Botanical Impact Statement

Proposed Hartenbos WWTW PV solar plant, Mossel Bay

13 October 2023

Author details

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Mark Berry is an independent botanical specialist with over 25 years of experience mainly in the Western Cape, but also in the adjacent provinces, Free State and KwaZulu-Natal. Mark is also experienced in undertaking/compiling Environmental Impact Assessments (EIA's), Environmental Management Programmes, environmental audits, land use surveys, etc. CV is available upon request.

Citation of report

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Declaration of Independence

I Mark Gerald Berry, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
  - **other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity**; or
  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- in terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

Signature of the Specialist:	
Name of Company:	MB Botanical Surveys
Date:	13 October 2023

Table of Contents

1. Introduction

Proposed development and area assessed

The applicant (Mossel Bay Municipality) wishes to establish a PV solar plant next to the Hartenbos wastewater treatment works (WWTW) on Portion 101 of Farm Hartenbosch 217. The site is located on a gentle slope, 1.5 km north of Hartenbos (**Figure 1-1**). Two layout options are proposed for the solar plant (**Figure 1-2**). Apart from the PV solar array, there will also be a substation building, a solar MV station, a step-up transformer, battery container, a power conversion system, generator and a generator control panel. Most of the latter will be accommodated inside the existing WWTW area. The development footprint is estimated at 6.1 ha.

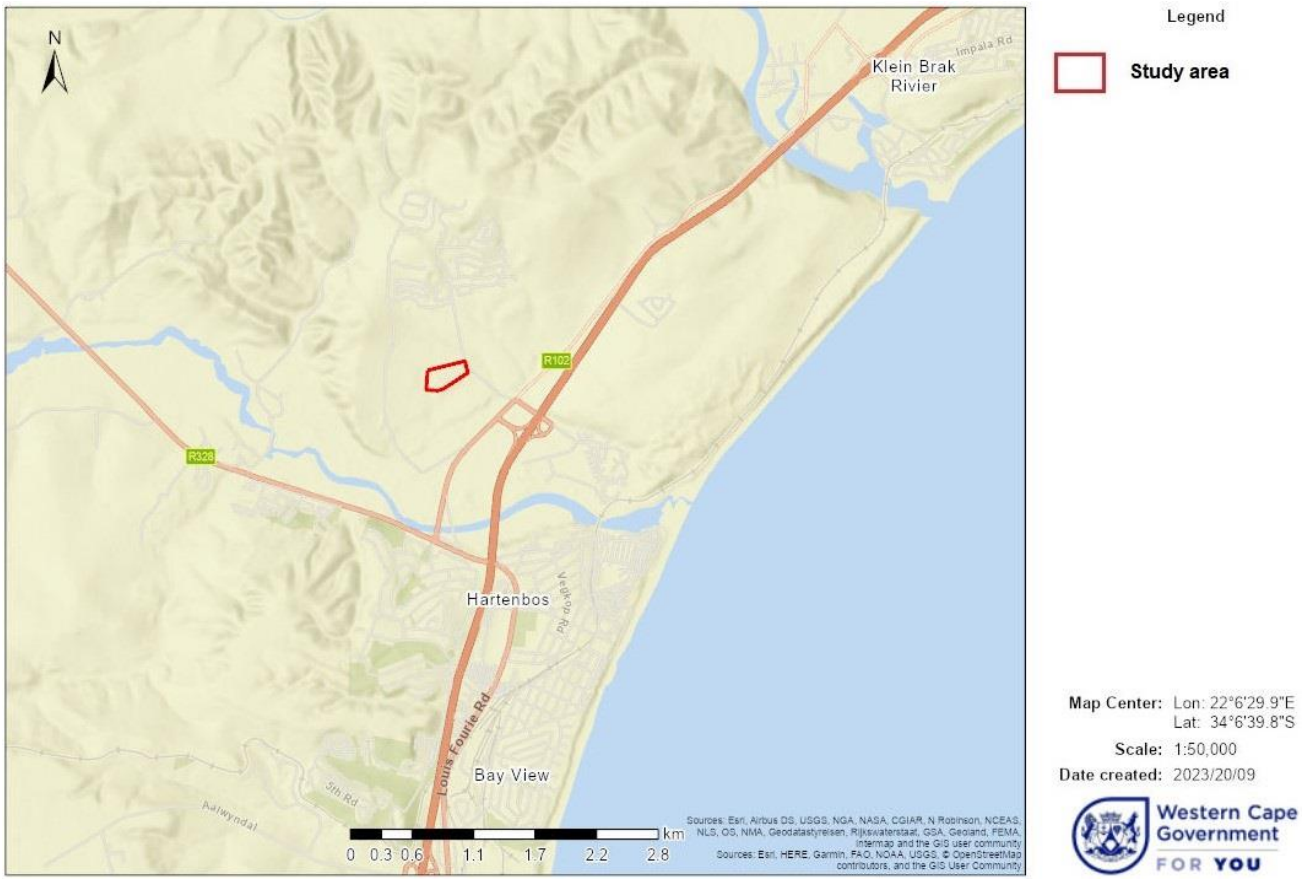

Figure 1-1: Location of the site north of Hartenbos, Mossel Bay area.

According to the Screening Report, generated by the EAP (Sharples Environmental Services) on 21 August 2023, the site has been mapped as Medium sensitive in the plant species theme. With regards to the terrestrial biodiversity theme, it has been mapped as Very High sensitive. The Very High sensitivity is ascribed to the possible presence of a threatened ecosystem and an ecological support area (ESA). As a result, MB Botanical Surveys was contracted to undertake a botanical survey of the site.

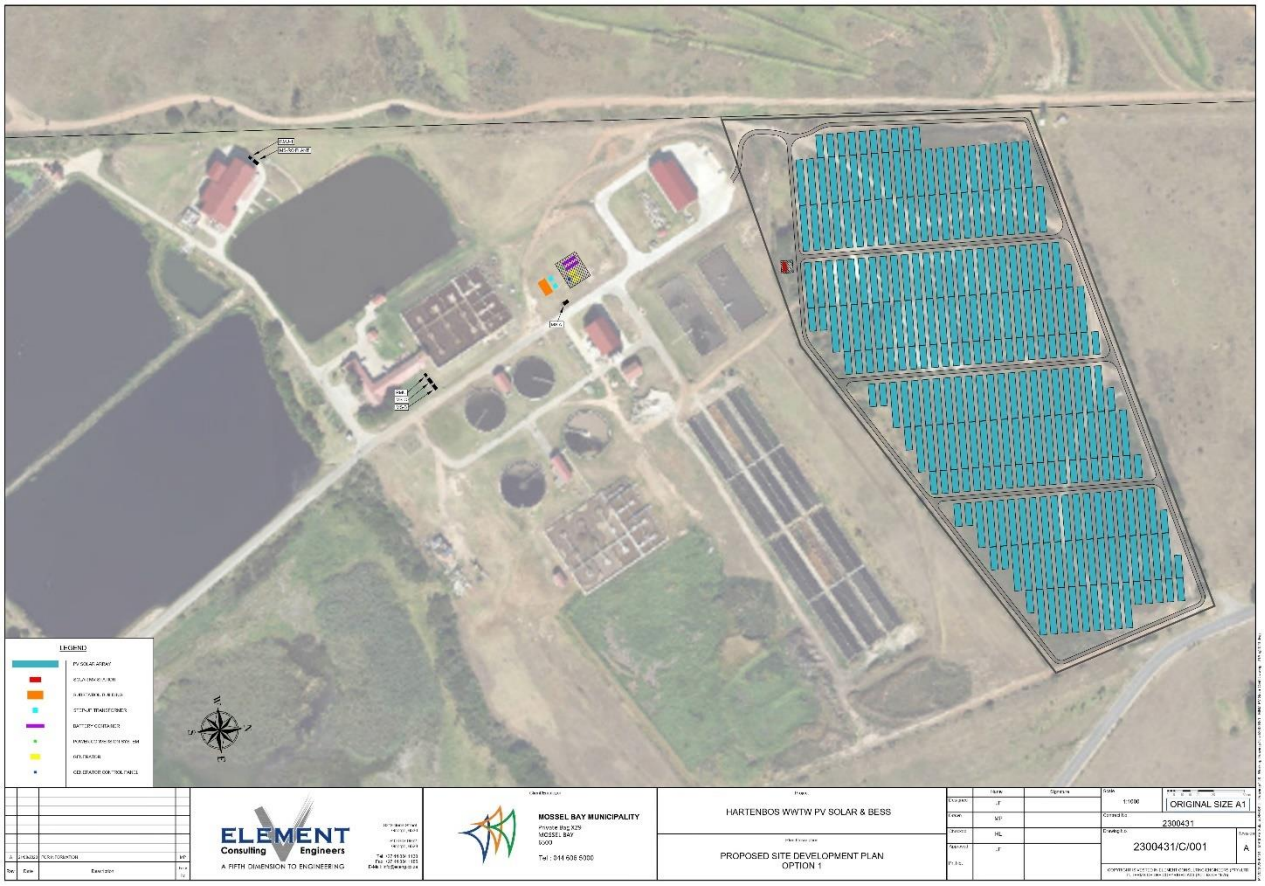

Figure 1-2: Proposed layout options.

Terms of Reference

The terms of reference agreed upon for this botanical study include:

- Adhere to the EAP's terms of reference for the study;
- Identify and describe biodiversity patterns at a community and ecosystem level (main vegetation type, plant communities and threatened ecosystems), at species level (Species of Conservation Concern and protected species) and in terms of significant landscape features;
- Describe the sensitivity of the site and its immediate surroundings;
- Map or describe the presence of invasive alien plants;
- Review the relevant biodiversity plans compiled in terms of the National Environmental Management Biodiversity Act (Act 10 of 2004);
- Make recommendations with regards to the protection/management of biodiversity; and
- Adhere to the NEMA and CapeNature protocols for biodiversity assessments.

Limitations and Assumptions

The following limitations and assumptions apply to the study:

- Fieldwork was carried out in spring, considered to be a suitable time for many flowering species in the Southern Cape. However, plants that only flower at other times of the year (e.g. late spring to summer), such as certain bulbs (Iridaceae and Orchidaceae), may have been missed. The overall confidence in the completeness and accuracy of the botanical findings is however considered to be good. Given the disturbed state of the site, no further surveys are deemed necessary.

Use of this report

This report reflects the professional judgment of its author(s). The information and recommendations presented in this report are specific to the project and site at hand and do not extend to future developments or neighbouring sites. Use of this report is therefore restricted.

2. Site Sensitivity Verification

The Department of Environmental Affairs online Environmental Screening Tool indicates that the plant species theme is of Medium sensitivity for the site. **Table 2-1** lists the threatened species and their sensitivity from the Screening Report. The Screening Report further indicates that the terrestrial biodiversity theme is of Very High sensitivity for the site. This rating is ascribed to the possible presence of a critically endangered ecosystem (i.e. Mossel Bay Shale Renosterveld) and an ecological support area (ESA).

Table 2-1: Threatened plant species as listed in the Screening Report. The names of sensitive species are withheld.

Sensitivity	Feature(s)
Medium	*Ruschia leptocalyx*
Medium	*Selago ramosissima*
Medium	*Hermannia lavandulifolia*
Medium	Sensitive Species 633
Medium	Sensitive Species 268
Medium	*Marsilea schelpeana*
Medium	Sensitive Species 1024
Medium	*Relhania garnotii*
Medium	*Polygala pubiflora*
Medium	Sensitive Species 980
Medium	Sensitive Species 516
Medium	Sensitive Species 800
Medium	Sensitive Species 763
Medium	*Diosma passerinoides*
Medium	*Agathosma microcarpa*

In circumstances where the *status quo* assessment proves the contrary to the above (i.e. where the site is deemed to be of Low sensitivity in respect of both themes, the GN320 of 2020 requires that a Terrestrial Biodiversity Compliance Statement is submitted as set out by the National Environmental Management Act (NEMA) (Act No. 107 of 1998) Regulations of 2020 (as amended). If the above is confirmed, then a biodiversity assessment will be required for development proposals.

3. Methodology

The methodology used in this terrestrial biodiversity assessment, including a desktop background assessment and one site visit, is outlined in the subsections below.

Desktop assessment

A brief review of online (e.g. Google Earth, iNaturalist.org, posa.sanbi.org and CapeFarmMapper) and desktop resources (available literature and reports) was undertaken to determine the nature of the site, the expected vegetation type(s), the presence of natural vegetation remnants and species of conservation concern (SCC), hydrological features, and the significance of the site in terms of biodiversity planning.

Site survey

A botanical survey of the site was undertaken on 27 September 2023 by the author. A qualitative assessment of the type and condition of affected vegetation on site, disturbances and presence of alien species, SCC and protected tree species was carried out. The path walked during the survey is shown on **Figure 3-1**. Plant species not identified in the field, were collected and/or photographed and identified at the office and Compton (Kirstenbosch) Herbarium. A few of the identifications were confirmed on iNaturalist. The 2018 South African Vegetation Map and the latest floristic taxonomic literature and reference books were used for the purpose of this specialist study. Any plants classified as rare or threatened in the Red List of South African Plants online database[1] are highlighted. The assessment follows the relevant national guidelines/protocols for biodiversity assessments as listed in the Government Gazette No. 43110 on 20 March 2020.

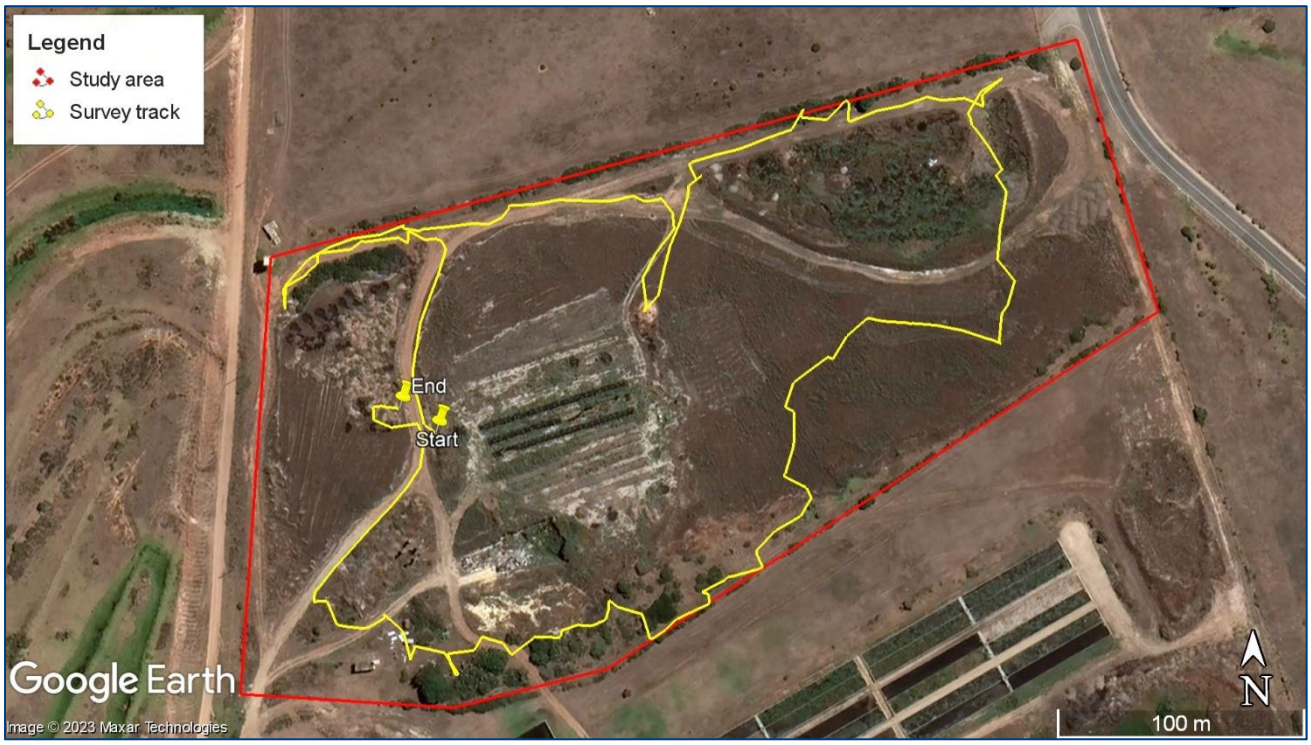

Figure 3-1: Satellite photo showing the survey track on the site.

The following information was recorded during the site visit:

1. The condition of the vegetation. Is the vegetation either disturbed or degraded? A disturbed or degraded area could range from agricultural fields (fallow land), or areas previously disturbed by mining activities, to an area that has been severely eroded or degraded as a result of bad land management or alien infestation.

[1] Threatened Species Programme | SANBI Red List of South African Plants

2. Species diversity (alpha diversity). This refers to the numbers of different indigenous plant species occurring on site.
3. Species of Conservation Concern (SCC), endemics, as well as protected tree species occurring on site. This would include near threatened, rare, vulnerable, endangered or critically endangered species. SCC and protected tree species were mapped using Easy GPS v2.5 software on an iPhone. Accuracy is given as ±4 m.
4. Identification of the vegetation type(s) and communities (if discernible) on the site. This would include trying to establish the distribution of a vegetation type and whether or not it is vulnerable, endangered or critically endangered.
5. Connectivity with (or isolation from) nearby natural vegetation.

Data analysis

Site ecological importance (SEI) of the affected (receptor) area has been determined by applying the criteria described in the Species Environmental Assessment Guideline (SANBI, 2020). See **Annexure 1** for a description of the SEI methodology.

4. Literature Study

A desktop literature review was undertaken during the biodiversity assessment using both online resources and existing maps and reports. A summary of the most relevant information to this assessment is presented below. Some of the information was ground truthed during the site surveys.

Location, topography & land use

The site is located on a gentle south-facing slope (25-35 masl), 1.5 km north of Hartenbos (**Figure 4-1**). There are no notable topographical features on or around the site. It has until recently been utilised for spoiling (dumping) purposed and is mainly covered by weeds (**Figure 4-2**). The surrounding area comprises pastures, with the Hartenbos WWTW located directly to the south of the site, and a nursery to the north.

Hydrology

According to Cape Farm Mapper, a small non-perennial watercourse touches the south-western corner of the site (**Figure 4-1**). There are also two natural NFEPA (National Freshwater Ecosystem Priority Area) wetlands (channelled and unchannelled valley-bottom wetlands) located ±200 m away to the south and east of the site. These again connect with an estuarine wetland associated with the Hartenbos River.

Figure 4-1: Combined topography and hydrology map.

Figure 4-2: One of a few soil stockpiles on site.

Climate

The mean annual rainfall for the site is 377 mm (as per Cape Farm Mapper climatic data for 1950 to 2000). The peak rainfall periods are the months of March (autumn) and October (spring), while the driest periods are the winter and summer months, i.e. bimodal rainfall regime. The study area lies in the transition zone between the winter and summer rainfall regions. Mean monthly maximum and minimum temperatures are 23.7°C and 10.2°C for January/February and July/August, respectively (as per Cape Farm Mapper data). The Köppen-Geiger climate classification for the Hartenbos area is BSh (arid, steppe, hot).

Geology

According to the 3422 AA Mossel Bay 1:50 000 geological map, the site is underlain by Uitenhage Group sediments (Hartenbos Formation) of Cretaceous age. The Hartenbos Formation comprises sand, silt and clay, and typically supports shale renosterveld in the area. This unit is well exposed in road cutting south of the Hartenbos River (Viljoen, 1993).

Biodiversity Planning Context

According to the 2018 Vegetation Map of South Africa, the site is located inside Mossel Bay Shale Renosterveld (**Figure 4-3**). The latter occurs on the coastal plains (undulating hills) and valleys from the Kruisrivier near Riversdale to Klein Brak River, centred on the Gouritz River (Mucina, 2006). The renosterveld is described as a medium dense, medium tall cupressoid-leaved shrubland dominated by renosterbos (*Elytropappus rhinocerotis*) (Mucina, 2006). Thicket patches and thicket elements are also common. Apart from a few pioneer renosterveld species recorded in the regrowth, a few thicket elements were also noted.

Due to its transformed state, Mossel Bay Shale Renosterveld is currently listed as Critically Endangered in the Revised National List of Threatened Ecosystems (DEA, 2022). Only about 38% of Mossel Bay Shale Renosterveld is still left, while 0.2% is currently protected[2]. A large percentage of it has been transformed in the past for pastures and croplands (Mucina, 2006). The ecosystem is also degraded by erosion and overgrazing (Mucina, 2006). The unit is narrowly distributed with high rates of habitat loss in the past 30 years, placing it at risk of collapse[3]. Being part of the Fynbos Biome, Mossel Bay Shale Renosterveld is maintained by a regular fire regime. Unfortunately, landscape fragmentation is disrupting

[2] Ecosystem Detail - Biodiversity BGIS (sanbi.org)
[3] Ecosystem Detail - Biodiversity BGIS (sanbi.org)

this 'maintenance' requirement, often leading to localised species loss and bush encroachment or alien infestation (pers. obs.).

Figure 4-3: Extract of the 2018 SA Vegetation map.

The site falls inside the Mossel Bay biodiversity network (**Figure 4-4**). Nearly the entire site has been mapped as a terrestrial ecological support area (ESA). The site falls inside an ecological corridor linking the respective estuaries of the Hartenbos and Klein Brak Rivers. There is also a second corridor along the coastline linking the two estuaries. Reasons for the importance of the mapped ESA include the presence of a threatened vegetation type albeit the wrong one (Groot Brak Dune Strandveld) and threatened vertebrate habitat (bontebok). The closest protected area appears to be the Diosma Reserve, a contract nature reserve located 9 km away in Heiderand to the south of the site. It aims to protect *Diosma aristata*, a critically endangered local endemic species.

CBA's are defined as areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure (Pool-Stanvliet, 2017). These sites are selected for meeting national targets for species, habitats and ecological processes (Pool-Stanvliet, 2017). Many of these areas support known occurrences of threatened plant species, and/or may be essential elements of designated ecological corridors. Loss of designated CBA's is therefore not recommended. ESA's, on the other hand, are supporting zones required to prevent the degradation of CBA's and Protected Areas.

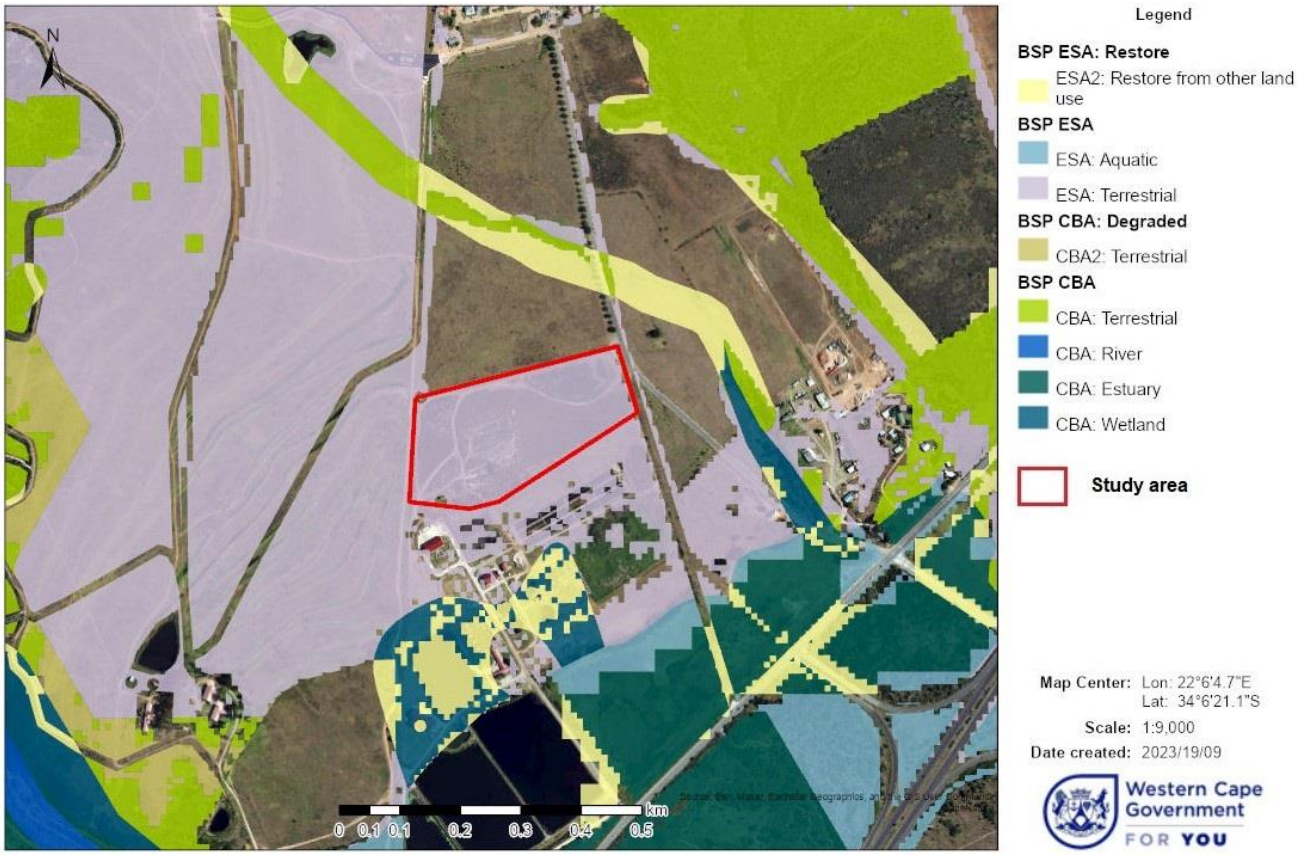

Figure 4-4: Extract of the Western Cape biodiversity network map.

5. Results

In order to fulfil in the requirements of the terrestrial biodiversity and plant species protocols, this section describes the vegetation (terrestrial biodiversity) and plant species encountered in two subsections. In the plant species subsection specific reference is made, among other, to species of conservation concern (SCC) and protected tree species.

Terrestrial biodiversity (vegetation)

The vegetation covering the site can be described as an alien herbland, with a few small patches of thicket in the north-western corner and on the southern side (**Figure 5-1**). Structurally, it can be classified as a low (0.3-1.0 m) closed shrubland following Campbell's classification (Campbell, 1981). The dominant species are all herbaceous weeds and grasses such as *Chenopodium album*, *Pseudognaphalium undulatum* and *Cenchrus clandestinus*. Due to the severity of past land-use activities (agriculture and dumping), it is highly unlikely that it will return to natural vegetation. The thicket patches, which are also degraded, include typical thicket species such as *Aloe ferox, Sideroxylon inerme, Schotia afra, Searsia pterota, Euclea undulata* and *Carissa bispinosa.* Disturbances, such as past farming activities, extensive dumping, farm tracks and alien infestation, were

noted. There is also a seemingly abandoned dwelling in the south-western corner of the site. **Figures 5-2** to **5-6** illustrate the current state of the vegetation on site.

Figure 5-1: Botanical attributes of the site. The untoned area has been transformed.

Figure 5-2: *Chenopodium album* covered eastern part of the site.

Figure 5-3: Disturbed area on site surrounded by alien shrubs (*Chenopodium album*).

Figure 5-4: Thicket path with *Aloe ferox* in the north-western corner of the site.

Figure 5-5: One of the thicket patches on the southern side of the site, overlooking the WWTW.

Figure 5-6: Abandoned dwelling in the south-western corner of the site.

Plant species

The following indigenous shrub species were recorded inside the herbland, namely *Pseudognaphalium undulatum* (dominant), *Nidorella ivifolia, Osteospermum moniliferum, Aspalathus cf nigra, Ruschia tenella, Carpobrotus acinaciformis, Drosanthemum floribundum, Mesembryanthemum aitonis, Aizoon portulacaceum, Pelargonium alchemilloides, Leonotis ocymifolia, Anisodontea cf scabrosa, Asparagus cf multiflorus, Gomphocarpus fruticosus* and *Anginon swellendamense*. The majority of these species are pioneers that thrive in disturbed areas. Hemicryptophytes and bulbs recorded include *Phragmites australis, Oxalis pes-caprae, Albuca canadensis* and *Moraea polyanthos*. The thicket patches and immediate surrounding areas are populated by *Aloe ferox, Sideroxylon inerme, Schotia afra, Indigofera nigromontana, Searsia pterota, S. pallens, S. lucida, Euclea undulata, Scolopia zeyheri, Lycium tenue, Carissa bispinosa, Azima tetracantha, Grewia occidentalis, Cynanchum viminale, C. obtusifolium, Hermannia lavandulifolia, Carpobrotus muirii* and *C. edulis*. **Figure 5-7** shows a few of the indigenous species.

Figure 5-7: A few indigenous species recorded on site, with *Drosanthemum floribundum* (top left), *Carpobrotus muirii* (top right), *Hermannia lavandulifolia* (bottom left) and *Searsia pterota* (bottom right).

Alien species are abundant throughout the site, including *Acacia cyclops* (rooikrans, 1b), *Senna multiglandulosa* (buttercup bush), *Helminthotheca echioides* (ox tongue), *Sonchus oleraceus* (sowthistle), *Cirsium vulgare* (spear thistle, 1b), *Datura stramonium* (thorn apple, 1b), *Ricinus communis* (castor-oil plant, 2), *Trifolium repens* (white clover), *Myoporum laetum* (New Zealand manitoka, 3), *M. insulare* (manitoka, 3), *Lantana camara* (lantana, 1b), *Opuntia ficus-indica* (prickly pear, 1b), *Agave americana* (garingboom, 3), *Yucca aloifolia* (yucca), *Phytolacca octandra* (inkberry, 1b), *Chenopodium album* (goosefoot), *Plantago lanceolata* (buckhorn plantain), *Erodium moschatum* (musk heron's bill), *Malva parviflora* (cheese weed), *Malva arborea* (tree mallow), *Sida poeppigiana, Cannabis sativa* (dagga), *Hirschfeldia incana* (Mediterranean mustard), *Lysimachia foemina* (blue pimpernel), *Bromus catharticus* (rescue grass) and *Cenchrus clandestinus* (kikuyu, category 1b in protected areas) (**Figure 5-8**). *Chenopodium album* (dense stands) and *Cenchrus clandestinus* are dominants.

Figure 5-8: A few alien species recorded on site, with *Malva arborea* (top left), *Myoporum laetum* (top right), *Opuntia ficus-indica* (bottom left) and *Lantana camara* (bottom right).

As indicated above, nearly half of these species are Categories 1b, 2 and 3 invaders in the Western Cape. In terms of the National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004) Alien and Invasive Species List (2016), Category 1b invasive species require compulsory control as part of an invasive species control programme.

Further in terms of the above Act, the harbouring of castor-oil plant (Category 2 invader) on a property is prohibited without a permit. Its fruits are extremely toxic to humans and animals, with just one fruit being potentially fatal (Bromilow, 2010). The high presence of aliens on the site is indicative of past disturbances (agricultural activities and dumping).

Two Species of Conservation Concern (SCC) were recorded on site, namely *Hermannia lavandulifolia* (VU) and *Carpobrotus muirii* (NR). The latter is still frequently encountered in the coastal strip between De Hoop and Mossel Bay, while *Hermannia lavandulifolia* is very common in the Mossel Bay area. The latter's listing as a threatened species is questionable. All the other recorded species are widespread and common in the region. Floristic association with Mossel Bay Shale Renosterveld is reasonable with a few important taxa recorded, namely *Carpobrotus acinaciformis Aloe ferox, Searsia pterota* and *Carissa bispinosa*. A single *Sideroxylon inerme* (milkwood), a protected tree species in terms of the National Forests Act (Act 84 of 1998), was recorded in one of the thicket patches on the southern side of the site. The removal of milkwoods requires a permit from the Department of Forestry.

Site Ecological Importance

In order to demonstrate the biodiversity sensitivity of the site, a site ecological importance (SEI) map was prepared (**Figure 5-9**). This map considers the biodiversity importance of the receptor area and its resilience to impacts. The receptor area is described as the affected habitat (transformed area and thicket patches in this instance), which may accommodate certain SCC. A Very Low SEI value was allocated to the site due to its transformed state, its relative isolation from large areas of natural vegetation and the small footprint (<0.5 ha) of the thicket patches.

6. Potential Impacts

Terrestrial biodiversity (vegetation)

It is the author's opinion that the site is significantly transformed/degraded, with the chance of rehabilitation slim. Due to the highly transformed state of the site and a high presence of invasive aliens, the impact posed by the development (both layout options) on terrestrial biodiversity is expected to be of low significance. Although the proposed development encroaches significantly onto a mapped ESA, it is not expected to impact on the functionality of the greater biodiversity network for the reason(s) mentioned above.

The thicket patches amount to a total area of 0.18 ha, which may imply that Activity 12 of Listing Notice 3 of the relevant NEMA EIA regulations (as amended on 7 April 2017) will be triggered. In terms of the above regulations, the "clearance of an area of 300 m^2 or more of indigenous vegetation within any critically endangered or endangered ecosystem listed in terms of Section 52 of the NEMBA" is a listed activity. Environmental authorisation

will be required in this instance. It is therefore recommended that the layout be slightly amended to exclude the thicket patches, which are accommodated in the description of Mossel Bay Shale Renosterveld.

Figure 6-9: Site ecological importance (SEI) map.

In the case of the site not being developed (no-go alternative), it will remain in a degraded state with the potential for restoration low.

Plant species

The impact on plant species, including potential SCC and protected tree species, is also expected to be of little significance or concern. All the recorded species are common and widespread in the region. Two SCC were recorded on the site, namely *Hermannia lavandulifolia* (VU) and *Carpobrotus muirii* (NT). Both are still very common in the Mossel Bay area. A single milkwood, a protected tree species, was also recorded in one of the thicket patches on the southern side of the site. With a slight amendment to the layout, all these species can still be accommodated on site. The probability of SCC listed in the Screening Report to occur in the vicinity of the site is indicated in **Table 6-1**. Those with a low-medium probability to occur here have been recorded in similar habitats elsewhere in the Mossel Bay area.

The identified construction and operational phase impacts are as follows:

Construction Phase

- No significant impact identified.

Operational phase

- Increased alien infestation.

Table 6-1: Threatened plant species as listed in the Screening Report.

Sensitivity	Feature(s)	Probability of presence & habitat
Medium	*Ruschia leptocalyx*	**Low**; recorded by the author and others elsewhere in the Mossel Bay area
Medium	*Selago ramosissima*	**Low-medium**; recorded in Mossel Bay area
Medium	*Hermannia lavandulifolia*	**Recorded on site**
Medium	Sensitive Species 633	**Low**; known from Klein Brak
Medium	Sensitive Species 268	**Low**; recorded in Mossel Bay area, but in a different habitat type
Medium	*Marsilea schelpeana*	**Low**; wetland species
Medium	Sensitive Species 1024	**Low**; recorded in renosterveld at Gondwana, east of Herbertsdale
Medium	*Relhania garnotii*	**Low**; known from Mossel Bay Shale Renosterveld, but no iNat records from the Mossel Bay area
Medium	*Polygala pubiflora*	**Low-medium**; limestone and stony clay soils
Medium	Sensitive Species 980	**Low**; recorded in renosterveld at Gondwana, northwest of Mossel Bay
Medium	Sensitive Species 516	**Low**; recorded in Mossel Bay area, but in a different habitat type
Medium	Sensitive Species 800	**Low-medium**; recorded in limestone and clay soils in Mossel Bay area
Medium	Sensitive Species 763	**Low**; no known records from Mossel Bay
Medium	*Diosma passerinoides*	**Low**; known from the hills between Herbertsdale and Friemersheim
Medium	*Agathosma microcarpa*	**Low-medium**; recorded in Mossel Bay area

The **cumulative botanical impact** of the project is expected to be equivalent to the impact on terrestrial biodiversity described above. In this instance, the loss of biodiversity and resultant cumulative impact is considered small (acceptable) due to the transformed state of the site.

7. Recommended Mitigation Measures

The following mitigation measures are required to ensure that the impact on terrestrial biodiversity and plant species is minimised:

- In order to avoid triggering any relevant NEMA listed activities, it is recommended

that the layout be amended to exclude the thicket patches. See Activity 12 of Listing Notice 3 of the NEMA EIA regulations.

- As a duty of care measure, indigenous succulent and bulb species (e.g. *Carpobrotus* species) can be searched and rescued to be replanted in suitable rehabilitation areas on site after construction. *Carpobrotus* species are useful soil binders.

8. Summary & Conclusion

This report sets out the results from a desktop study, as well as a field survey conducted on 27 September 2023, to ascertain terrestrial biodiversity and plant species constraints and possible impacts associated with the development of a PV solar plant next to the Hartenbos WWTW on Portion 101 of Farm Hartenbosch 217.

The vegetation covering the site can be described as an alien herbland, with a few small patches of thicket in the north-western corner and on the southern side. The dominant species are all herbaceous weeds and grasses. Due to the severity of past land-use activities, it is highly unlikely that it will return to natural vegetation. The thicket patches are also somewhat degraded. All the recorded indigenous species are common and widespread in the region. The two recorded SCC, namely *Hermannia lavandulifolia* (VU) and *Carpobrotus muirii* (NT), are both very common in the Mossel Bay area. A single milkwood, a protected tree species, was also recorded in one of the thicket patches. With a slight amendment to the development layout, all these species can still be accommodated on site.

Due to the highly transformed state of the site, the impact on both terrestrial biodiversity and plant species is expected to be of low significance. Despite the site's position inside the biodiversity network, it is highly compromised by past agricultural and dumping activities and invasive aliens. The chance of successful rehabilitation is slim. It is therefore recommended that the proposed development be considered for approval, subject to the consideration of the proposed mitigation measures.

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Annexure 1: Site Ecological Importance

Site Ecological Importance (SEI) is considered to be a function of the biodiversity importance (BI) of the receptor (e.g. SCC, the vegetation community or habitat type present on site) and its resilience to impacts (receptor resilience or RR) 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 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. CI is defined here as: "The importance of a site for supporting biodiversity features of conservation concern present, e.g. populations of SCC (CR, EN, VU & NT), Rare species, range-restricted species, and areas of threatened ecosystem types, through mainly natural processes". Fulfilling criteria to evaluate CI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation, providing a more robust evaluation of CI (Table 1).

Table 1: Conservation importance (CI) criteria.

CI	Criteria
Very high	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of <10 km^2. 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 EN ecosystem type.
High	Confirmed or highly likely occurrence of CR, EN and VU species that have a global EOO of >10 km^2. IUCN threatened species (CR, EN & VU) must be listed under any criterion other than A. If listed as threatened only under Criterion 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.
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN & VU) listed under Criterion A 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. Presence of range-restricted species.
Low	>50% of receptor contains natural habitat with potential to support SCC. No confirmed or highly likely populations of SCC.

CI	Criteria
	No confirmed or highly likely populations of range-restricted species. <50% of receptor contains natural habitat with limited potential to support SCC.
Very low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Functional integrity (FI) of the receptor (e.g. the vegetation community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Ecological processes can be considered to be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table 2).

Table 2: Functional integrity (FI) criteria.

FI	Criteria
Very high	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).
High	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.
Medium	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 between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (>1 ha but <5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very low	Very small (<1 ha) area.

FI	Criteria
	No habitat connectivity except for flora with wind-dispersed seeds. Several major current negative ecological impacts

Recalling that biodiversity importance (BI) is a function of conservation importance (CI) and the functional integrity (FI) of a receptor, BI can be derived from a simple matrix of CI and FI as follows:

Biodiversity importance		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional integrity	Very high	Very high	Very 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

Receptor resilience (RR) is defined here as: "The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention." The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor (Table 3) and will require justification by the specialist.

Table 3: Receptor resilience (RR) criteria.

RR	Criteria
Very high	Habitat that can recover rapidly (<5 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (5-10 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (>10 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: >15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of

RR	Criteria
	remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Finally, after the successful evaluation of both BI and RR as described above, it is possible to evaluate the **site ecological importance (SEI)** from the final matrix as follows:

Site ecological importance		Biodiversity importance				
		Very high	High	Medium	Low	Very low
Receptor resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

Table 4: Guidelines for interpreting SEI in the context of the proposed development activities.

SEI	Interpretation in relation to proposed development activities
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.
High	Avoidance mitigation wherever possible. Minimisation 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.
Medium	Minimisation and restoration mitigation - development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation - development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very low	Minimisation mitigation - development activities of medium to high impact acceptable and restoration activities may not be required.