species	Low Small area (1–5 ha) impacted by overgrazing and alien plant invasion	Low Unlikely to recover fully (< 50% of species and functional) after long period (> 15 yrs)	Medium BI = Medium RR = Medium
Thicket Clumps (embedded in grazing lawn, confirmed SCC)	Low No confirmed or likely SCC populations	Low Small area (1–5 ha) impacted by overgrazing and alien plant invasion	Medium Slow recovery (> 10 yrs) to restore > 75% of species composition	Low BI = Low RR = Medium
Grazing Lawn	Very Low Not representative of original ecosystem	Very Low Very limited habitat connectivity, impacted by overgrazing and alien plant invasion	High As this is not a natural system, its ability to recover to a non-natural state is good	Very Low BI = Very Low RR = Very Low
Wetland	Very Low Not representative of original ecosystem	Very Low Very small area (< 1 ha) with very limited habitat connectivity	High As this is not a natural system, its ability to recover to a non-natural state is good	Very Low BI = Very Low RR = High
Alien Invasive Vegetation	Very Low No natural habitat areas remaining	Very Low Impacted by dense habitat alien plant invasion, low rehabilitation potential	Very High As this is not a natural system, its ability to recover to a non-natural state is good	Very Low BI = Very Low RR = Very High
Rubble, Developed (including dirt track)	Very Low No natural habitat areas remaining	Very Low Several major current negative ecological impacts	Very High As these are transformed areas, their ability to recover to this state is good	Very Low BI = Very Low RR = Very High

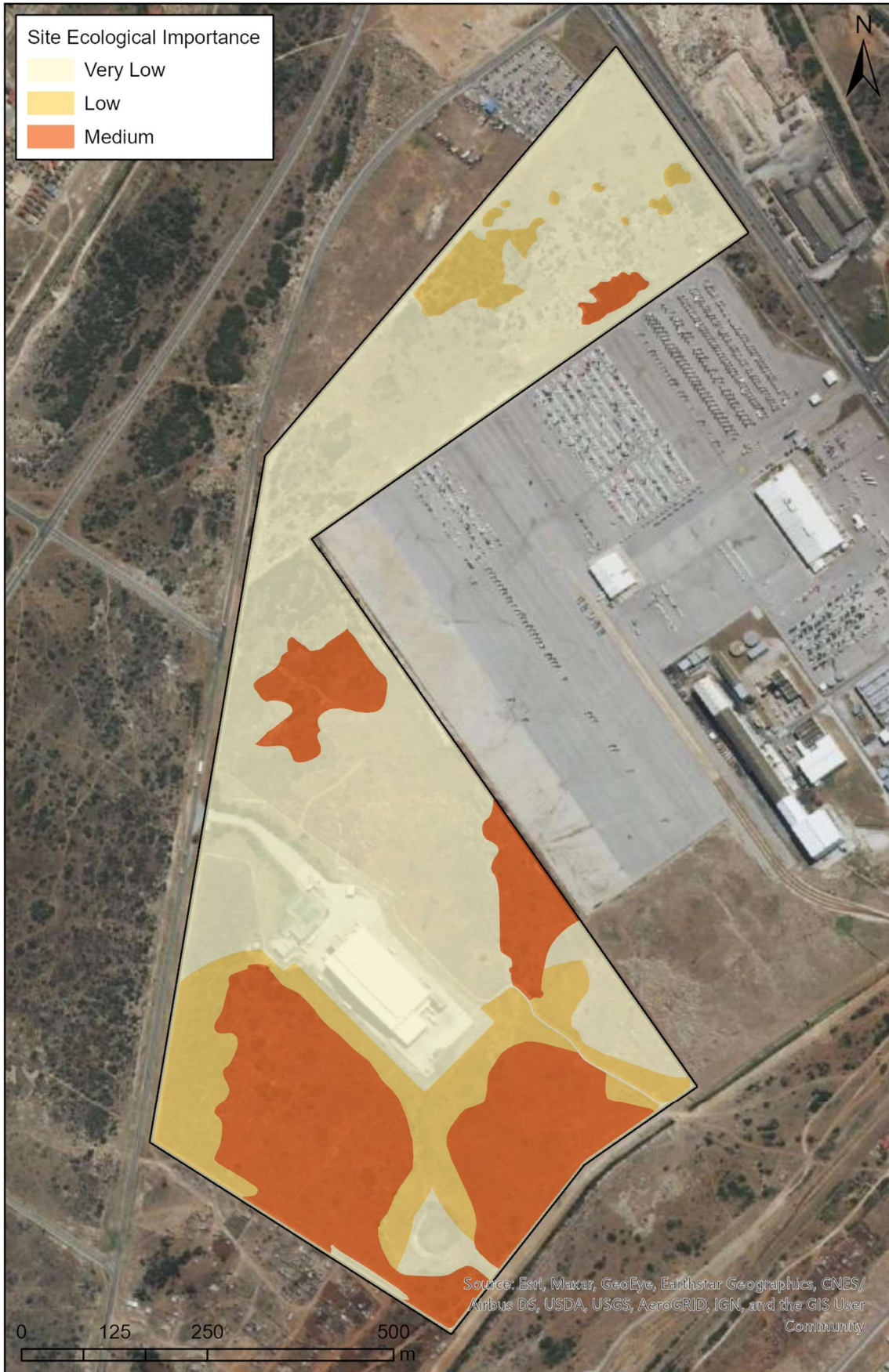


Figure 7: Site Ecological Importance (SEI) of vegetation units and other habitats in the study area. See Table 3 for evaluation of SEI.

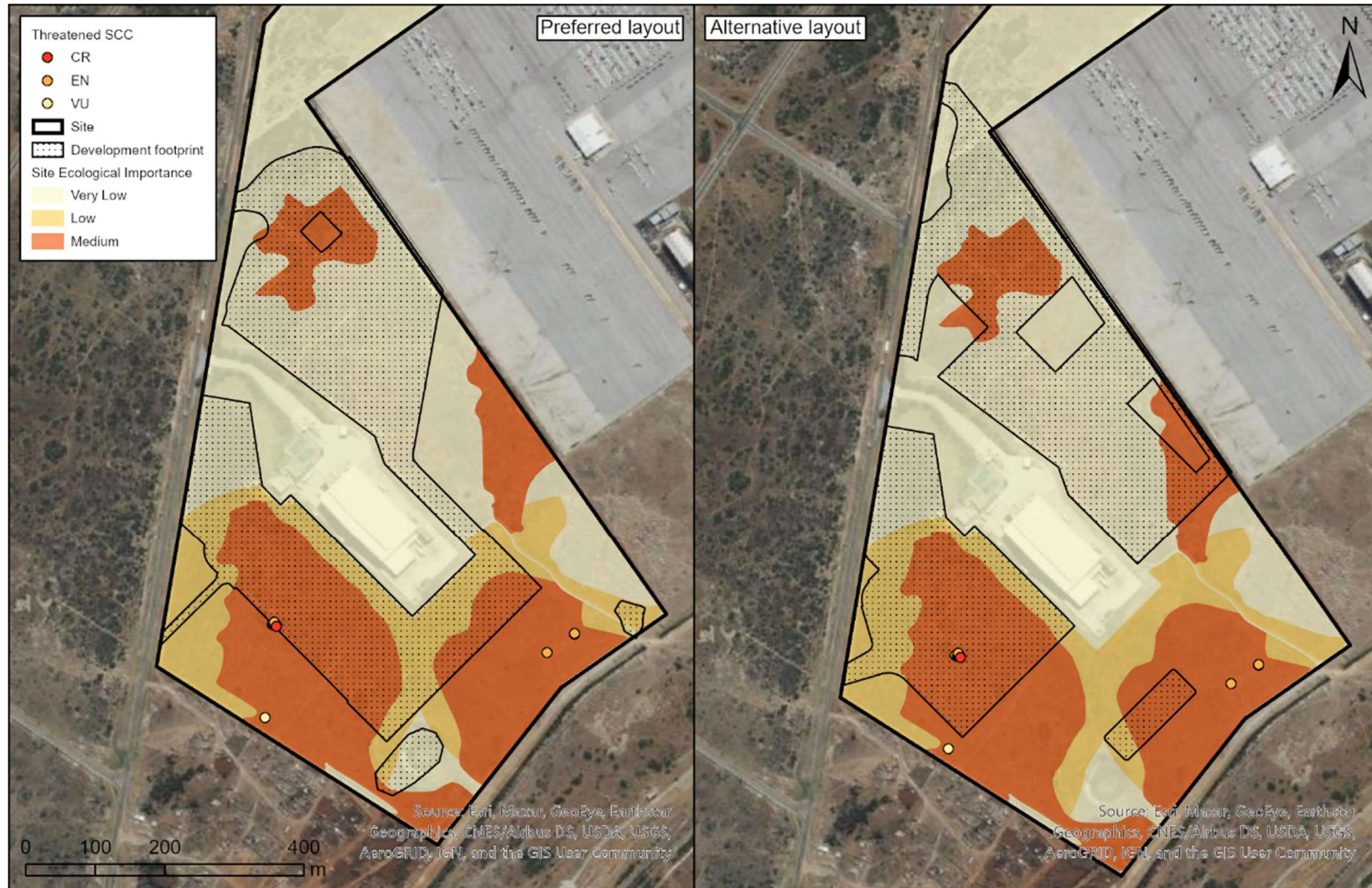


Figure 8: The proposed development footprint (= project area of influence) of the preferred (left) and alternative (right) distribution centre expansion superimposed over the Site Ecological Importance and location of threatened plant species of conservation concern (SCC). Surface areas of development footprints are summarized in Table 4.

7. Impact Identification and Assessment

7.1 Project Alternatives

Approximately 5.79 ha of the site has been developed to accommodate the existing distribution centre. Two layouts for the expansion of the facility with different development footprints are proposed, although both are centred around the existing developed area (Figure 8). The preferred development layout will result in the clearing of 18.85 ha of vegetation, of which 6.31 ha has Medium SEI, 3.30 ha has a Low SEI, and 9.24 ha has a Very Low SEI (Table 4). The alternative layout would require 0.32 ha more vegetation to be cleared, covering a total area of 19.17 ha; this comprises 6.61 ha of Medium SEI, 2.20 ha of Low SEI and 10.36 ha of Very Low SEI.

Table 4: Areal footprint of the preferred and alternative development layout for each category of Site Ecological Importance. See Figure 8 for spatial distribution of alternative development footprints.

Site Ecological Importance	Preferred layout	Alternative layout
Very Low	9.24 ha	10.36 ha
Low	3.30 ha	2.20 ha
Medium	6.31 ha	6.61 ha
Total:	18.85 ha	19.17 ha

Based on the advantages and disadvantages of the development layout alternatives (Figure 8), the preferred layout will likely result in less severe environmental impacts due to the smaller area covered by the proposed footprint in comparison with the alternative layout (Table 5). The advantages/disadvantages associated with the No-Go option (i.e., not proceeding with development) are based on current impacts that are likely to continue in the study area.

Table 5: Summary of advantages and disadvantages of project alternatives.

Prospecting alternative	Advantages	Disadvantages
No-Go alternative	No additional negative impacts on terrestrial biodiversity and plant species.	Continued invasion of indigenous vegetation by alien invasive plants; continued overgrazing/overbrowsing by livestock in the northeastern portion of the site; potential establishment of ecologically inappropriate fire regime.
Preferred layout	Smaller overall footprint concentrated in vegetation with Very Low SEI; marginally smaller footprint in vegetation with Medium SEI.	Destruction of relatively intact Grassridge Bontveld vegetation (Medium SEI) providing habitat to three threatened plant species.
Alternative layout	None.	Larger overall footprint; marginally larger footprint in vegetation with Medium SEI; destruction of relatively intact Grassridge Bontveld vegetation (Medium SEI) providing habitat to three threatened plant species.

7.2 Impact Assessment of Preferred Alternative

The following sections provide details on the anticipated impacts of the proposed development activities, and the assessment thereof is aligned with the requirements for Basic Assessment Reports, as stipulated in GN R326 Appendix 1, 3. (1) of the National Environmental Management Act (No. 107 of 1998) Environmental Impact Assessment Regulations (2014) (as amended in 2017). Impacts are evaluated for the Construction and Operational phase of the preferred development layout only as no Decommissioning phase is anticipated. Should decommissioning occur, then the relevant legislation, guidelines and rehabilitation requirements applicable at that time must be adhered to.

7.2.1 Construction Phase

Direct Impacts

Direct Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by clearing.
Extent	Site-specific
Duration	Permanent
Severity	High
Probability	Definite
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	High Negative
Mitigation	<ul style="list-style-type: none"> ▪ Limit vegetation clearing to areas within the approved development footprints. ▪ Disturbance to intact vegetation must be restricted by demarcating those areas that will be cleared during construction, including access roads, haul roads, and lay-down and stockpile areas. ▪ Lay-down areas should be contained within the planned clearance areas and should not be placed in the surrounding intact vegetation. ▪ All construction personnel active on site must be notified of the importance of avoiding disturbance to intact vegetation outside of demarcated clearance areas. ▪ The No-Go area must be excluded from development and managed for conservation (Figure 9).
Status and Significance (after mitigation)	Medium Negative

Direct Impact	Individuals of plant SCC (including three threatened species) will be negatively affected by destruction or damage caused during vegetation clearing.
Extent	Site-specific
Duration	Permanent
Severity	High
Probability	Definite
Degree of Confidence	High
Reversibility	Irreversible
Irreplaceable Loss of Resources	Irreplaceable
Status and Significance (without mitigation)	High Negative

Mitigation	<ul style="list-style-type: none"> ▪ Permits for the destruction of protected plant species (SCC and <i>Sideroxylon inerme</i>) must be obtained from the relevant authorities. ▪ Permits for the removal and translocation of plant SCCs should be obtained from the appropriate authorities. ▪ Prior to vegetation clearing, demarcated development footprints must be surveyed for threatened plant SCC by an Environmental Control Officer or similarly qualified person and a search-and-rescue operation undertaken for species that are suitable for translocation – this includes the succulent species <i>Bergeranthus addoensis</i>, <i>Corpuscularia lehmannii</i> and <i>Rhombophyllum rhomboideum</i>. ▪ Rescued SCCs should be translocated to the No-Go area where specific microhabitats of the translocated species; areas in the southeast of the site where these SCC occur should suffice for this purpose (Figure 9). ▪ Care must be taken to not disturb any individuals of plant SCC that is not to be translocated. ▪ Translocation should occur during cooler and wetter periods of the year (e.g., autumn or winter) to minimize stress on the plants. ▪ Plants must be watered once every two weeks for the first two months following translocation to enhance their survival potential. ▪ Survival of all translocated plants must be monitored and recorded monthly for the first year following translocation; these results must be reported to the authors of this report (which are to be shared with the South African National Biodiversity Institute).
Status and Significance (after mitigation)	Medium Negative

Direct Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be positively affected by destruction of alien invasive plants (AIP) during vegetation clearing.
Extent	Site-specific
Duration	Permanent
Severity	Low
Probability	High
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	Low Positive
Mitigation	<ul style="list-style-type: none"> ▪ An AIP management plan must be developed for the site and implemented during the Construction and Operational phases of the project. This plan should aim to eradicate and control the spread of AIPs within the portions of the site that are not proposed for development. ▪ Any AIP material removed during clearing of the development footprints must be removed from the site and destroyed or moved to a registered landfill site so that reestablishment on site is avoided. ▪ Follow-up clearing for AIPs within the intact vegetation should take place on a yearly basis.
Status and Significance (after mitigation)	Medium Positive

Indirect Impacts

Indirect Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by increased soil erosion.
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Extent	Site-specific
Duration	Long term
Severity	Medium
Probability	Medium
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	High Negative
Mitigation	<ul style="list-style-type: none"> ▪ Disturbance to intact vegetation must be restricted by demarcating those areas that will be cleared during construction, including access roads, haul roads, lay-down and stockpile areas, personnel rest areas and site offices. ▪ Wind erosion should be limited by watering cleared footprints as soon as clearing has taken place and by replanting indigenous vegetation once construction is completed. ▪ Existing vehicle tracks should be used as far as possible, and no new roads/tracks should be created in the portions of the site not proposed for development. ▪ A stormwater management plan must be designed and implemented for the Construction and Operational phases of the project.
Status and Significance (after mitigation)	Low Negative

Indirect Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by the establishment of an ecologically inappropriate fire regime.
Extent	Local
Duration	Medium-term (10–15 years)
Severity	High
Probability	Low
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	Medium Negative
Mitigation	<ul style="list-style-type: none"> ▪ No open fires must be allowed on site.
Status and Significance (after mitigation)	Neutral

Indirect Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by increased alien plant invasion due to disturbance.
Extent	Local
Duration	Long-term
Severity	High
Probability	Medium
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	High Negative

Mitigation	<ul style="list-style-type: none"> ▪ An AIP management plan, which aims to eradicate and control the spread of AIPs, must be developed for the site and implemented during the Construction and Operational phases of the project. ▪ Disturbance to intact vegetation must be restricted by demarcating those areas that will be cleared during construction, including access roads, haul roads, and lay-down and stockpile areas. ▪ Areas disturbed during construction must be inspected for establishing AIPs on a regular basis, and these should be removed and destroyed or moved to a registered landfill site as soon as possible before setting seed to limit their spread. ▪ Follow-up clearing of AIPs should take place on a yearly basis.
Status and Significance (after mitigation)	Low Negative

Indirect Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by plant poaching.
Extent	Local
Duration	Short-term
Severity	Medium
Probability	Medium
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	Medium Negative
Mitigation	<ul style="list-style-type: none"> ▪ Access to areas of intact vegetation, particularly in the No-Go area, should be restricted. ▪ Construction workers must be notified of the prohibition of poaching plants and a fine system implemented.
Status and Significance (after mitigation)	Neutral

Cumulative Impacts

Cumulative Impact	The regional vegetation variant (Grassridge Bontveld) and its component plant SCC populations will be negatively affected by loss of natural vegetation cover (through direct damage to plants, increased wind erosion, increased plant invasion). Vegetation clearing on site will contribute to transformation of Grassridge Bontveld in the surrounding landscape, which further includes past and future vegetation transformation on adjacent properties.
Extent	Regional
Duration	Long-term
Severity	High
Probability	Medium
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	High Negative
Mitigation	<ul style="list-style-type: none"> ▪ The No-Go area should be set aside and managed for conservation (Figure 9). ▪ The No-Go area should be clearly demarcated prior to any construction personnel, machinery or vehicles entering the site, and no clearing should be permitted within these areas.

	<ul style="list-style-type: none"> ▪ Disturbance to intact vegetation should be limited by demarcating those areas that will be cleared during construction, including access roads, haul roads, and lay-down and stockpile areas. ▪ Lay-down areas should be contained within the planned clearance areas and should not be placed in the surrounding intact vegetation. ▪ All construction personnel active on site must be notified of the importance of avoiding disturbance to intact vegetation outside of demarcated clearance areas.
Status and Significance (after mitigation)	Medium Negative

Cumulative Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by further impairment of ecological connectivity.
Extent	Site-specific
Duration	Long-term
Severity	Low
Probability	High
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	Medium Negative
Mitigation	<ul style="list-style-type: none"> ▪ Clearing of vegetation must be restricted to approved development footprints. ▪ The No-Go area must be set aside and managed for conservation to maintain connectivity within this patch. ▪ Existing major roads should be used as transport corridors to and from the site.
Status and Significance (after mitigation)	Low Negative

7.2.2 Operational Phase

Direct Impacts

Direct Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by infrastructure maintenance.
Extent	Site-specific
Duration	Long-term
Severity	Low
Probability	High
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	Medium Negative
Mitigation	<ul style="list-style-type: none"> ▪ Any activity associated with maintenance should take place in areas where vegetation has already been cleared and must not encroach on intact vegetation, especially in the No-Go area. ▪ Mowing/brushcutting of vegetation along roads/fire breaks should be minimal. Mowed strips must not exceed 2 m (average height of vegetation).

	<ul style="list-style-type: none"> Care should be taken when fuel for maintenance equipment is used/stored to avoid spillage and contaminating soil.
Status and Significance (after mitigation)	Low Negative

Indirect Impacts

Indirect Impact	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by disruption of pollinator networks through increased vehicular traffic around the site.
Extent	Local
Duration	Long-term
Severity	Low
Probability	Medium
Degree of Confidence	High
Reversibility	Partially reversible
Irreplaceable Loss of Resources	Partially replaceable
Status and Significance (without mitigation)	Medium Negative
Mitigation	<ul style="list-style-type: none"> Existing major roads should be used as transport corridors to and from the site. Speed limits for vehicles (< 40 km/h) must be implemented on site.
Status and Significance (after mitigation)	Low Negative



8. Conclusion

Based on the project information, potential impacts of the proposed development activities have been identified and are summarised in Table 5 below. The most significant impacts relate to the direct and cumulative loss of Grassridge Bontveld vegetation and its associated SCC during the construction phase. In general, the proposed development is likely to have moderate potential to negatively impact on terrestrial biodiversity and plant SCC in the study area as most potential impacts were evaluated to be of Low and Medium significance following the implementation of appropriate mitigation measures. The implementation of an AIP management plan, which is recommended as a mitigation measure, will further have a positive impact on the terrestrial biodiversity and plant species on site. Therefore, it is the terrestrial biodiversity and plant species specialists' opinion that the development project may be approved, but only if mitigations are stringently implemented and this is verified by an appointed Environmental Control Officer or similarly qualified person.

Table 6: Summary of Potential impacts of the proposed development. The significance of impacts is indicated with and without appropriate mitigation measures.

Project Phase	Impact type	Impact	Significance	
			Without mitigation	With mitigation
Construction:	Direct:	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by clearing.	High Negative	Medium Negative
		Individuals of plant SCC (including three threatened species) will be negatively affected by destruction or damage caused during vegetation clearing.	High Negative	Medium Negative
		Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be positively affected by destruction of alien invasive plants (AIP) during vegetation clearing.	Low Positive	Medium Positive
	Indirect:	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by increased soil erosion.	High Negative	Low Negative
		Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by the establishment of an ecologically inappropriate fire regime.	Medium Negative	Neutral
		Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by increased alien plant invasion due to disturbance.	High Negative	Medium Positive
		Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by plant poaching.	Medium Negative	Neutral
	Cumulative:	The regional vegetation variant (Grassridge Bontveld) and its component plant SCC populations will be negatively affected by loss of natural vegetation cover (through direct damage to plants, increased wind erosion, increased plant invasion). Vegetation clearing on site will contribute to transformation of Grassridge Bontveld in the surrounding landscape, which further includes past and future vegetation transformation on adjacent properties.	High Negative	Medium Negative
		Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by further impairment of ecological connectivity.	Medium Negative	Low Negative
Operational:	Direct:	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by infrastructure maintenance.	Medium Negative	Low Negative
	Indirect:	Indigenous vegetation (Grassridge Bontveld) that provides habitat to plant SCC (including three threatened species) will be negatively affected by disruption of pollinator networks through increased vehicular traffic around the site.	Medium Negative	Low Negative



Figure 9: The assessed development footprint and No-Go area to be set aside for conservation at the site. Also indicated is the general area into which rescued plant SCC must be translocated.



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