Botanical Impact Assessment

Proposed Grootbrak WWTW PV solar plant powerlines, Mossel Bay

6 September 2024

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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.

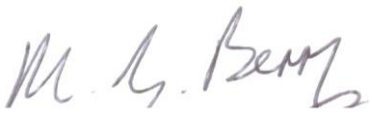
Citation of report

Berry, M.G. 2024. Botanical Impact Assessment: Proposed Grootbrak WWTW PV solar plant powerlines, Mossel Bay. MB Botanical Surveys, Somerset West.

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:	6 September 2024

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1. Introduction

Proposed development and area assessed

The applicant (Mossel Bay Municipality) wishes to construct two powerlines, which will run from the proposed Grootbrak WWTW PV solar plant to the Kleinbrak and Sandhoogte water treatment works (WTW), respectively (**Figure 1-1**). The 11 kV cables will be laid underground. The longest cable, which will run mainly alongside the R102 to the Kleinbrak WTW, will be 5.53 km in length. The shorter cable (0.59 km) will run straight up the hill slope north of the Grootbrak WWTW, inside a municipal servitude (**Figure 1-2**). The Kleinbrak WTW cable will run mainly along a vegetated municipal reserve alongside the R102, while the Sandhoogte WTW cable will run through a cultivated area. It is expected that Activity 12 of Listing Notice 3 of the NEMA EIA regulations (as amended on 7 April 2017) will be triggered if 300 m^2 or more of indigenous vegetation within a critically endangered or endangered ecosystem will be cleared.

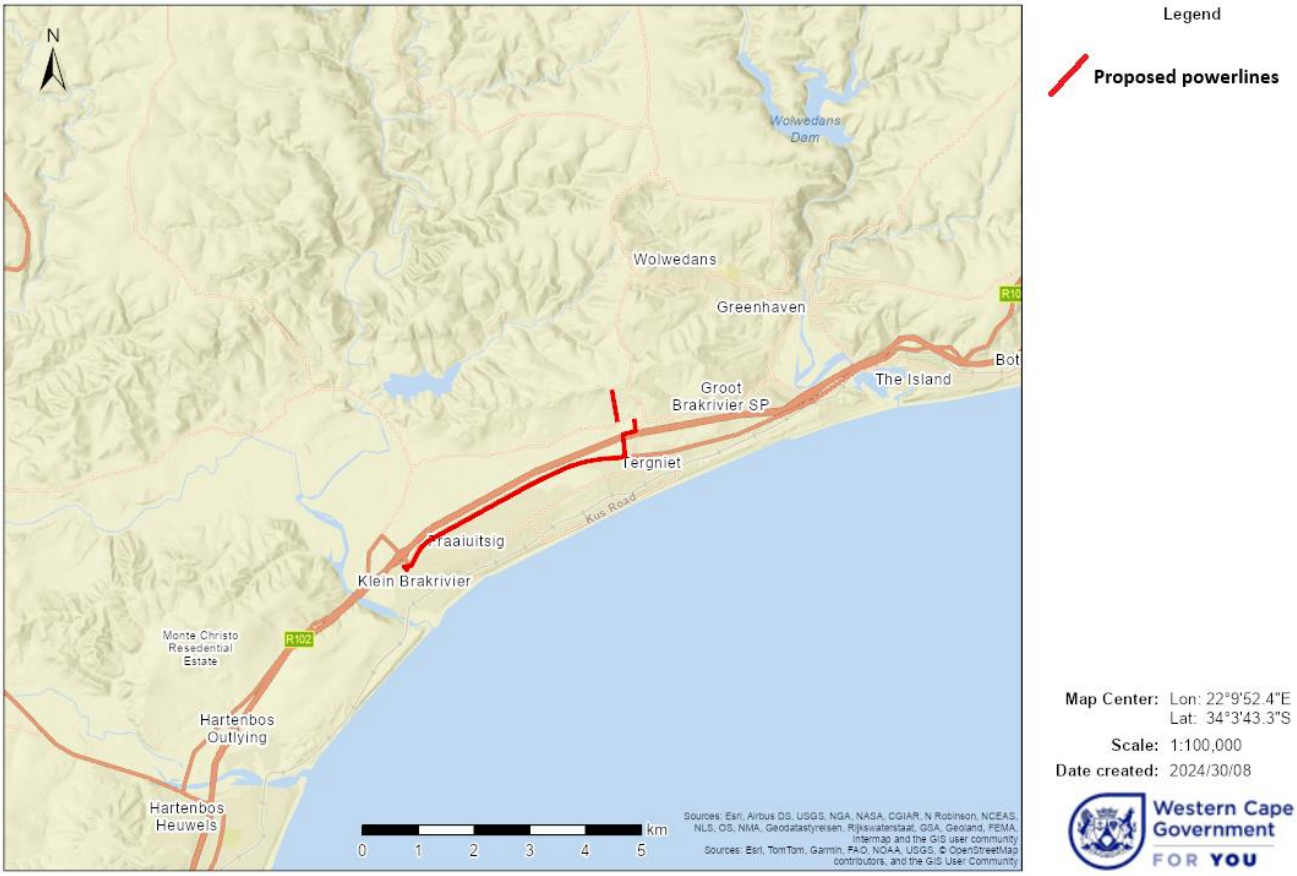

Figure 1-1: Location of the proposed powerlines between the Klein Brak and Groot Brak River, northeast of Hartenbos.

According to the Screening Report for the Kleinbrak WTW cable, generated by the EAP (Sharples Environmental Services) on 30 August 2024, the proposed cable is located inside an area 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 encroachment of the cable route on the biodiversity network (CBA & ESA). According to the Screening Report for the Sandhoogte WTW cable, also generated by Sharples Environmental Services on 30 August 2024, the proposed cable is located inside an area mapped as Low 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 threatened vegetation types. As a result, MB Botanical Surveys was contracted to undertake a botanical survey of the site. Please note that this report supplements the botanical impact statement prepared for the Grootbrak WWTW PV solar plant by MB Botanical Surveys in March 2024.

Figure 1-2: Proposed powerline routes from the Grootbrak WWTW to the Sandhoogte and Kleinbrak WTW.

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 pipeline route 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 late in the winter season (August), considered to be a reasonable time for many flowering species in the southern Cape. Plants that only flower at other times of the year (e.g. spring to summer), such as certain bulbs (Iridaceae & Orchidaceae), may have been missed. However, the overall confidence in the completeness and accuracy of the botanical findings is considered to be good.

Notwithstanding the above limitation and the degraded/transformed state of certain sections of the powerline routes, the specialist is of the opinion that the survey and findings are adequate to aid decision making.

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 Kleinbrak WTW cable route. **Annexure 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 cable route. This rating is ascribed to the possible presence of a terrestrial critical biodiversity area (CBA), a degraded critical biodiversity area (CBA2), ecological support areas (ESA's) and a threatened vegetation type (i.e. Hartenbos Dune Thicket). With regards to the Sandhoogte WTW cable route, the plant species theme is of Low sensitivity, while the terrestrial biodiversity theme is of Very High sensitivity. The latter is ascribed to the possible presence of two threatened vegetation types (i.e. Hartenbos Dune Thicket & Garden Route Granite Fynbos).

In circumstances where the *status quo* assessment proves the contrary to the above (i.e. where the pipeline route 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 botanical impact assessment will be required for the project.

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 & Cape Farm Mapper) and desktop resources (available literature & 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 and data analysis

A botanical survey of the pipeline route was undertaken on 20 August 2024 by the author. A qualitative assessment of the types and condition of vegetation, disturbances and presence of alien species, SCC and protected tree species was carried out. The waypoints (WP 1-10) for photographs in this report are shown in **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.

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

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

eroded or degraded as a result of bad land management or alien infestation.

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.

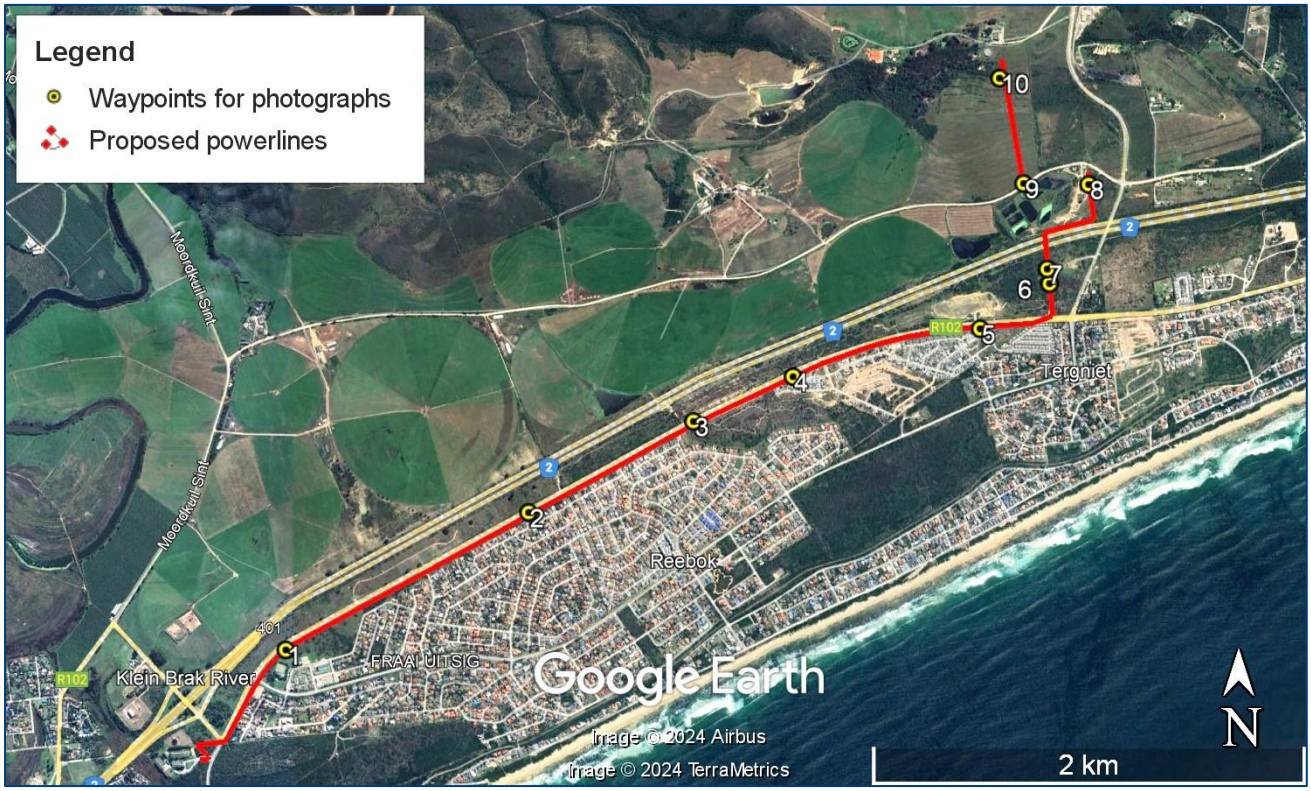

Figure 3-1: Satellite photo showing the photo waypoints (1-10) along the proposed powerline routes.

For practical reasons, site ecological importance (SEI) of the affected (receptor) area has not been determined (see the criteria described in SANBI's Species Environmental Assessment Guideline).

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 survey.

Location, topography & land use

The powerline routes are located between Groot Brak and Klein Brak River, northeast of Hartenbos. The immediate surrounding area can be described as mildly sloping (15-150 masl) (**Figure 4-1**). There are no striking landscape features in the area. As noted earlier, the proposed Kleinbrak WTW cable passes mainly through a vegetated open space (dune thicket and regrowth) alongside the R102, while the Sandhoogte WTW cable will run through a cultivated (pasture) area. The Kleinbrak WTW cable also crosses both the N2 and R102.

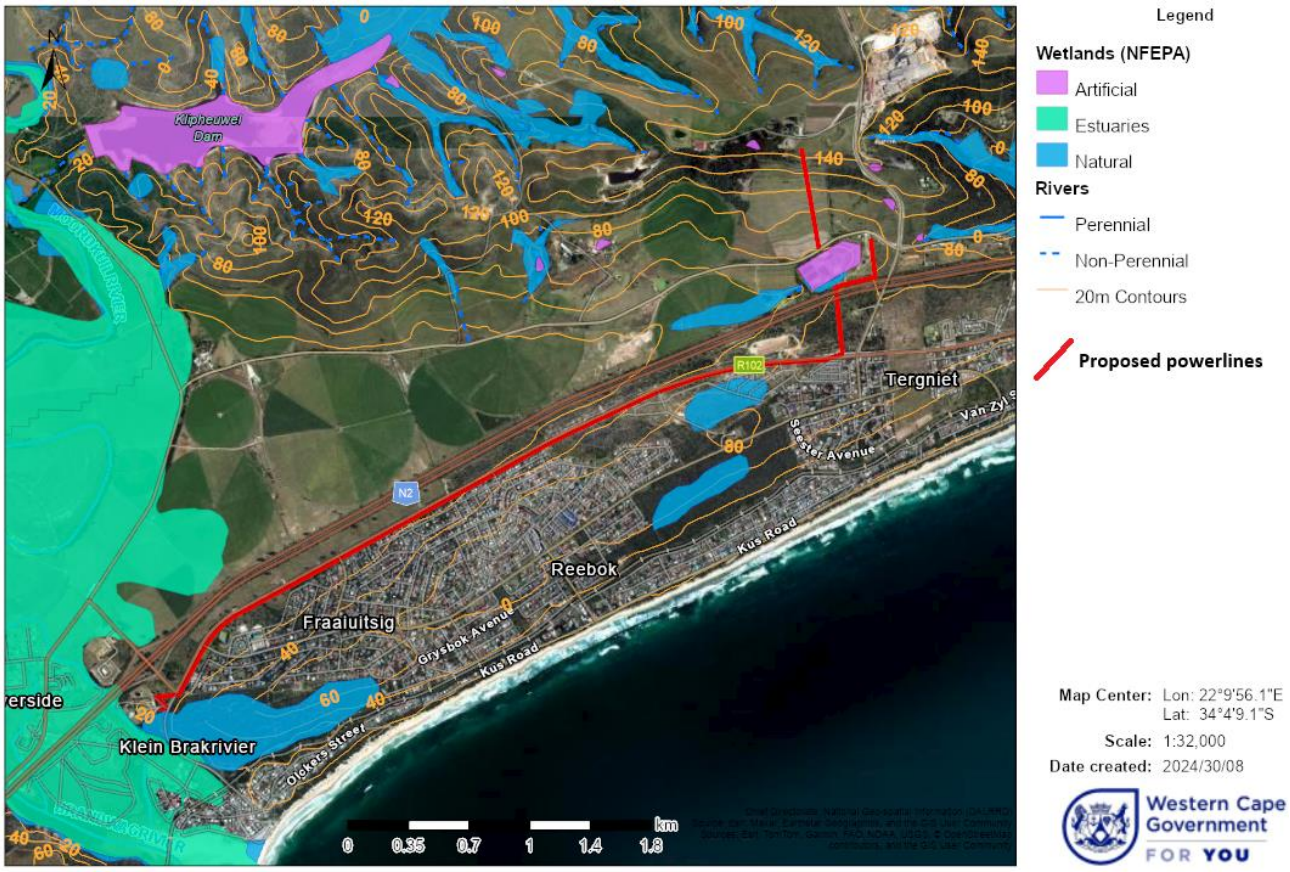

Figure 4-1: Combined topography and hydrology map.

Hydrology

According to Cape Farm Mapper, the Kleinbrak WTW powerline route encroaches the Grootbrak WWTW, which has been mapped as an artificial NFEPA (National Freshwater Ecosystem Priority Area) wetland and an adjacent, smaller natural wetland (**Figure 4-1**). During the site survey, no distinct wetland features were recorded along the powerline routes. The Klein Brak Estuary is the closest significant water feature, i.e. ±200 m southwest of the Kleinbrak WTW end of the powerline. All these have been included in the biodiversity network.

Climate

The mean annual rainfall for the area is between 461 and 513 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 around 23.6°C and 9.9°C for February and July, respectively (as per Cape Farm Mapper data). The Köppen-Geiger climate classification for the Klein Brak and Groot Brak River area is BSk/h (arid, steppe, cold/hot).

Geology

According to the 3422AA Mossel Bay 1:50 000 geological map, the Kleinbrak WTW powerline route is mainly underlain by non-shelly sand, with consolidated to unconsolidated calcareous sand and gravel with shell fragments (Bredasdorp Group) at the western end (**Figure 4-2**). The Sandhoogte WTW route is underlain by Uitenhage Group sediments (Kirkwood Formation) of Cretaceous age. The Kirkwood Formation comprises mudstone, siltstone, sandstone and subordinate conglomerate, and typically supports valley thicket and renosterveld in the area. This unit is usually exposed in road and river cuttings, as well as in quarries (Viljoen, 1993).

Figure 4-2: Exposed non-shelly sand along the Kleinbrak WTW powerline route (WP 4).

Biodiversity Planning Context

According to the 2018 Vegetation Map of South Africa, the Kleinbrak WTW powerline route runs through Hartenbos Dune Thicket, while most of the Sandhoogte WTW route runs through Garden Route Granite Fynbos (**Figure 4-3**). The site survey also revealed a stretch of strandveld (Groot Brak Dune Strandveld) along a section of the Kleinbrak WTW powerline route between the N2 and R102. The latter, along with Garden Route Granite Fynbos, belong to the Fynbos Biome. Hartenbos Dune Thicket stretches from the Duiwenhoks River mouth in the west to Glentana in the east. It is described as "a mosaic of low (1-3 m) thicket, occurring in small bush clumps dominated by small trees and woody shrubs, in a mosaic of low (1-2 m) asteraceous fynbos. Thicket clumps are best developed in fire-protected dune slacks, and the fynbos shrubland occurs on upper dune slopes and crests" (Mucina, 2006). Hartenbos Dune Thicket is well represented on the fixed dunes between Hartenbos and Glentana.

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

Garden Route Granite Fynbos occurs as three units from Botterberg (south of Robinson Pass) in the west to Hoogekraal Pass (west of Karatara) in the east. The site is situated on the southern side of the western block between Botterberg and Groot Brak River. It is described as a dense proteoid and ericoid shrubby grassland (Mucina, 2006). In the west,

most of the remnants are dominated by proteas (Mucina, 2006). Eastwards, graminoid and ericaceous fynbos are dominant on the flatter areas (Mucina, 2006).

Although well represented in the larger area (79% still left), Hartenbos Dune Thicket is currently listed as Endangered[2]. It is being threatened by invasive aliens and habitat loss due to cultivation, road building and coastal developments. Almost 6% is formally protected in the Geelkrans Nature Reserve complex and several contract nature reserves, such as Pauline Bohnen and Gourikwa. With only 37% left[3], Garden Route Granite Fynbos is currently listed as Critically Endangered in the Revised National List of Threatened Ecosystems (DEA, 2022). It has been transformed mainly for cultivation, pine plantations and urban development (Mucina, 2006). Remnants of Garden Route Granite Fynbos largely remain in isolated pockets on steeper slopes (Mucina, 2006). About 1% of it is conserved in the Garden Route National Park and few private nature reserves (Mucina, 2006). Its protection should therefore remain a priority in the coastal areas. Like all fynbos types, Garden Route Granite Fynbos is maintained by a regular fire regime. Unfortunately, landscape fragmentation is disrupting this 'maintenance' requirement, often leading to localised species loss and bush encroachment or alien infestation (pers. obs.). Fire is an important ecological driver in the Fynbos Biome and regular fires are needed for biodiversity maintenance and recruitment purposes.

While the proposed Sandhoogte WTW powerline appears to fall outside the Mossel Bay biodiversity network, the Kleinbrak WTW powerline runs through long stretches of ecological support areas (ESA) (**Figure 4-4**). These form part of an ecological link or corridor between the Groot Brak and Klein Brak Estuaries. The western (Kleinbrak WTW) end of the route also runs through a terrestrial critical biodiversity area (CBA) and degraded critical biodiversity area (CBA2). This area corresponds roughly with a patch of dune thicket. Reasons for the importance of the mapped ESA and CBA units include the presence of threatened vegetation types (Groot Brak Dune Strandveld & Western Cape Milkwood Forests), threatened vertebrate habitat (bontebok), wetland types (channelled valley bottom & flat wetlands), an estuary (Klein Brak Estuary) and water resource protection (Southern Coastal Belt). The closest protected area appears to be the Diosma Reserve, a contract nature reserve located 12-17 km away in Mossel Bay (Heiderand) to the southwest of the powerline routes.

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

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

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.

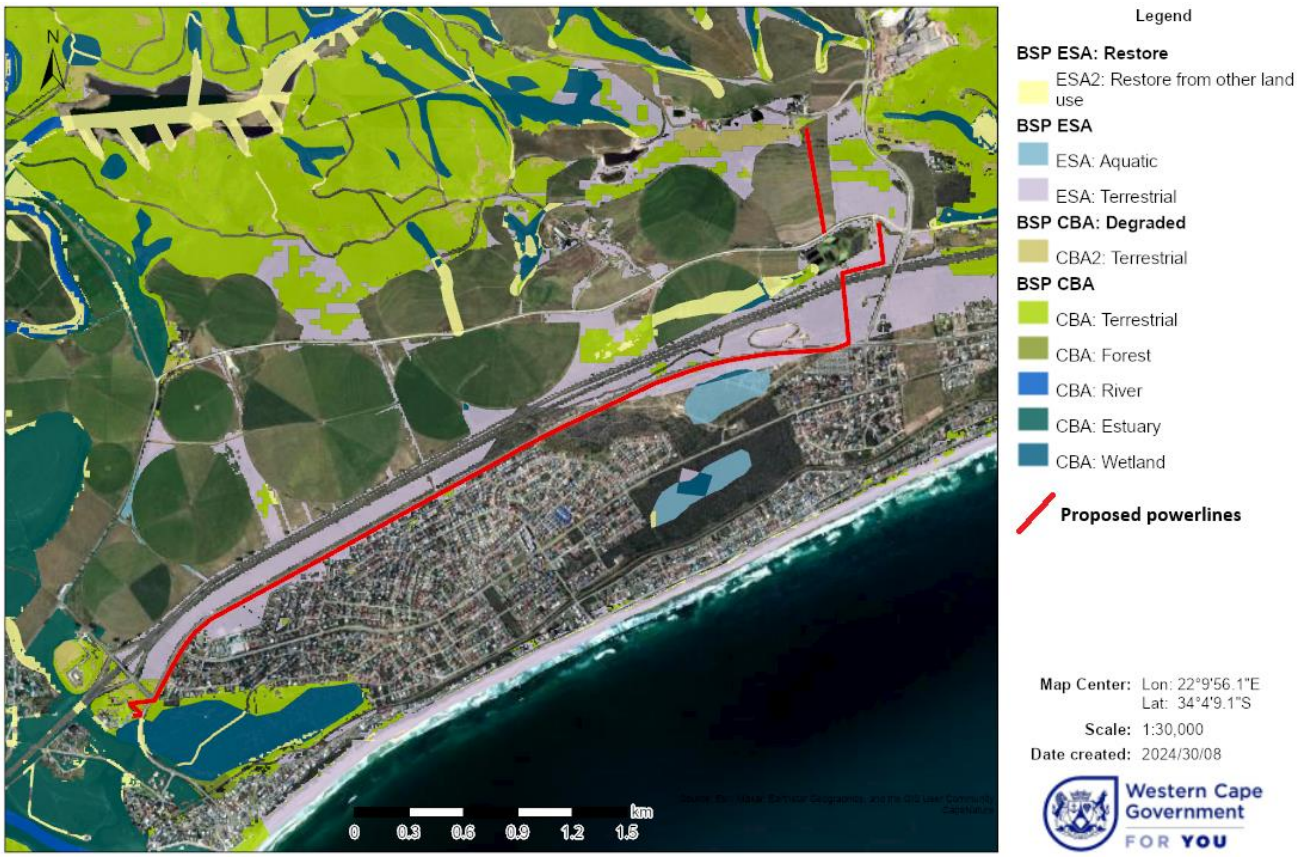

Figure 4-4: Extract of the Western Cape biodiversity network map.

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).

Terrestrial biodiversity (vegetation)

The proposed powerline routes run through a mixture of transformed/cultivated and regrowth areas, as well as some good quality dune thicket and strandveld (**Figures 5-1** to **5-9**). The Kleinbrak WTW powerline route follows a municipal reserve on the southern side of the R102 for most of the way with significant regrowth and dune thicket in places. Some of the passages through the dune thicket are already disturbed, such as the thicket at the western end of the route and the one just south of the N2. The Sandhoogte WTW powerline route runs through a cultivated area. Only a few narrow strips ('hedges') of indigenous

growth remain where the route crosses a road reserve and near the northern (upper) end of this route, which are the result of contoured cultivation. The crossing of the N2 and the R102 is also of little or no botanical interest as the crossing points are highly degraded or covered by typical roadside regrowth.

The most prominent vegetation type recorded along the Kleinbrak WTW powerline route is dune thicket. It is about 4-5 m tall, impenetrable and comprises typical thicket species, such as *Sideroxylon inerme, Searsia pterota, Olea europaea, Schotia afra, Azima tetracantha* and *Mystroxylon aethiopicum*. One of the thicket patches is dominated by *Pittosporum viridiflorum* at the 'expense' of *Sideroxylon inerme*. Both are protected tree species. Notable indigenous regrowth was also recorded between the thicket patches, but these could not be allocated to a specific vegetation type due to the young age of the regrowth. Common species in the regrowth include *Osteospermum moniliferum, Seriphium plumosum, Carpobrotus edulis, Salvia aurea, Leonotis ocymifolia* and *Tetragonia fruticosa*. The regrowth inside the municipal reserve (on the residential or southern side of fence line) is of a better quality and more diverse than the regrowth inside the road reserve. The vegetation here is probably not subject to regular bush-cutting or mowing activities associated with road maintenance.

Figure 5-1: Good quality dune thicket along the Kleinbrak WTW powerline route (WP 2).

Figure 5-2: Regrowth dominated by *Salvia aurea* and *Osteospermum moniliferum* (WP 1).

Figure 5-3: Regrowth, with the fence line separating the municipal reserve from road reserve (WP 3).

Figure 5-4: Patch of strandveld between the N2 and R102, dominated by *Thamnochortus insignis* (WP 6).

Figure 5-5: Disturbed passage through dune thicket directly south of the N2 (WP 7).

Figure 5-6: Transformed municipal reserve (WP 5).

Figure 5-7: Powerline route inside the fence line of Grootbrak WWTW (WP 8).

Figure 5-8: View from bottom of Sandhoogte WTW powerline route across cultivated land (WP 9).

Figure 5-9: View from top of Sandhoogte WTW powerline route (WP 10).

A patch of Groot Brak Dune Strandveld was also noted along the Kleinbrak WTW powerline route, between the N2 and R102 (**Figure 5-4**). This vegetation type is distinguished from dune thicket by its slightly more open and lower structure, as well as a notable presence of fynbos/strandveld elements such as *Thamnochortus insignis, Agathosma apiculata, Euchaetis burchellii* and *Trichocephalus stipularis*. This poorly mapped unit was also recorded by the author in a few other places to the east and west of this site. In a recent study on strandveld types along the southern Cape coastline, the strandveld in this area has been remapped as Southeastern Strandveld (Cowling R.M., 2023).

The section of the Kleinbrak WTW powerline route north of the N2, which is located inside the fenced-off Grootbrak WWTW, is quite degraded/modified with only a few common species present, including *Osteospermum moniliferum, Senecio rosmarinifolius Carpobrotus edulis, Mesembryanthemum aitonis, Searsia pallens, Grewia occidentalis, Tecomaria capensis* and *Oxalis pes-caprae*. The N2 embankment is mainly covered by *Grewia occidentalis*. Disturbances noted along the cable routes include agricultural activities (Sandhoogte WTW powerline route), road infrastructure and maintenance, overhead powerlines, an electrical substation, construction activities (at Grootbrak WWTW) and alien infestation. Some gardening activities were also noted in a few places where neighbours created their own gardens inside the municipal reserve. The botanical attributes of the proposed powerline routes are presented in **Figures 5-10** to **5-12**.

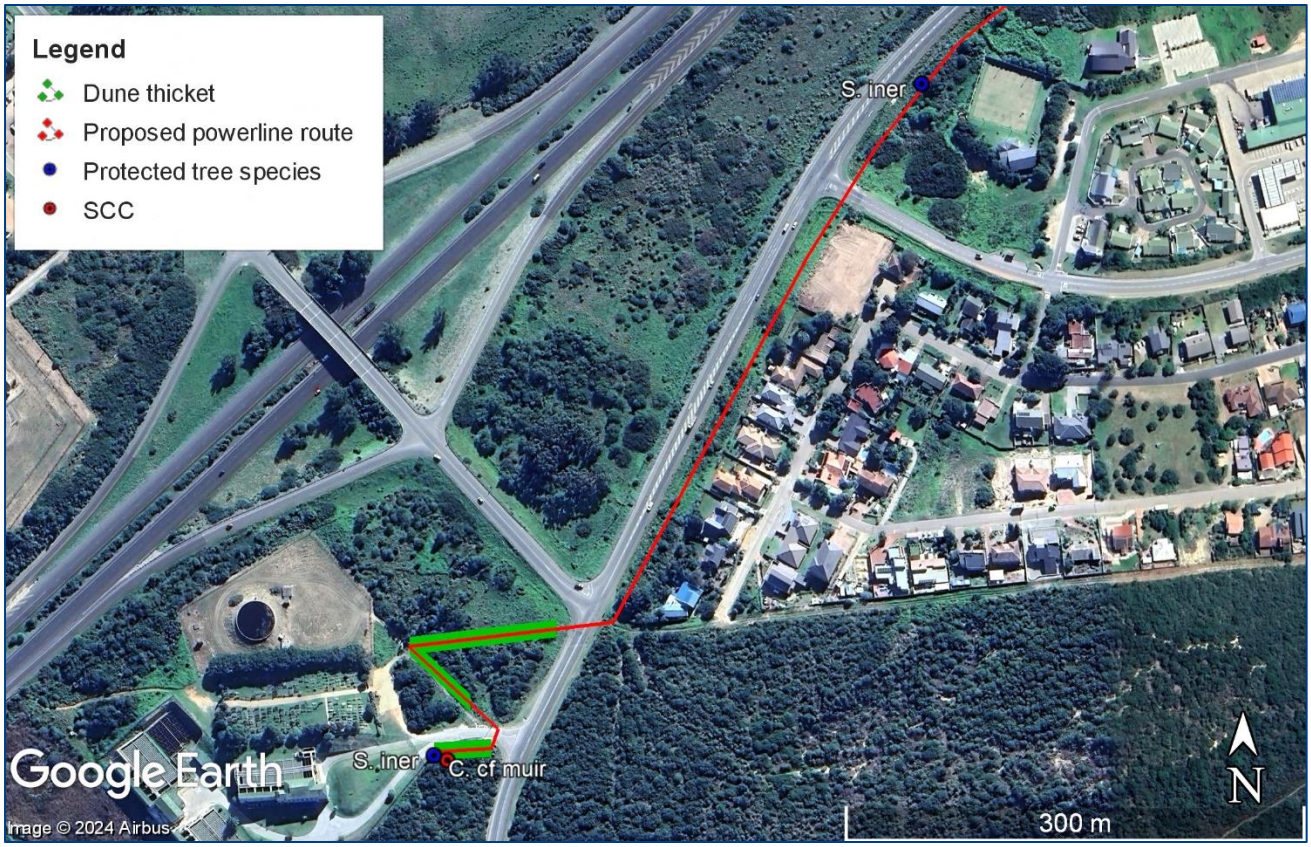

Figure 5-10: Botanical attributes of the western section of Kleinbrak WTW powerline route.

Figure 5-11: Botanical attributes of the middle section of Kleinbrak WTW powerline route.

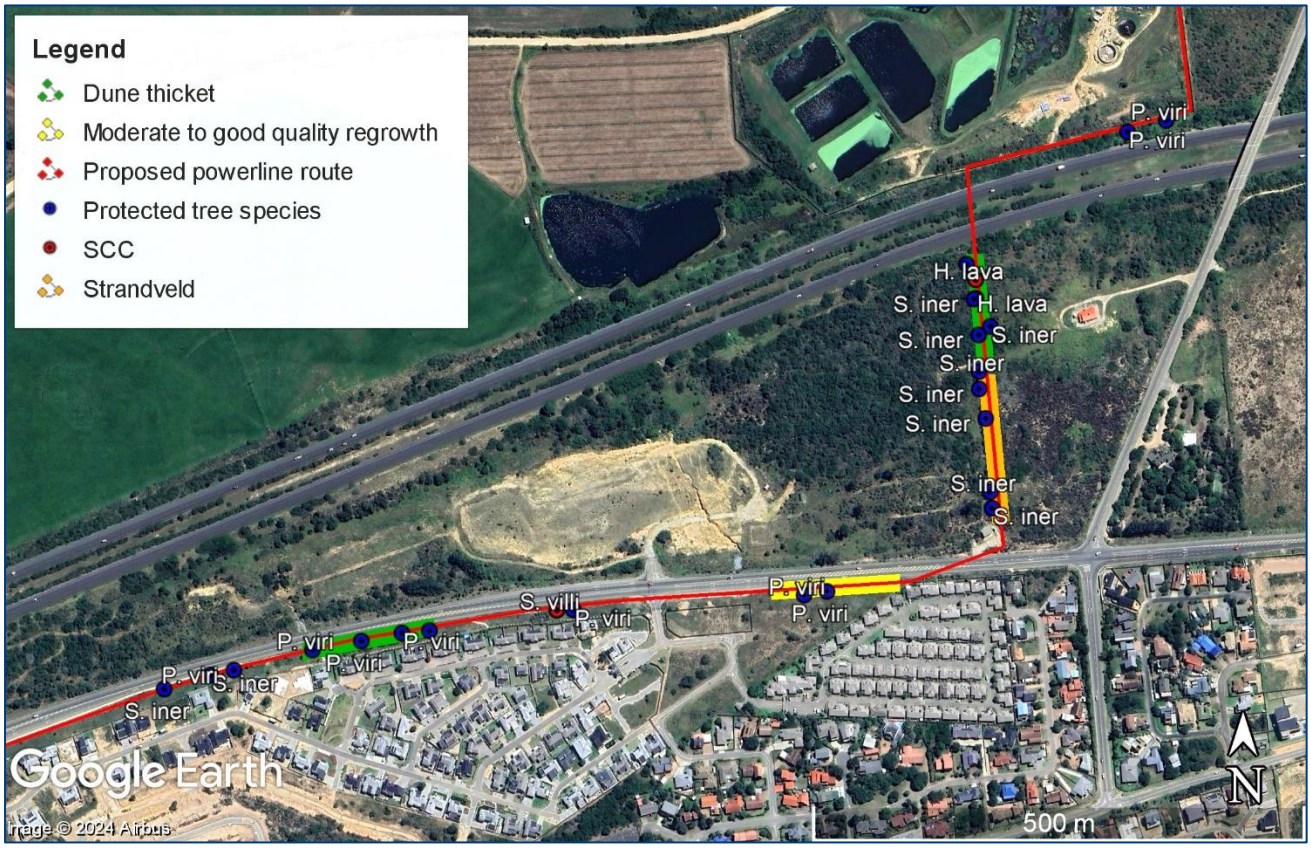

Figure 5-12: Botanical attributes of the eastern section of Kleinbrak WTW powerline route.

Plant species

The following indigenous shrub and tree species were recorded in the dune thicket and adjacent regrowth areas, namely *Osteospermum moniliferum*, *Senecio rosmarinifolius, S. ilicifolius, S. hastatus, S. angulatus*, *Helichrysum patulum, H. cymosum, Seriphium plumosum, Oedera genistifolia, Tarchonanthus littoralis, Nidorella ivifolia, Pseudognaphalium undulatum, Berkheya heterophylla, Chrysocoma ciliata, Schotia afra, Vachellia karroo, Indigofera nigromontana, Sideroxylon inerme, Searsia pterota*, *S. glauca, S. crenata, S. lucida, Olea europaea, Carissa bispinosa*, *Gymnosporia buxifolia, Putterlickia pyracantha, Mystroxylon aethiopicum, Lauridia tetragona, Pterocelastrus tricuspidatus, Pittosporum viridiflorum, Euclea undulata, E. crispa, Lycium tenue, L. ferocissimum, Solanum africanum, Capparis sepiaria, Azima tetracantha, Diospyros dichrophylla, Tecomaria capensis*, *Cotyledon orbiculata, Carpobrotus edulis, C. cf muirii, Ruschia tenella, Drosanthemum* sp, *Delosperma litorale, Tetragonia fruticosa, Aloe arborescens*, *A. maculata, Crassula expansa, C. ovata, C. capitella* ssp. *thyrsiflora, Euphorbia mauritanica, E. burmannii, E. clandestina, Clutia daphnoides, Grewia occidentalis, Hermannia holosericea, H. lavandulifolia, H. salviifolia, Colpoon compressum, Pelargonium peltatum, P. capitatum, Clausena anisata, Salvia aurea, Leonotis leonurus, L. ocymifolia, Pseudodictamnus africanus, Solanum linnaeanum, Anthospermum aethiopicum, Rhoicissus digitata, Cynanchum obtusifolium, C. viminale, Asparagus aethiopicus, A. asparagoides, Hypoestes aristata, Selago villicaulis* and *Chaenostoma caeruleum*. *Tecomaria capensis*, which is indigenous to the eastern parts of South Africa, is probably introduced (planted).

Only a few hemicryptophytes and geophytes were recorded, including *Megathyrsus maximus, Ehrharta* sp, *Oxalis pes-caprae, Albuca canadensis* and *Chasmanthe aethiopica*. There is a high possibility of more spring flowering bulbs present. Species recorded exclusively inside the strandveld patch between the N2 and R102 include *Euchaetis burchellii, Passerina corymbosa, Agathosma apiculata, Trichocephalus stipularis, Carpobrotus acinaciformis* and *Thamnochortus insignis*. Floristic affinity with Hartenbos Dune Thicket/Groot Brak Dune Strandveld is strong with a large number of important taxa recorded, including *Schotia afra, Sideroxylon inerme, Carissa bispinosa*, *Putterlickia pyracantha, Mystroxylon aethiopicum, Pterocelastrus tricuspidatus, Aloe arborescens*, *Pelargonium peltatum, Clausena anisata, Asparagus aethiopicus* and the herb *Hypoestes aristata*.

Indigenous species recorded along the Sandhoogte WTW powerline route (mainly inside the contour 'hedges' in the upper part) include *Erica quadrangularis, Athanasia trifurcata, Senecio rosmarinifolius, Metalasia acuta, Helichrysum cymosum, Seriphium plumosum, Carpobrotus edulis, Lampranthus elegans, Gymnosporia buxifolia, Searsia pallens, S. lucida, Grewia occidentalis, Diospyros dichrophylla, Cynodon dactylon* (dominant groundcover) and *Bobartia robusta*. Most of these are pioneer species commonly associated with regrowth. Floristic affinity is difficult to determine, but the presence of *Erica quadrangularis, Athanasia trifurcata, Metalasia acuta, Lampranthus elegans* and *Searsia*

pallens suggest it will be either fynbos or renosterveld. None of the recorded species here are important in Garden Route Granite Fynbos. The substrate is also wrong for the latter. **Figure 5-13** shows a few of the recorded species.

Figure 5-13: A few indigenous species recorded on site, with *Pelargonium peltatum* (top left), *Salvia aurea* (top right), *Sideroxylon inerme* (middle left), *Hermannia lavandulifolia* (middle right), *Euphorbia clandestina* (bottom left) and *Erica quadrangularis* (bottom right).

Three Species of Conservation Concern (SCC) were recorded along the powerline routes, namely *Hermannia lavandulifolia* (VU; Worcester to Plettenberg Bay), *Selago villicaulis* (VU; Still Bay to Plettenberg Bay) and *Carpobrotus cf muirii* (NT; De Hoop to Mossel Bay). *Hermannia lavandulifolia* and *Carpobrotus cf muirii* are still common and frequently encountered in the Mossel Bay area. *Selago villicaulis* seems less common with only a few iNat records from the area. According to the online Red List of South African Plants[4], these species are threatened by habitat loss to crop cultivation, coastal developments and alien plant infestation. As noted earlier, *Sideroxylon inerme* (milkwood) and *Pittosporum viridiflorum* (cheesewood) are protected tree species in terms of the National Forests Act (Act 84 of 1998). The removal of milkwood and cheesewood requires a permit from the Department of Forestry.

Figure 5-14: A few alien species recorded on site, with *Malva arborea* (top left), *Opuntia ficus-indica* (top right), *Ricinus communis* (bottom left) and *Pinus radiata* (bottom right).

Alien species recorded along the powerline routes include *Acacia saligna* (port jackson,

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

category 1b), *A. mearnsii* (black wattle, 2), *A. cyclops* (rooikrans, 1b), *Lantana camara* (lantana, 1b), *Verbena bonariensis* (purple top, 1b), *Pinus radiata* (radiata pine, 1b), *Eucalyptus* sp (gum), *Schinus terebinthifolia* (Brazilian pepper tree, 3), *Agave americana* (sisal, 3), *Myoporum insulare* (manitoka, 3), *Psidium guajava* (guava), *Opuntia ficus-indica* (prickly pear, 1b), *Datura stramonium* (olieboom, 1b), *Ricinus communis* (castor-oil plant, 2), *Cestrum laevigatum* (inkberry, 1b), *Echium plantagineum* (Patterson's curse, 1b), *Helminthotheca echioides* (ox tongue), *Malva arborea* (tree mallow), *Tropaeolum majus* (kappertjie) and *Cenchrus clandestinus* (kikuyu, 1b in protected areas). **Figure 5-14** shows a few of the recorded alien species.

The high presence of invasive aliens is indicative of the degraded state of the powerline routes. As indicated above, the majority these species are Categories 1b and 2 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 black wattle (Category 2 invader) on a property is prohibited without a permit.

6. Potential Impacts

Terrestrial biodiversity (vegetation)

The vegetation recorded along the Kleinbrak WTW powerline route has been identified as mostly Hartenbos Dune Thicket and a smaller area of Groot Brak Dune Strandveld (= Southeastern Strandveld), both of which are currently listed as threatened. Notable regrowth was also noted between these units, but their floristic affinity to a specific vegetation type is not clear. The rest of the powerline routes, including the entire Sandhoogte WTW powerline route, is transformed or highly degraded. Parts are also infested with woody aliens or populated by introduced species (indigenous to other parts of South Africa), such as *Tecomaria capensis*.

The impact on terrestrial biodiversity is difficult to quantify, but if heavy construction plant is kept out of the good quality thicket, strandveld and regrowth areas, the impact should not be significant. An estimated total length of 1300 m of dune thicket will be affected, of which 295 m comprises disturbed passages along which the cable can be laid. In addition to this, a 150 m long strip of strandveld and a total length of 1770 m of moderate to good quality regrowth will also be affected. Strict control will be needed during the construction phase to ensure that the cable will follow the most disturbed route and avoid the good quality vegetation areas.

The Kleinbrak WTW powerline route also encroaches on mapped ESA's and CBA's, which link the Groot Brak Estuary with the Klein Brak Estuary. The vegetation should therefore be treated as sensitive as it aids in the functioning of the local biodiversity network. Apart

from providing a backbone to the local biodiversity network, the mapped ESA's and CBA's serve as important passages along which fauna can migrate between the CBA's and conservation areas. One can therefore expect a slight impact on its functionality during the construction phase. Given the linear nature of the project and the modified state of most of the fringing vegetation, the impact on terrestrial biodiversity is of a medium-low significance prior to mitigation. Care must be exercised to ensure that vegetation outside the works areas is not unnecessarily disturbed. **Table 6-1** summarises the impact on terrestrial biodiversity.

Table 6-1: Impact on terrestrial biodiversity.

Phase	Construction Phase	Operational Phase
Nature of impact(s)	- Loss of dune thicket, strandveld & regrowth. - Slight impact on biodiversity network. - Erosion due to poor stormwater control & rehabilitation efforts.	- Increased alien infestation. - Erosion due to poor vegetation cover & maintenance.
Extent of impact	Powerline corridor	Powerline corridor & immediate adjacent area
Duration	Medium	Long term
Intensity	Medium	Low
Probability of occurrence	Medium-high	Medium-high
Degree of reversibility	Medium	High
Irreplaceability of resource	Medium	Medium-low
Mitigatory potential	High	High
Significance before mitigation	Medium-low	Medium-low
Significance after mitigation	Low	Low

The rehabilitation potential of the disturbed areas post construction should be very good. Likely, most of the species which originally occurred along the powerline route will return, including the aliens. As an indirect impact, soil disturbance caused by earthworks will provide ideal conditions for the establishment of invasive alien species. The presence of invasives, such as port jackson, black wattle, rooikrans and lantana, will exacerbate this impact. Therefore, as an operational phase maintenance concern, keep the powerline corridor (servitude) clear of invasive aliens. As stated earlier, it is a legal requirement for the landowner to clear/control the invasive aliens on their land.

Plant species

The impact on plant species, including SCC and protected tree species, is also expected to be of medium-low significance prior to mitigation. Most of the recorded species are

common and widespread in the region. Three Species of Conservation Concern (SCC) could be affected along the Kleinbrak WTW cable route, namely *Hermannia lavandulifolia* (VU), *Selago villicaulis* (VU) and *Carpobrotus cf muirii* (NT). *H. lavandulifolia* and *C. cf muirii* are still common and frequently encountered in the Mossel Bay area, but *S. villicaulis* seems less common. In addition to these, a high number of *Sideroxylon inerme* (milkwood) and *Pittosporum viridiflorum* (cheesewood) are also present. Both are protected in terms of the National Forests Act (Act 84 of 1998) and a permit is needed for their removal. Removal or damage to these trees can be avoided by hand digging the trench for the cable and thus avoiding the trees. It is therefore recommended that all trenching in sensitive areas be undertaken by hand. Strict control will be required when working in these areas. Topsoil and seedbearing plant material from the vegetated areas to be disturbed can be used in the rehabilitation of disturbed areas after construction. **Table 6-2** summarises the impact on plant species, including SCC and protected tree species.

Table 6-2: Impact of the project on indigenous flora, SCC & protected tree species.

Phase	Construction Phase	Operational Phase
Nature of impact(s)	- Loss of indigenous flora, SCC & protected tree species	- Alien infestation & resulting displacement of indigenous flora
Extent of impact	Powerline corridor	Powerline corridor & immediate adjacent area
Duration	Medium	Long term
Intensity	Medium	Low
Probability of occurrence	Medium-high	Medium-high
Degree of reversibility	Medium	High
Irreplaceability of resource	Medium	Medium-low
Mitigatory potential	High	High
Significance before mitigation	Medium-low	Medium-low
Significance after mitigation	Low	Low

The **cumulative botanical impact** of the project is expected to be equivalent to the impact on terrestrial biodiversity and plant species described above, i.e. the continued erosion of Hartenbos Dune Thicket, Groot Brak Dune Strandveld and the biodiversity network as a result of infrastructure development. In this instance, the loss of biodiversity and resultant cumulative impact will be of low significance (with mitigation) due to the current state of the affected habitat, nature of the project and the potential for rehabilitation. There should be no residual impact.

7. Recommended Mitigation Measures

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

- During the construction phase, fence off the construction footprints where it encroaches on Hartenbos Dune Thicket, Groot Brak Dune Strandveld and good quality regrowth. Restrict all construction activities, such as stockpiling and parking, to already disturbed or transformed areas away from the sensitive areas. The contractor(s) must be made aware of the sensitive areas where SCC and protected tree species may be present. These areas outside the work areas must be declared 'no-go' areas and not be disturbed in any way. The removal of milkwood and cheesewood requires a permit from the Department of Forestry.
- All trenching in sensitive areas must be undertaken by hand. No heavy construction plant must be allowed inside these areas. An effort must be made to avoid good quality indigenous vegetation and protected tree species as far as possible.
- Search and rescue (S&R) succulents and bulbs from the construction areas for replanting in the disturbed or rehabilitation areas after construction. Topsoil, cuttings and seedbearing plant material can also be salvaged for this purpose. Bulbs should be removed along with some soil, placed in gel, bagged and then taken to a nursery for temporary storage or transplanted directly in the receiving area. S&R should be done at an appropriate time of the year, preferably when the soil is wet during the raining season. Please note that a CapeNature permit is needed for the removal/relocation of indigenous plant species.
- Rehabilitate/revegetate all the disturbed surfaces. A Search & Rescue and Rehabilitation Plan will be needed. Allow at least 24 months for the monitoring of rehabilitation success and alien infestation post construction.

Mitigation measures recommended for the **operational phase**:

- Monitor the powerline routes for erosion. Where needed, rehabilitate/revegetate disturbed surfaces. Erosion prevention measures may be needed on steep slopes, such as logs or netting, to slow down runoff and potential erosion. Mulching and seeding with indigenous dune thicket/strandveld seed may also be needed.
- As a long-term maintenance requirement, engage in alien clearing, focussing on invasive species such as port jackson, black wattle, rooikrans and lantana. These species are category 1b and 2 invaders that require compulsory control as part of an invasive species control programme.

8. Conclusion

This report presents results from a desktop study, as well as a field survey conducted on 20 August 2024, to ascertain terrestrial biodiversity and plant species constraints associated with the proposed construction of two powerlines from the proposed Grootbrak WWTW PV solar plant to the Kleinbrak and Sandhoogte water treatment works (WTW), respectively.

The proposed powerline routes run through a mixture of transformed/cultivated and regrowth areas, as well as some good quality Hartenbos Dune Thicket and Groot Brak Dune Strandveld. Both these vegetation types are currently listed as threatened. The Kleinbrak WTW powerline route follows a municipal reserve on the southern side of the R102 for most of the way with significant regrowth and dune thicket in places. The Sandhoogte WTW powerline route runs through a cultivated area. Three SCC could be affected along the Kleinbrak WTW powerline route, namely *Hermannia lavandulifolia* (VU), *Selago villicaulis* (VU) and *Carpobrotus cf muirii* (NT). *H. lavandulifolia* and *C. cf muirii* are still common and frequently encountered in the Mossel Bay area, while *S. villicaulis* seems less common. In addition to these, a high number of milkwood and cheesewood are also present. Both are protected in terms of the National Forests Act (Act 84 of 1998) and a permit is needed for their removal. Despite the above constraints, potential for mitigation is very good. Among other, it is recommended that all trenching in sensitive areas be undertaken by hand. An effort must be made to avoid good quality indigenous vegetation and protected tree species as far as possible. The feasibility of rehabilitation after construction is also good. All in all, the impact on both terrestrial biodiversity and plant species is expected to be of low significance, with mitigation.

It is therefore recommended that the project be considered for approval, but subject to the proposed mitigation measures listed above.

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Annexure 1: Threatened plant species as listed in Screening Report (species in bold were recorded in study area)

Sensitivity	Feature(s)	Probability of presence
Medium	*Lampranthus fergusoniae*	Low-medium (iNat records <1 km east of Kleinbrak WTW)
Medium	*Lampranthus pauciflorus*	Low
Medium	*Ruschia leptocalyx*	Low
Medium	*Lebeckia gracilis*	Low
Medium	*Leucospermum praecox*	Low (iNat records <1 km east of Kleinbrak WTW)
Medium	*Wahlenbergia polyantha*	Low
Medium	***Selago villicaulis***	Recorded on site
Medium	*Erica unicolor* ssp. *mutica*	Low
Medium	*Erica glandulosa* ssp. *fourcadei*	Low
Medium	***Hermannia lavandulifolia***	Recorded on site
Medium	Sensitive species 153	Low
Medium	Sensitive species 268	Low
Medium	*Duvalia immaculata*	Low
Medium	*Cotula myriophylloides*	Low
Medium	*Agathosma eriantha*	Low
Medium	*Agathosma muirii*	Medium (iNat records <1 km southeast of Kleinbrak WTW)
Medium	*Euchaetis albertiniana*	Low-medium (doubtful iNat records from area)
Medium	*Muraltia knysnaensis*	Low (doubtful iNat records from area)
Medium	*Polygala pubiflora*	Low
Medium	*Nanobubon hypogaeum*	Low
Medium	Sensitive species 516	Low
Medium	Sensitive species 800	Low
Medium	Sensitive species 500	Low
Medium	Sensitive species 654	Low
Medium	*Agathosma microcarpa*	Low
Medium	*Zostera capensis*	Low

Annexure 2: Impact Assessment Methodology

Each issue that is identified consists of components that on their own or in combination with each other give rise to potential impacts, either positive or negative, from the project onto the environment or from the environment onto the project. In the EIA the significance of the potential impacts is considered before and after identified mitigation is implemented, for direct, indirect, and cumulative impacts, in the short and long term.

A description of the nature of the impact, any specific legal requirements and the stage (construction/decommissioning or operation) were given. The following criteria will be used to evaluate the significance of each issue that was identified:

Nature: This is an appraisal of the type of effect the activity is likely to have on the affected environment. The description includes what is being affected and how. The nature of the impact will be classified as positive or negative, and direct or indirect.

- **Extent and location**: This indicates the spatial area that may be affected (**Table 1**).

Table 1: Geographical extent of impact

Rating	Extent	Description
1	Site	Impacted area is only at the site – the actual extent of the activity.
2	Local	Impacted area is limited to the site and its immediate surrounding area
3	Regional	Impacted area extends to the surrounding area, the immediate and the neighbouring properties.
4	Provincial	Impact considered of provincial importance
5	National	Impact considered of national importance – will affect entire country.

- **Duration**: This measures the lifetime of the impact (**Table 2**).

Table 2: Duration of Impact

Rating	Duration	Description
1	Short term	0–3 years, or length of construction period
2	Medium term	3–10 years
3	Long term	>10 years, or entire operational life of project.
4	Permanent – mitigated	Mitigation measures of natural process will reduce impact – impact will remain after operational life of project.
5	Permanent – No mitigation	No mitigation measures of natural process will reduce the impact after implementation – impact will remain after operational life of project.

- **Intensity/severity**: This is the degree to which the project affects or changes the environment; it includes a measure of the reversibility of impacts (**Table 3**).

Table 3: Intensity of Impact

Rating	Intensity	Description
1	Negligible	Change is slight, often not noticeable, natural functioning of environment not affected.
2	Low	Natural functioning of environment is minimally affected. Natural processes can be reversed to their original state.
3	Medium	Environment remarkably altered, still functions, if in modified way. Negative impacts cannot be fully reversed.
4	High	Natural functions and processes disturbed – potentially ceasing to function temporarily.
5	Very high	Natural functions and processes permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. Negative impacts cannot be reversed.

- **Potential for irreplaceable loss of resources**: This is the degree to which the projectwill cause loss of resources that are irreplaceable (**Table 4**).

Table 4: Potential for irreplaceable loss of resources.

Rating	Potential for irreplaceable loss	Description
1	Low	No irreplaceable natural resources will be impacted.
3	Medium	Natural resources can be replaced, with effort.
5	High	There is no potential for replacing a particular vulnerable resource that will be impacted.

- **Probability**: This is the likelihood or the chances that the impact will occur (**Table 5**).

Table 5: Probability of Impact

Rating	Probability	Description
1	Improbable	Under normal conditions, no impacts expected.
2	Low	The probability of the impact to occur is low due to its design or historic experience.
3	Medium	There is a distinct probability of the impact occurring.
4	High	It is most likely that the impact will occur.
5	Definite	The impact will occur regardless of any prevention measures.

- **Confidence**: This is the level of knowledge or information available, the specialist had in his/her judgement (**Table 6**).

Table 6: Confidence in level of knowledge or information

Rating	Confidence	Description
	Low	Judgement based on intuition, not knowledge/information.
	Medium	Common sense and general knowledge inform decision.
	High	Scientific/proven information informs decision.

- **Consequence**: This is calculated as extent + duration + intensity + potential impact on irreplaceable resources.

- **Significance**: The significance will be rated by combining the consequence of the impact and the probability of occurrence (i.e. consequence x probability = significance). The maximum value which can be obtained is 100 significance points (**Table 7**).

Table 7: Significance of issues (based on parameters)

Rating	Significance	Description
1-14	Very low	No action required.
15-29	Low	Impacts are within the acceptable range.
30-44	Medium-low	Impacts are within the acceptable range but should be mitigated to lower significance levels wherever possible.
45-59	Medium-high	Impacts are important and require attention; mitigation is required to reduce the negative impacts to acceptable levels.
60-80	High	Impacts are of great importance, mitigation is crucial.
81-100	Very high	Impacts are unacceptable.

- **Cumulative Impacts**: This refers to the combined, incremental effects of the impact. The possible cumulative impacts will also be considered.