

# **Proposed Expansion of the Zandberg Sand Mine near Robertson, Western Cape**

## **Biodiversity Offset Report**



**Version: 1.2**

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## DETAILS OF SPECIALIST REPORT AND DECLARATION OF INDEPENDENCE

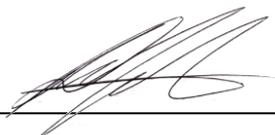
This is to certify that the following biodiversity offset plan has been prepared as per the requirements of:

- Section 32 (3) of the NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (Act No. 107 OF 1998) ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS 2014 as per Government Notice No. 38282 GOVERNMENT GAZETTE, 4 DECEMBER 2014 (as amended in 2017).

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<b>Report prepared by:</b>	Douglas Macfarlane and Robyn Phillips
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<b>Reviewed &amp; approved by:</b>	Douglas Macfarlane
<b>Signature:</b>	
<b>Client:</b>	Greenmined Environmental

I, Douglas Macfarlane, hereby declare that this report has been prepared independently of any influence or prejudice as may be specified by Department of Environmental Affairs.

Signed: \_\_\_\_\_



Date: \_\_\_\_\_

8<sup>th</sup> February 2022

### DISCLAIMER

This Biodiversity Offset Plan has been drawn up for sole use in the Proposed Zandberg Sand Mine Expansion Project on Portion 4 of the Farm Zandberg Fontein No 97, near Robertson, Western Cape. This Plan has been developed through consultation with key stakeholders and with reference to best available offset guidelines. Further changes may however be required following feedback from regulating authorities. This report must however not be amended without prior consultation and approval from the Client and Eco-Pulse Consulting.

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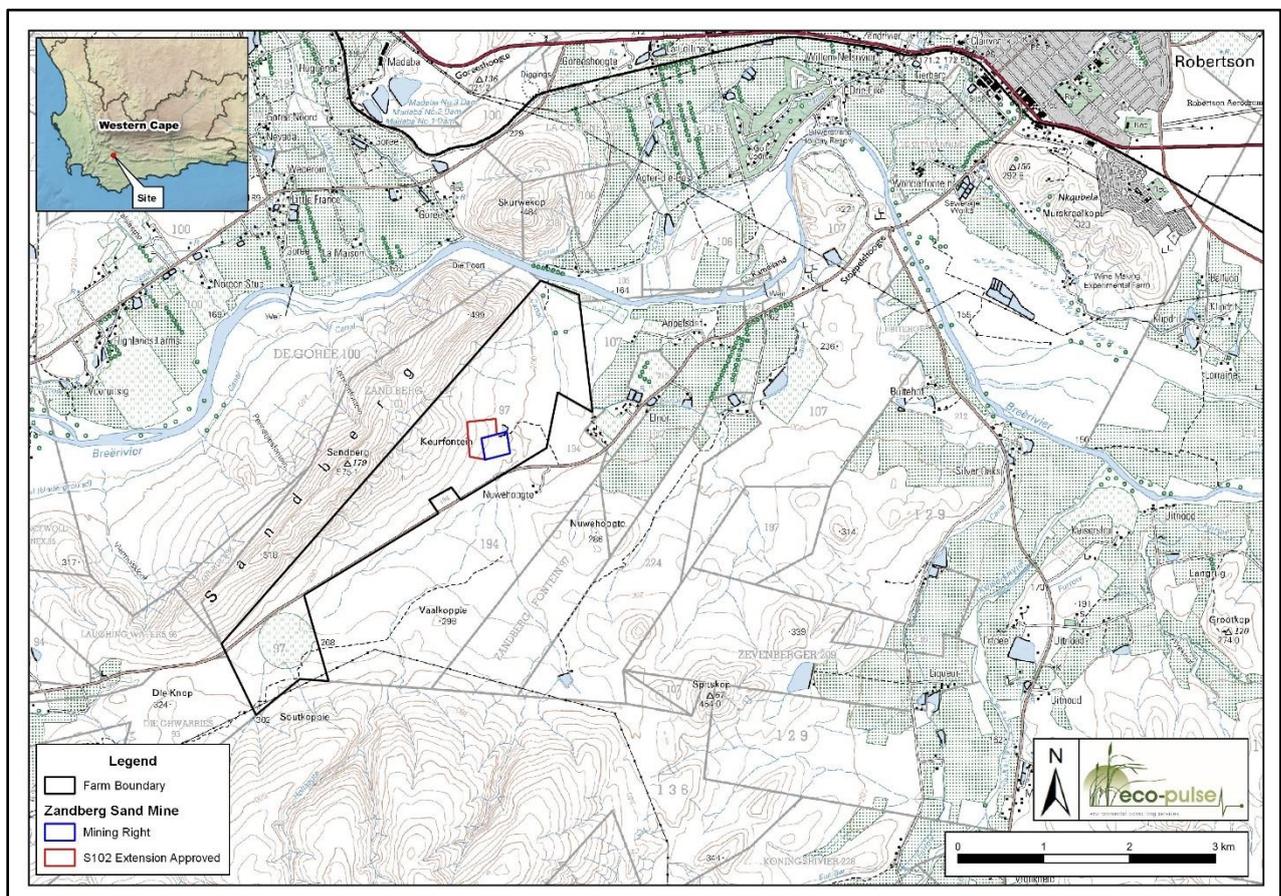
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# 1. INTRODUCTION

## 1.1. Background to the project

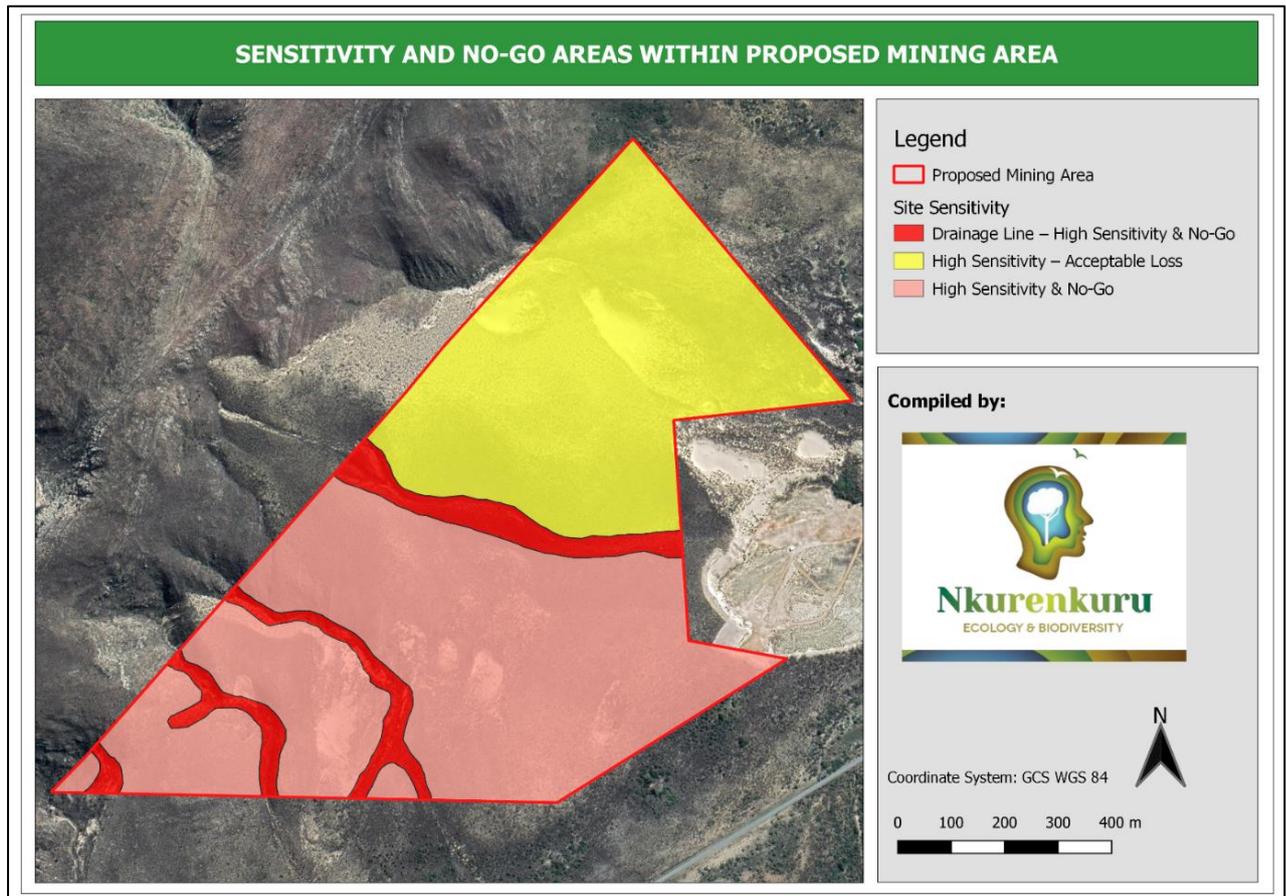
### 1.1.1. Project location and preliminary planning

Zandberg Sandput (Pty) Ltd (Zandberg) currently holds a Mining Right (MR) for an approved area of 17.6826 ha, which comprises the original MR area of 7.48 ha and an approved 10.2 ha extension granted in December 2018, valid until May 2047. Zandberg proposes to further expand their sand mining operations within Portion 4 of the Farm Zandberg Fontein No 97, approximately 536 ha in extent, just southwest of Robertson in Langeberg Local Municipality, Western Cape Province (Figure 1). Greenmined Environmental Consulting (Greenmined) was appointed to undertake the environmental process for the application for a Section 102 amendment of the Environmental Authorisation (EA) as required by the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended in 2017).



**Figure 1** Location of the study area

Initially Zandberg submitted a S102 amendment application in terms of the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA), to expand the current MR area by ~108.37 ha, and a Draft Scoping Report (DSR) was submitted to the Competent Authority in June 2020. The extent of the area proposed for mining was not supported by the authorities. Following further botanical input, the proposed mining footprint was reduced to ± 27 ha, and a proposal was made to set aside a “No-Go” area as a biodiversity offset area (Figure 2).



**Figure 2** Map illustrating the ecological sensitivity of the project site and revised target mining area (yellow).

A Draft Environmental Impact Report (DEIR) was then submitted for public review and stakeholder comment on 30 November 2020. The extent of the area proposed for mining was still not supported by the conservation authorities however due to the area falling within a Critical Biodiversity Area (CBA1), and it was clear that further reductions in the proposed footprint would need to be considered. Further feedback from key stakeholders relevant to this application and the need to strengthen the application of the mitigation hierarchy, including biodiversity offsets is outlined below.

### **1.1.2. Preliminary stakeholder feedback on initial application**

Following is a summary of the comments received on the first Draft Environmental Impact Assessment Report and Environmental Management Programme Report for the Expansion of the Sand Mine (DMR ref. no.: WC 30/5/1/2/2/87 MR & WC 30/5/1/2/2/10080 MR) in December 2020.

#### **CapeNature (1 December 2020)**

- *CapeNature does not support the application as currently proposed as it will result in the loss of ± 27 ha of CBA1 habitat. Should the mining proposal be considered further a biodiversity offset study will need to be undertaken after applying the mitigation hierarchy and need and desirability will need to be motivated.*

- *The vegetation types present according to the National Biodiversity Assessment (NBA) classification are Breede Sand Fynbos (listed as Vulnerable) over most the area with North Sonderend Sandstone Fynbos (listed as Least Concern) along the north-western boundary.*
- *The Breede Sand Fynbos is also mapped as such by the Upper Breede Fine Scale Planning (FSP) Vegetation Mapping, which is a finer scale product than the NBA vegetation mapping and has been ground-truthed (Helme, 2007).*
- *According to the botanical assessment (Nkurenkuru, 2020), the sensitivity of the vegetation across the entire site is classified as highly sensitive. The conservation value of the habitats is rated as high apart from the mobile and semi-stabilised dunes which are moderate-high.*
- *The fieldwork was not undertaken in an optimal time of year to identify ephemeral seasonal species that are only identifiable in late winter/spring and may have been dormant at the time of the surveys.*
- *The localities of the SCC populations need to be indicated to assess the impact and a spring survey is required to identify any SCCs which may have been dormant when the January survey was undertaken.*
- *The conclusion of the botanical assessment states that the classification as CBA1 is supported and accordingly the permissible land uses within CBAs are referred to, for which mining is not an appropriate land use.*
- *CapeNature wish to query the contradiction that the northern section is more uniform and hence of lower conservation value and is therefore acceptable for the proposed mining expansion, as this area too consists of CBA1 and was rated of high sensitivity and high conservation value.*
- *The proposal is that the remainder of the area which formed part of the mining application area to the south should be conserved as a biodiversity offset.*
- *In following the principles of the mitigation hierarchy, the first step of avoidance would include investigation of alternative locations, which is not always possible for mineral deposits. Considering construction sand is not a rare mineral resource, the importance of this mineral resource relative to other deposits of sand for exploitation would need to be taken into consideration relative to the loss of CBA1 habitat.*
- *Following thorough application of the mitigation hierarchy, including motivation of the need and desirability, a biodiversity offset would need to be implemented should the proposed mining expansion be contemplated further. Should a biodiversity offset be considered for the mining proposal, it must comply with the Draft Western Cape Guideline on Biodiversity Offsets (2015) and the Draft National Policy on Biodiversity Offsetting in South Africa (2018).*
- *Habitat that is considered irreplaceable is not offsettable.*
- *The biodiversity offset would need to aim for “like for like” as far as possible in protecting the same habitat that will be lost.*
- *The area to be conserved is determined in accordance with the ratios in the above-mentioned guidelines and policy. CBA 1 and Critically Endangered ecosystems require offsets at a ratio of 1:30.*
- *The biodiversity offset should be determined through an independent biodiversity offset specialist study, which must also include operation and implementation. The broader landscape should be included within the investigation of the most suitable target site for the biodiversity offset and should take into consideration existing protected area expansion initiatives and connectivity.*

- *A stormwater management plan has been compiled and included in an appendix and must be integrated with the rehabilitation and closure plan.*
- *The proposed end use of the mine is to return it to natural vegetation, with rehabilitation taking place progressively as mining proceeds. It should however be emphasized that the proposal is not to restore the original vegetation on site but instead to rehabilitate to functional habitat (which would be of lower conservation value than the original vegetation on site), which we agree is a more realistic goal. The design and rehabilitation will also ensure that there is free drainage of water to minimize impacts on hydrology which is supported. CapeNature recommends that a suitably qualified specialist must be appointed to undertake rehabilitation.*

#### **Department of Environmental Affairs and Development Planning (DEADP) (2 December 2020)**

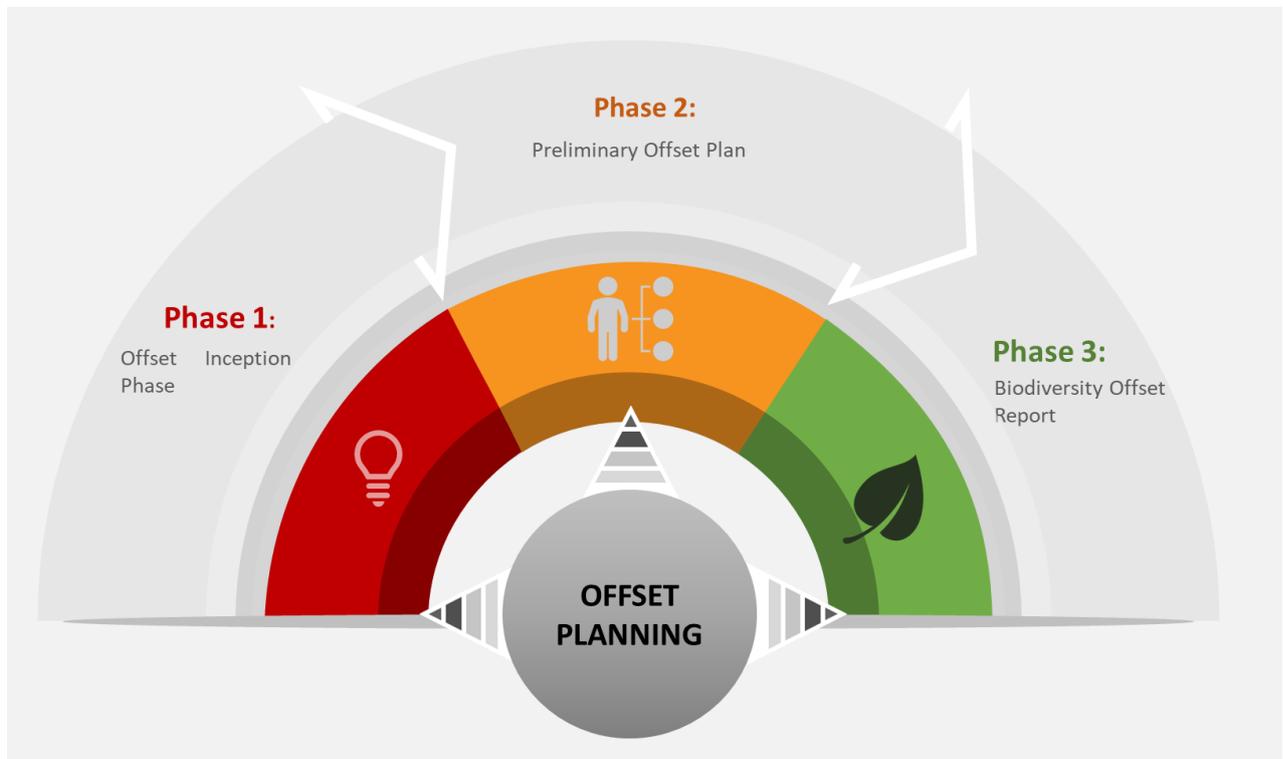
- *Please amend both mine plans to indicate the extent (27 ha) of the preferred layout alternative in relation to the originally proposed 10 8ha mining area. A final layout plan must be compiled, which excludes the southern portion of the proposed mining footprint (to be regarded as a “no-go” area and treated as a Biodiversity Offset Area).*
- *Although the area to be mined has been reduced to 27 ha, the area is still located within a Critical Biodiversity Area (“CBA”). As previously indicated in our comments on the DSR, this Directorate does not support mining within a CBA.*
- *It is noted that an on-site area of 81ha will be set aside as a biodiversity offset. Please be advised that comment must be obtained from CapeNature regarding the proposed offset and must be included in the Final EIA Report.*
- *It is essential that the 100m buffer to the northern drainage line is always treated as a “no-go” area for not only mining, but also any other associated activities, such as haul roads, lay-down areas, etc. Furthermore, the identified greater “no-go” area of 81ha (shown as the red shaded portion of the red polygon in Figures 5 and 7 in the Draft EIA Report) should be strictly enforced.*

In response to these comments and recommendations Eco-Pulse Environmental Consulting Services were appointed by the applicant to assist in offset planning for this project.

## **1.2. Approach to biodiversity offset planning**

The practice of biodiversity offsetting is relatively new in South Africa and consequently approaches are being adapted and refined on a regular basis. While efforts have been made to develop an overarching national offsets policy, this is yet to be endorsed as a formal policy. As such, the practice of biodiversity offsets is still being established and varies to some extent in different parts of the country. The Western Cape was however the first province to prepare provincial guidelines (DEADP, 2015), and this has been used to help guide the planning and practice of biodiversity offsets in the province. This, together with the latest Draft National Biodiversity Offset Guidelines (DFFE, 2021a) were therefore used to inform the offset planning approach adopted for this project.

Given the importance of stakeholder input, offset planning was undertaken in an iterative fashion (Figure 3), with relevant guidance from key stakeholders. During the inception phase (Phase 1), emphasis was placed on obtaining an understanding of the ecological context and biodiversity importance of the site and working with the EAP and applicant to ensure appropriate implementation of the mitigation hierarchy.



**Figure 3** Overview of approach to offset planning.

Once a revised proposal had been prepared, residual impacts and associated offset targets were calculated and a preliminary offset plan<sup>1</sup> was prepared with reference to available biodiversity offset guidelines (Phase 2). A meeting was then held with Cape Nature on 16 November 2021 to provide an overview of the updated development proposal and preliminary biodiversity offset recommendations. The feedback received through this interaction was then used as a basis for refining and finalizing the Biodiversity Offset Report (Phase 3).

### **1.3. Further guidance received from Cape Nature**

Formal feedback was received from Cape Nature on the Preliminary Offset Plan<sup>2</sup> and is summarized as follows:

- *CapeNature supported the offset proposal as a preliminary recommendation to inform decision-making.*
- *The offset proposal meets the necessary requirements in terms of the biodiversity offset guidelines and will contribute towards the conserving priority biodiversity and the conservation estate.*

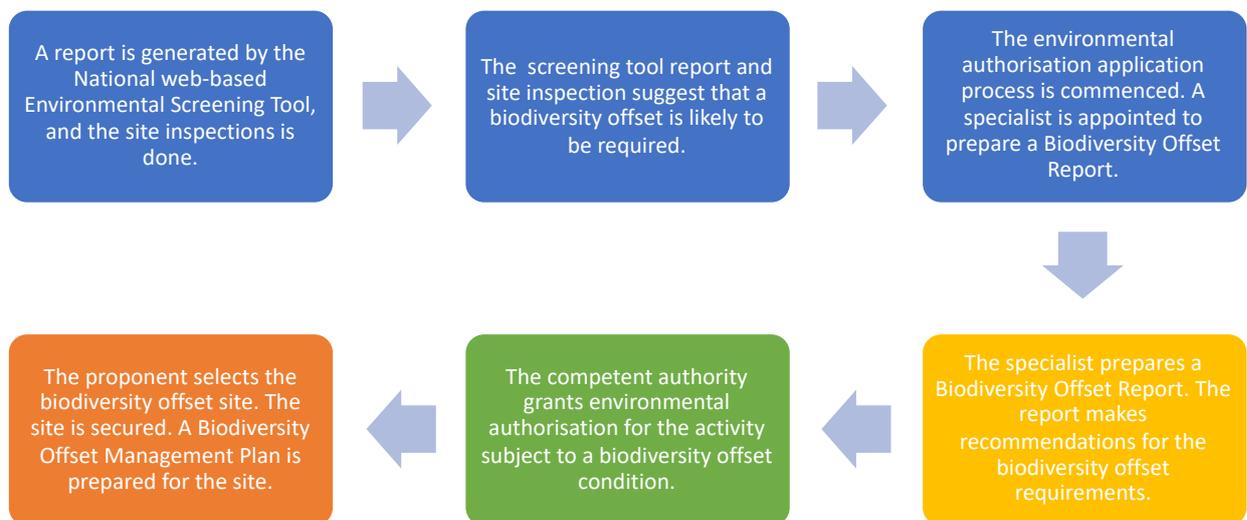
<sup>1</sup> Eco-Pulse, 2021. Preliminary Offset Investigation Report. PowerPoint Presentation. 16 November 2021.

<sup>2</sup> Cape Nature, 2022. Feedback on proposed biodiversity offset. Letter received from Rhett Smart (Manager (Landscape Conservation Intelligence)) on 7<sup>th</sup> January 2022.

- They recommend that a full biodiversity offset report be included with the final submission and should provide recommendations for inclusion as conditions of approval in the environmental authorisation (should this be issued).
- The proposed biodiversity offset must be presented to the CapeNature Protected Area Expansion and Stewardship Review Committee on 2 February 2022, in order to provide a final recommendation, specifically regarding the protected area status.
- Further details regarding the logistics, costs and roles and responsibilities must be included in the final biodiversity offset report.
- The applicant should provide a written commitment to securing the offset in the submission of the final biodiversity offset report.

#### 1.4. Scope and Purpose of this Document

This Biodiversity Offset Report was prepared as a key step of the EA application process. This effectively builds on the findings of specialist biodiversity reports prepared in response to issues raised in the EIA screening tool and preliminary feedback from key stakeholders (Figure 4). The blue boxes represent the pre-application phase, the yellow box, the EIA phase, the green box, the decision-making phase and the orange boxes, the post-decision phase (DFFE, 2021a).



**Figure 4** Contextualizing offset planning within the EIA process.

This Biodiversity Offset Plan is designed to provide concrete and practical recommendations to compensate for negative impacts of the proposed development on biodiversity. Key aspects specifically addressed in this plan include:

- A review of the ecological context and biodiversity importance of the site;
- An overview of offset policies and guidelines relevant to this application;
- An overview of actions taken to strengthen the application of the mitigation hierarchy;
- Quantification of residual impacts and offset targets using best-practice guidelines;

- Offset site selection and quantification of potential offset contributions;
- Brief outline of recommended offset actions;
- Indicative costing and financing requirements;
- Programme and phasing of compensatory actions; and
- Recommended conditions of authorization.

It is envisaged that final changes to this offset report will be made following feedback obtained by Cape Nature following submission of the draft EIA report. A Biodiversity Offset Management Plan will then need to be prepared for the selected offset site to guide long term management of the offset site (not covered as part of this report).

## 2. REGIONAL ECOLOGICAL CONTEXT

### 2.1. The DFFE Screening Tool Report

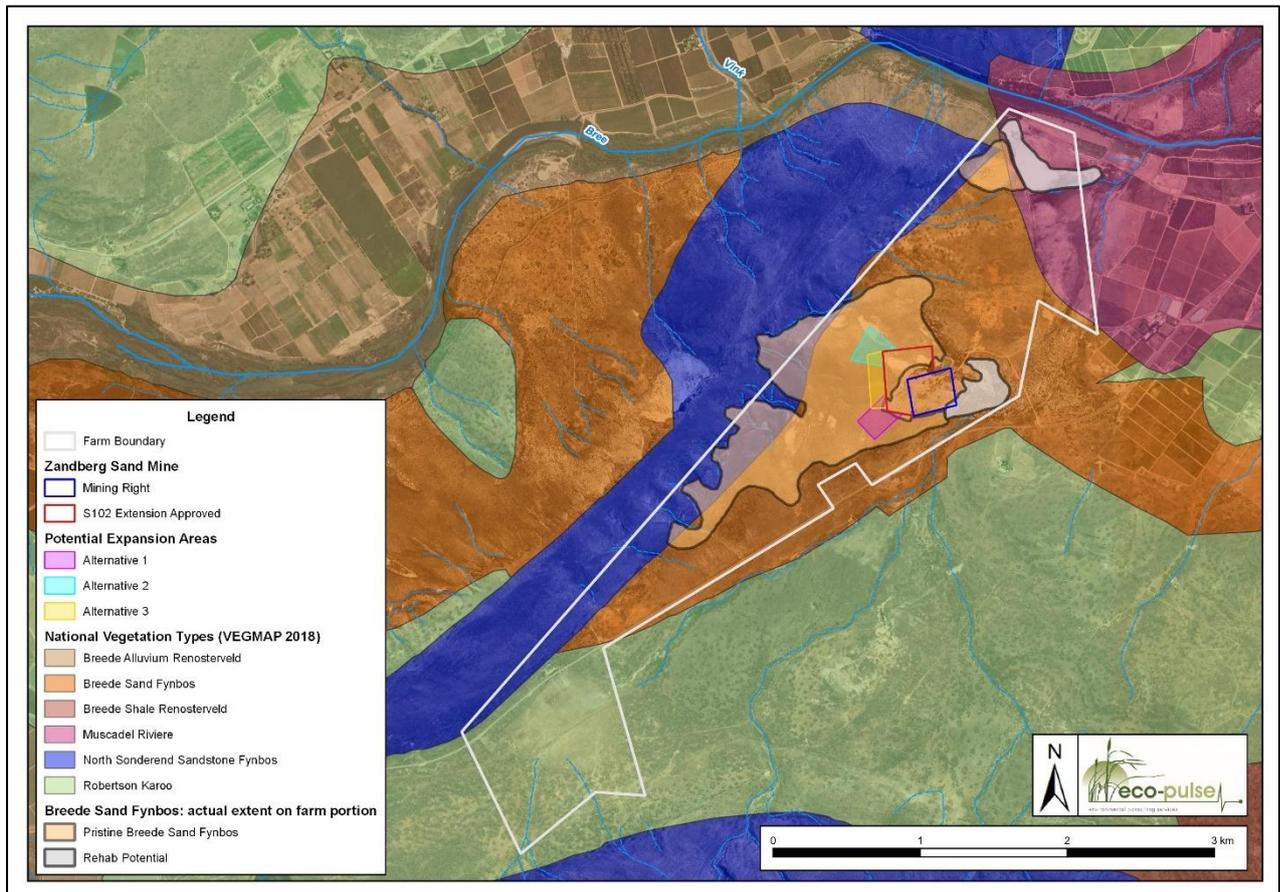
A Screening Report for the proposed site environmental sensitivity, as required by the EIA Regulations of 2014 (as amended in 2017) for an EA, was generated for the project on 13/01/2020 using the National Web-Based Environmental Screening Tool. Table 1 shows the site environmental sensitivities identified for the proposed development. Themes pertaining to biodiversity are highlighted and discussed in the sections that follow.

**Table 1:** Summary of site environmental sensitivities identified by the Screening Tool

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
<b>Animal Species Theme</b>		X		
<b>Aquatic Biodiversity Theme</b>				X
Archaeological and Cultural Heritage Theme			X	
Civil Aviation Theme		X		
Palaeontology Theme			X	
<b>Plant Species Theme</b>			X	
Defence Theme				X
<b>Terrestrial Biodiversity Theme</b>	X			

### 2.2. National Vegetation Types

The study area is located mostly within the East Coast Renosterveld Bioregion, which forms part of the Fynbos Biome, and is interspersed with areas forming part of the Rainshadow Valley Karoo Bioregion, which is part of the Succulent Karoo Biome (Rutherford and Westfall, 1994). According to Mucina & Rutherford (2018), most of the site falls within the original extent of the Breede Sand Fynbos (FFd 8) vegetation type, which has established on the wind-blown sand deposit covering the mountain side, with North Sonderend Sandstone Fynbos (FFs 13) occurring on the remainder of the mountain slopes towards the western boundary. Robertson Karoo (SKv 7) vegetation to the extreme southwest and Muscadel Riviere (AZi8) to the northeast (Figure 5).



**Figure 5** The study area in relation to regional vegetation types

Breede Sand Fynbos is a fragmented vegetation type with very limited extent, comprising only about 97 km<sup>2</sup> of land area and is classified as Vulnerable (Mucina and Rutherford, 2006). Its conservation target is 30%, but none of the unit is conserved in statutory conservation areas, while only 2% is protected in the Hawequas and Quaggas Berg Private Nature Reserves. Furthermore, some 45% of the area has been transformed, mainly for agriculture and by building of the Brandvlei and Kwaggaskloof Dams (Mucina and Rutherford, 2006; Nkurenkuru, 2021). The largest mapped fragment (VegMAP) is almost entirely inundated by the Brandvlei Dam. Breede Sand Fynbos is a poorly studied vegetation unit. This, together with high levels of fragmentation, the non-existence of statutory conserved areas of the unit, and the moderate level of transformation of the unit, makes it a high conservation priority (Nkurenkuru, 2021). The property targeted in this mining application is located within one of the current largest contiguous patches of Breede Sand Fynbos.

### 2.3. Western Cape Biodiversity Spatial Plan (WCBS)

A Provincial Conservation Plan aims to build on national plans at the provincial level. It is intended to be used by those involved in development planning, particularly specialists who need a comprehensive source of biodiversity information. The Western Cape Biodiversity Spatial Plan (WCBS; Pool-Stanvliet *et al.*, 2017) uses a systematic biodiversity planning approach to identify the priority biodiversity areas and ecological infrastructure in the province. The WCBS is a spatial tool that comprises a map of biodiversity priority areas, accompanied by contextual

information and land use guidelines that make quality biodiversity information available for land use and development planning, environmental assessment and regulation, and natural resource management (Pool-Stanvliet *et al.*, 2017).

The WCBSP Map covers biodiversity importance for both the terrestrial and freshwater realms, as well as major coastal and estuarine habitats. A BSP Map is the product of a systematic biodiversity plan that uses the five broad biodiversity priority categories, as per SANBI's Technical Guidelines for biodiversity maps, i.e., Protected Areas (PA), Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA), and Severely Modified or No Natural Remaining (NNR). The Map delineates CBAs and ESAs, which require safeguarding to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services (Pool-Stanvliet *et al.*, 2017).

According to the WCBSP, the entire area proposed for expansion is located within a Critical Biodiversity Area 1 (CBA1) (Figure 6 **Error! Reference source not found.**). Areas classified as CBA1 are regarded as “*areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure*”. The desired outcome for such areas is to maintain them “*in a natural or near natural state, with no further loss of habitat*”, and only “*low-impact, biodiversity-sensitive land uses*” are appropriate (Pool-Stanvliet *et al.*, 2017). Ground-truthing confirmed that the proposed mining Alternative areas conform to CBA1 criteria (Nkurenkuru, 2021). According to the WCBSP, the reasons for the area classified as **irreplaceable** (CBA1) are:

- *Vegetation: Breede Sand Fynbos (VU)*
- *Threatened Vertebrates: Mountain Zebra*
- *Watercourse protection: Southern Fold Mountains*
- *Vegetation: North Sonderend Sandstone Fynbos (LT)*

## 2.4. National Threatened Ecosystems

According to the currently gazetted National List of Threatened Terrestrial Ecosystems (DEA, 2011), the Breede Sand Fynbos Ecosystem (FFd 8) is listed as Vulnerable in terms of Section 52 of NEMBA (DEA, 2011). The ecosystem threat status assessments conducted for the WCBSP (Pool-Stanvliet *et al.*, 2017) and those conducted for the 2018 National Biodiversity Assessment (NBA) (Skownow *et al.*, 2019) also list it as Vulnerable (**Figure 7**), however, current evaluation by SANBI suggests that the Breede Sand Fynbos Ecosystem will be classified as Critically Endangered due to its limited extent (D. Macfarlane per. Comm. With A. Skownow, August 2021). The Draft Revised List of Ecosystems that are Threatened or in need of Protection, which was published for public comment on 5 November 2021, now lists Breede Sand Fynbos as Critically Endangered (DFFE, 2021b).

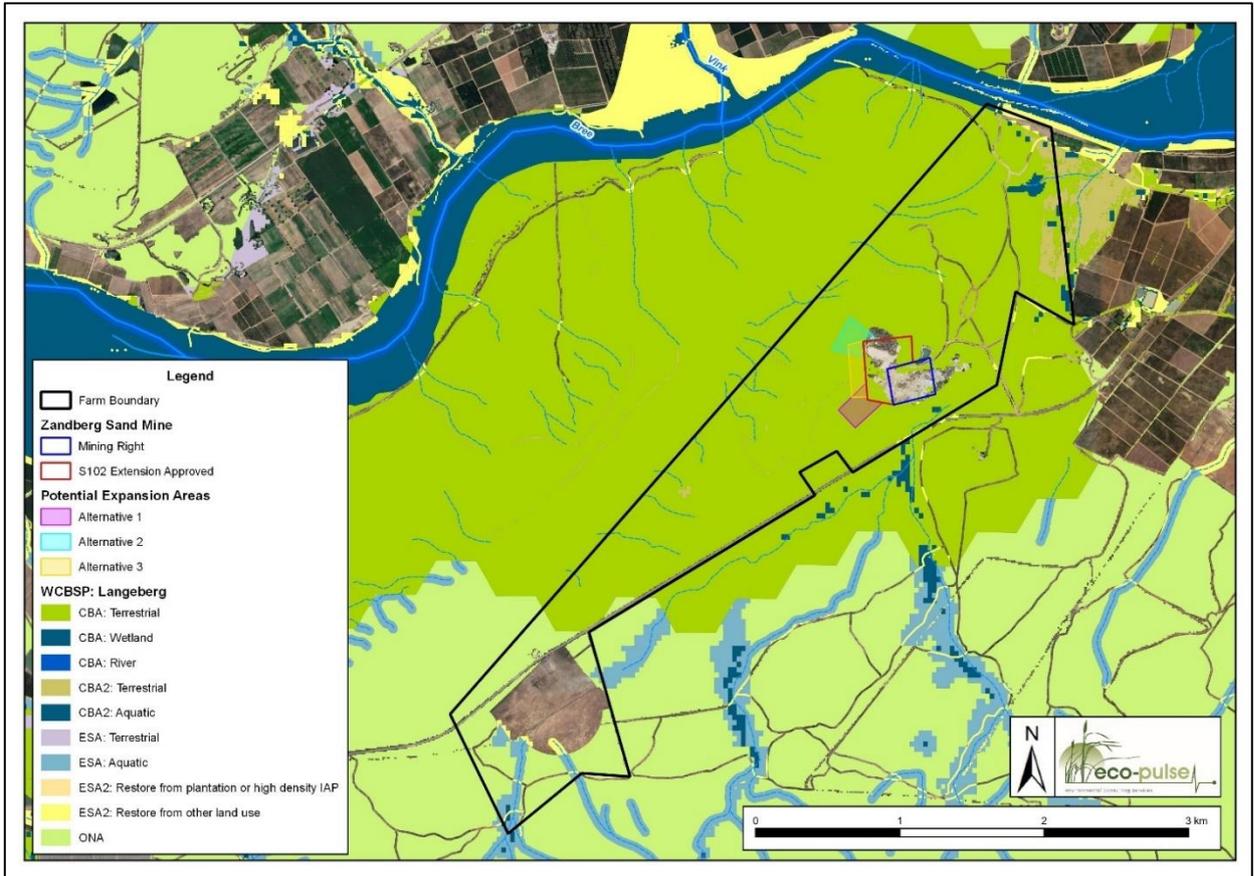


Figure 6 The study area in relation to the Critical Biodiversity Areas of the Western Cape.

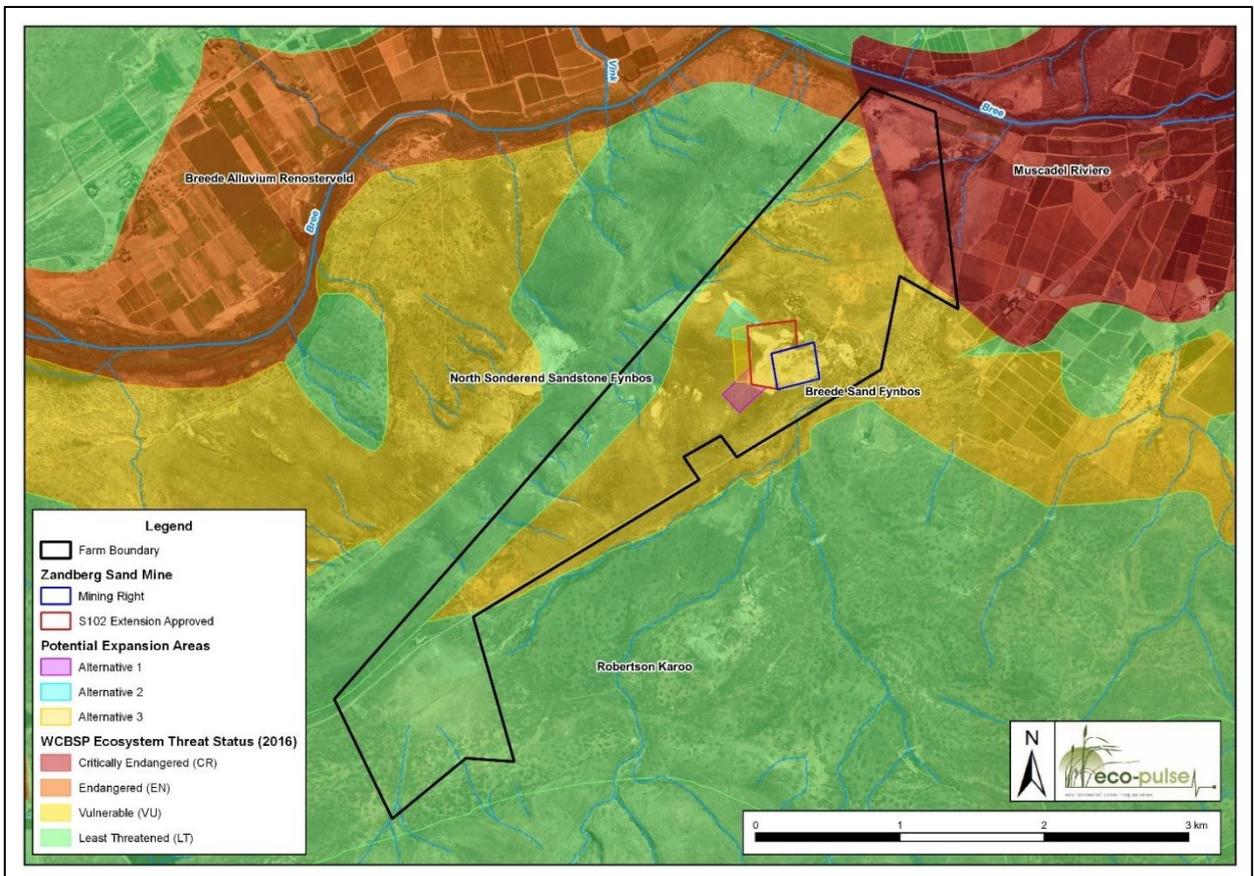
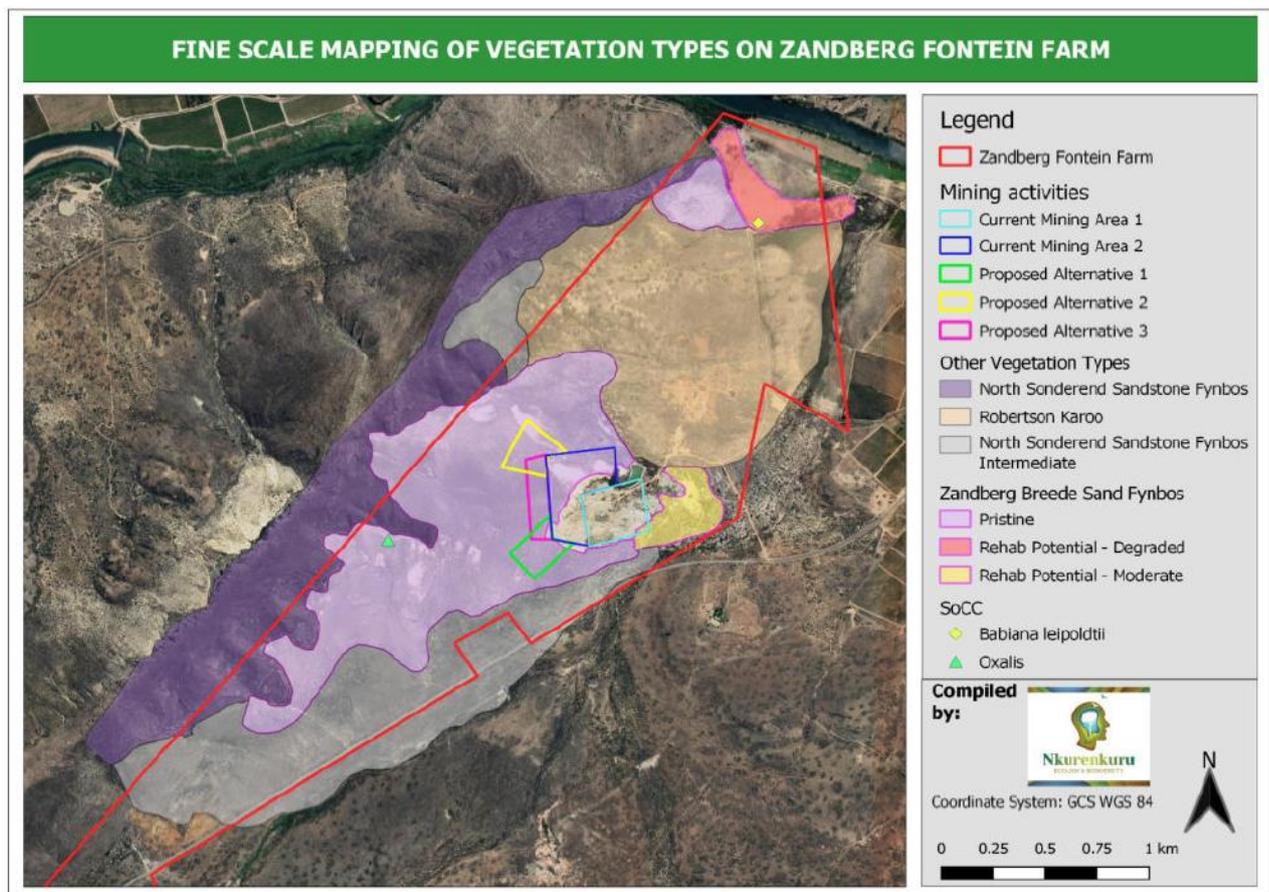


Figure 7 The study area in relation to national threatened ecosystems.

## 2.5. Specialist Investigations

### 2.5.1. Botanical Assessment

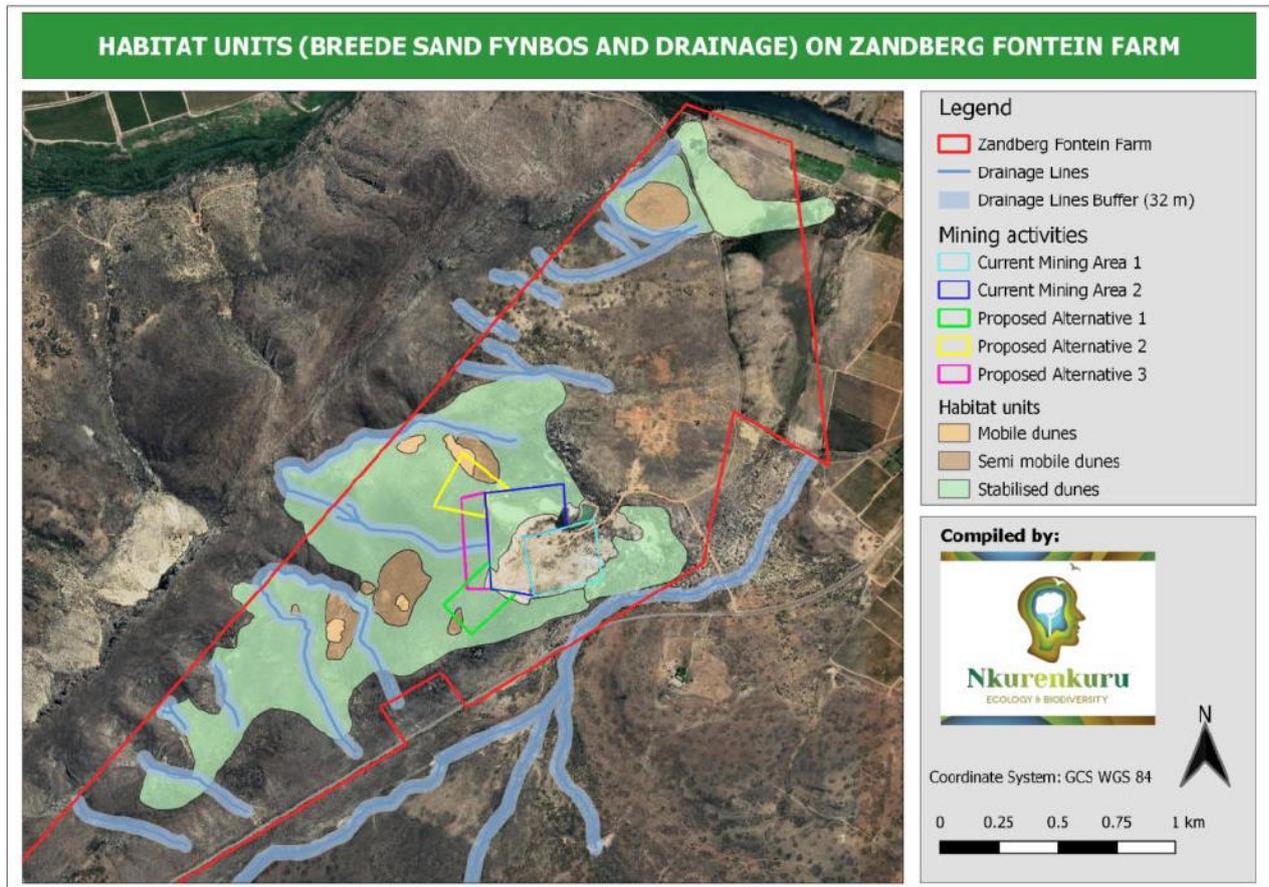
According to Nkurenkuru (2021), most of the target property comprises pristine Breede Sand Fynbos with pristine North Sonderend Sandstone Fynbos occurring along the western part of the farm boundary. The extent of the Breede Sand Fynbos within the farm portion is less than what has been mapped according to Mucina and Rutherford (2018). Of the Breede Sand Fynbos found in the study area, a pristine main contiguous unit (in which occur all three proposed alternatives fall) occurs towards the centre of the property, with a smaller pristine unit in the north-eastern corner of the farm. Two degraded units of Breede Sand Fynbos occur on the property, one (moderately degraded) adjacent to the east to the current mining area, and the other (heavily degraded) in the extreme north-eastern corner of the property (Figure 8).



**Figure 8** Fine-scale mapping of the vegetation types on the site (Nkurenkuru, 2021).

The Breede Sand Fynbos vegetation across the site is relatively uniform in terms of species composition, and is characterised by a tall proteoid shrub layer, with an open to medium dense restioid undergrowth. Variability in habitat types is mostly related to vegetation cover where mobile, windblown dunes sustain sparse vegetation cover, semi-mobile dunes comprise moderate cover, and stabilised dunes support high cover where the vegetation is well established (Figure 9). A total of 32 species of conservation concern (SCC) was recorded on site, 10 Red List (2 EN, 5 VU, 1 NT, 2 DD identified) and 28 Provincially Protected species. Many of the Breede Sand Fynbos SCC occur in large

numbers across the site, for example, *Aspalathus lactea* subsp. *breviloba* (VU), *Euchaetis pungens* (VU), and *Metalasia adunca* (NT) all > 1000 plants each recorded (Nkurenkuru, 2021).



**Figure 9** Habitat units within the Breede Sand Fynbos found on the site (Nkurenkuru, 2021).

The Endangered species *Babiana leipoldtii* was found in the degraded Breede Sand Fynbos section in north-eastern corner of the farm. Although it was not found in or near the proposed alternative areas, it is likely to occur in the vicinity. An unknown *Oxalis* species that does not seem to have been described before (personal communication Dr Kenneth Oberlander, *Oxalis* taxonomist) was found on the site. The identity of the species would need to be confirmed by more extensive studies. The species was found away from the proposed alternative areas, on the higher slopes of the Breede Sand Fynbos close to its border with North Sonderend Sandstone Fynbos in the western portion of the study area and would likely not be impacted by the proposed activities.

According to Nkurenkuru (2021), the vegetation of the area is pristine (no invasive aliens, no transformation, and no secondary vegetation), numerous unique micro-habitats exist, and various important functions and services are provided by the habitat units and their vegetation cover. These habitats therefore have a high ecological sensitivity and conservation value / importance. Loss of these habitats would not be acceptable unless appropriate biodiversity offset measures were implemented to converse the remaining vegetation at a ratio of 30:1. In addition, rehabilitation must be implemented after mining.



**Photo 1.** Dense vegetation cover of stabilised dunes



**Photo 2.** Semi-mobile and mobile dunes



**Photo 3.** Proteas growing on the lower foot slopes

The three alternative areas proposed for mining activities share a very similar suite of species, since all three areas are fully within Breede Sand Fynbos. Alternative area 1 is however characterised by a higher dominance of proteoid species, specifically *Protea laurifolia*, *Leucadendron salignum*, and *Leucospermum calligerum*. Although these species

are protected, they are very widespread and not threatened. Their dominance in Alternative area 1 also means that the abundances of other Red List species are less than in area 2. Area 3 is intermediate between areas 1 and 2 with the southern section having a lower abundance of Red List species, while the northern part has a higher abundance. For these reasons, Alternative area 1 would be the preferred option from a botanical perspective, since it would entail destroying a lower number of plant SCC. Alternative 3 is also an option as it minimises edge effects with a perimeter of ~580 m vs ~690 m and ~720 m of Alternatives 1 and 2 respectively.

### **2.5.2. Preliminary Faunal Assessment**

Based on the environmental sensitivities of the proposed development footprint, the DFFE Screening Tool identified the need for an Animal Species Assessment or Compliance Statement for inclusion in the EIA report due to the possibility of the following species occurring in the area:

- High: Black Harrier (*Circus maurus*) EN
- High: Black Eagle (*Aquila verreauxii*) VU
- Medium: Riverine Rabbit (*Bunolagus monticularis*) CR
- Medium: *Thestor kaplani* (butterfly) CR
- Medium: *Aloeides lutescens* (butterfly) EN

A preliminary faunal assessment based on a brief site visit and desktop analysis, was therefore undertaken. The aim of the assessment was to ascertain whether the site provides suitable habitat for the SCC listed above and whether further taxon specific investigations would be required. The objective would be to inform whether the offset would require provision for faunal SCC or confirm if the offset for the vegetation would suffice. As a result, a separate investigation for the presence of butterflies was deemed necessary, while the preliminary terrestrial faunal assessment covered birds, mammals, and herpetofauna (reptiles and amphibians).

According to Cossypha Ecological (2021) the site is currently in a natural condition and provides suitable habitat for an array of terrestrial faunal species. As per the botanical assessment, the habitats on the sand deposit ranged from areas with sparse vegetation cover due to the scouring effect of the wind, to areas with moderate vegetation cover and well-established vegetation cover on stabilised sands. The sandy soils provide important burrowing habitat for fossorial animals. The rocky habitat on the surrounding mountain is likely to support a slightly different suite of species due to the change in altitude, substrate, and vegetation type. Habitat heterogeneity and connectivity is provided by both habitat types in the landscape (Breede Sand Fynbos on sandy substrate and North Sonderend Sandstone Fynbos on the higher rocky slopes). The sandy habitat is however more fragmented due to the nature of the deposit and certain species that rely on this substrate may be confined to this habitat. Species with more diverse habitat requirements and more mobile species will be able to move through / over the dune.

While no formal sampling was undertaken, it was evident that the site supports an array of terrestrial fauna. No SCC were recorded during the brief site visit, and those known to occur in the region (such as those listed above) were given a medium to low likelihood of occurring on the site. While certain bird species may be encountered within the

study area, it's unlikely that the site provides critical habitat for these species. It is possible that *Certhilauda brevirostris* (Agulhas Long-billed Lark), endemic to the region and currently classified as NT, could occur on the site.

	
<p><b>Photo 4.</b> Common Duiker (droppings and spoor)</p>	<p><b>Photo 5.</b> Genet sp. (spoor and dropping)</p>
	
<p><b>Photo 6.</b> Cape Golden Mole feeding track</p>	<p><b>Photo 7.</b> Droppings of Cape/Scrub Hare (left) and Four-striped Grass Mouse (right)</p>

According to Cossypha Ecological (2021), impacts to terrestrial fauna (excluding butterflies), including SCC can be minimised through a reduced mining footprint (4 ha or less), careful placement of the expanded area, phasing mining activities, and ensuring effective rehabilitation of mined areas. Alternatives 1 and 3 are preferred to Alternative 2 as they are placed further down the slope and will ensure connectivity is maintained on the upper regions of the slope. The configuration of Alternative 3 is preferred, with its position being a narrow band along the length of the western border of the approved mining area. It expands the mining footprint in a uniform and consolidated block, as opposed to an additional piece projecting out further into the natural areas, as with Alternative 1.

### 2.5.3. Butterfly Assessment

The DFFE Screening Tool identified the medium possibility of *Aloeides lutescens* (EN). Dave Edge & Associates was appointed to conduct a butterfly sensitivity study for the site, which included a desktop study and preliminary site visit in September 2021. They found a strong probability (>50%) that the butterfly SCC *A. lutescens* could occur on the site but was not found because it only starts flying in October. The site visit revealed that another butterfly SCC *Chrysoritis rileyi* (Riley's Opal) currently listed as Endangered (EN) occurs on the site, close to mining extension area 2. It was recommended that a second site visit be undertaken during the flight period of *A. lutescens* in the second

half of October 2021 to establish if it occurs at the site, and to establish the full extent of the occurrence of *C. rileyi* in the vicinity of the intended mining operations. A third site visit conducted in early December 2021 was intended to determine which parts of the potential offset area of up to 148 ha are most likely to support populations of the SCC butterflies.

During the follow-up site surveys, *A. lutescens* was not detected despite the habitat being suitable, however the more common *Aloeides thyra* was found. Well-established populations of *Chrysothrix rileyi* were found on the site, both in Alternative areas 1 and 2, as well as in the already approved extension area. The populations of *C. rileyi* were confirmed to be substantial and viable, with many hundreds of individuals per brood recorded. It's likely that they have been present on the site for millennia, and without anthropogenic activities and disturbance they would endure indefinitely. Furthermore, another potential SCC has been located on the site in Alternative area 2, represented by an undescribed subspecies of *C. pyroeis*. This population requires further taxonomic investigation to determine its possible status as a new subspecies and IUCN status. A third species of *Chrysothrix* was found, *Chrysothrix brooksi*, which is not a SCC.



Photo 8. *C. rileyi* female on the site (underside)



Photo 9. *C. rileyi* female on the site (upperside)

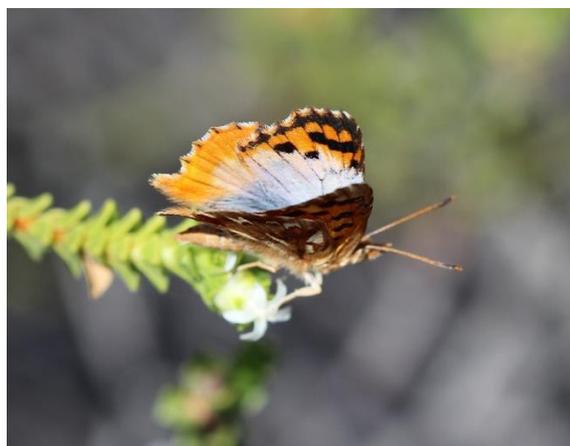
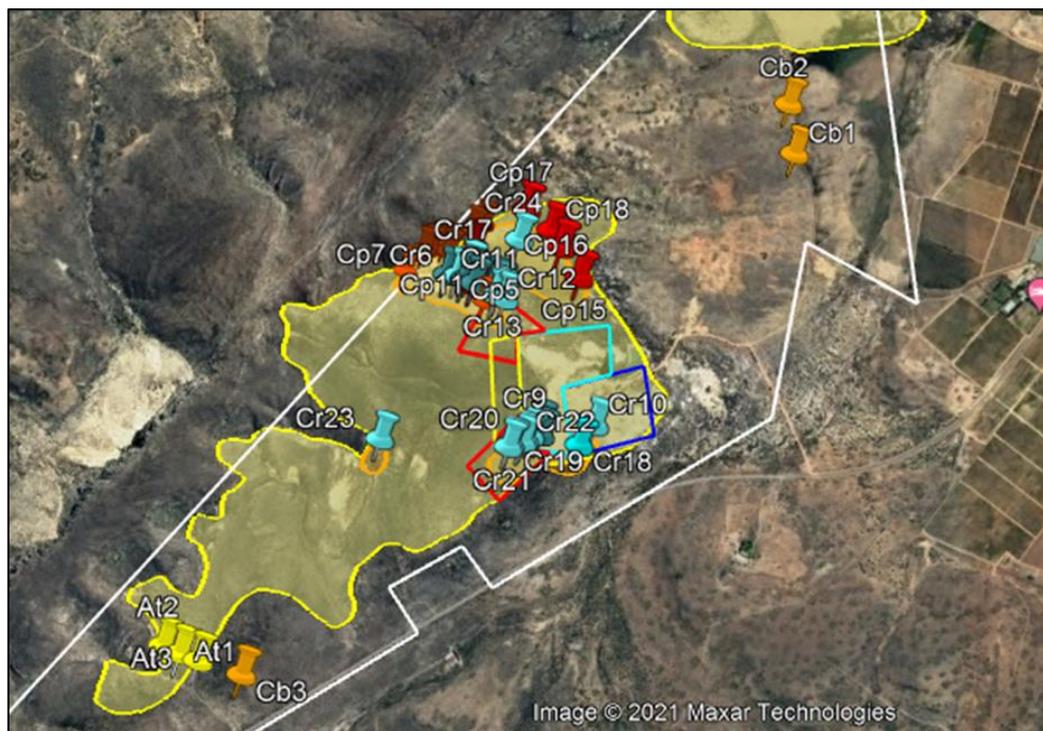
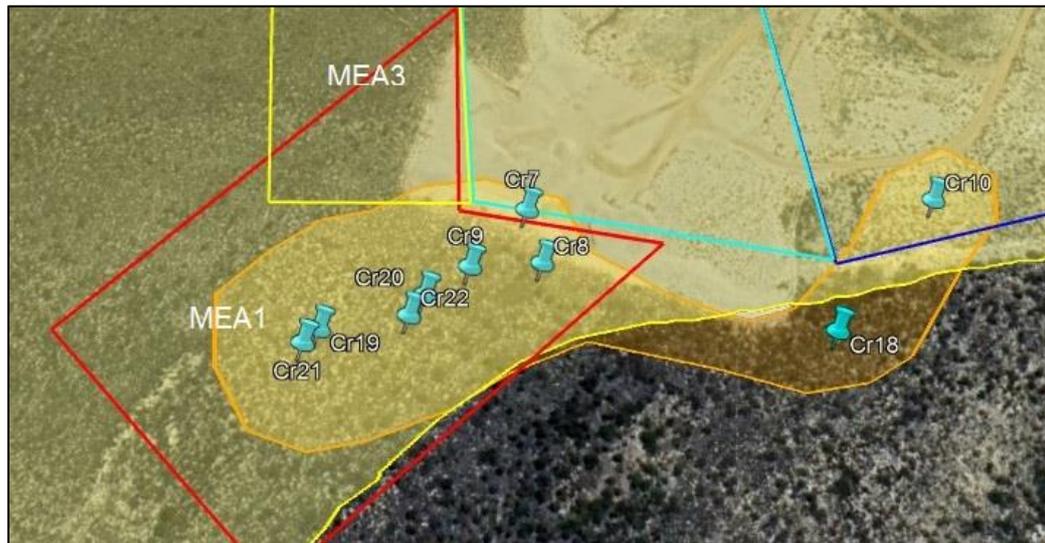


Photo 10. *C. rileyi* male on the site (upperside)

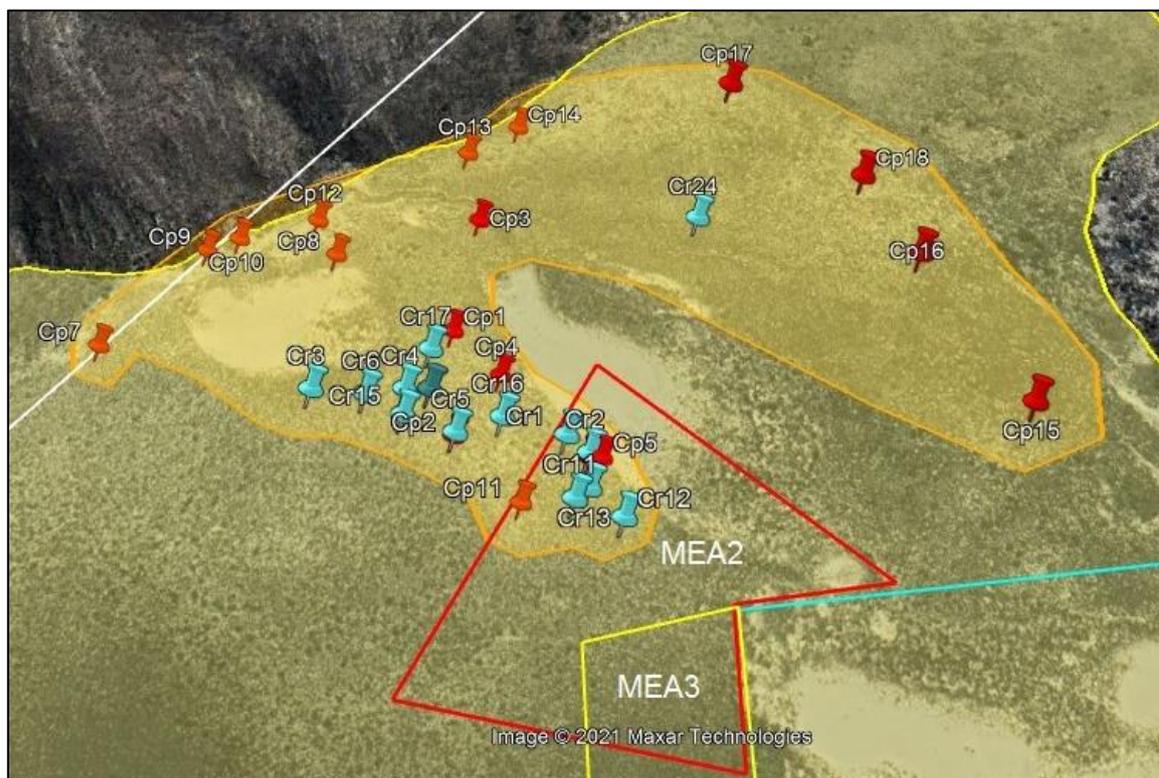
According to Dave Edge & Associates (2021), Alternative areas 1 and 2 are highly sensitive for butterflies and are not suitable for sand mining because of the importance of the butterfly populations found there (Figure 10). The potential impact of the proposed mining extension Alternative area 3 is minimal since no SCC butterflies were recorded there, even allowing a 50 m buffer. It is therefore possible that suitable offset area(s) could be found on the owner's property that contain butterfly populations sufficient to compensate for the damage done by mining. It is of critical importance to conserve all the populations recorded on the site since *C. rileyi* has a Global Red List status of Endangered, and the *C. pyroeis* ssp. may represent a newly discovered taxon, with a high Red List status. Given the small global extent and population size of both taxa, conserving the populations at Zandberg would significantly reduce their risk of extinction. Furthermore, the Red List status of *C. rileyi* will improve if the Zandberg populations were protected.



**Figure 10** All records of butterflies on Zandberg property. Yellow: At = *Aloeides thyra*; Orange: Cb = *Chrysoritis brooksi*; Red: Cp = *C. pyroeis*; and Blue: Cr = *C. rileyi* (Dave Edge & Associates, 2021)



**Figure 11** Butterfly records in vicinity of Alternative area 1. Blue: Cr = *C. rileyi* (Dave Edge & Associates, 2021)



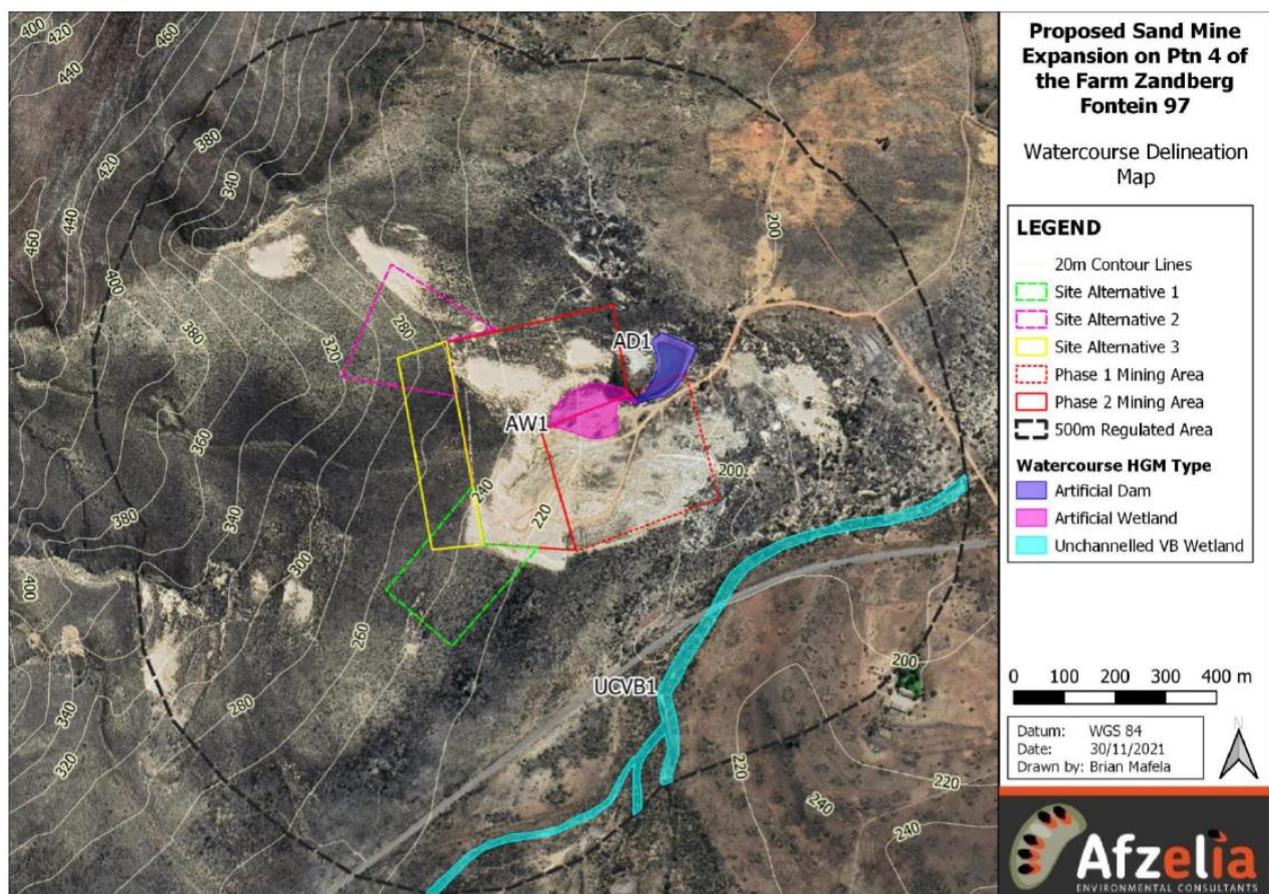
**Figure 12** Butterfly records in vicinity of Alternative area 2. Orange: Cb = *C. brooksi*; Red: Cp = *C. pyrois*; and Blue: Cr = *C. rileyi* (Dave Edge & Associates, 2021)

#### 2.5.4. Watercourse Delineation & Assessment

A wetland assessment was commissioned to delineate and assess any watercourses occurring within and around Alternative 3. According to Afzalia Environmental Consultants (2021), no watercourse (i.e. wetland or river habitat) occurs within Alternative 3 (Figure 13). Extension of the sand mine within Alternative 3 will therefore not result in the transformation of any watercourse.

Afzelia (2021) confirmed the presence of two wetland habitats within the 500m DWS regulated area. These were delineated as an artificial wetland habitat and an unchannelled valley bottom wetland (Unit UCVB1) (**Figure 13**). The artificial wetland habitat (Unit AW1) was evaluated as being at a high risk of being impacted by the proposed development whilst the unchannelled valley bottom wetland (Unit UCVB1) was at a low risk. An artificial off-stream dam (Unit AD1) was also recorded in the study area.

Anticipated adverse impacts these watercourses linked with the operation of the sand mine are expected to be of medium impact significance. Direct disturbance of the wetland habitat (Unit AW1), water pollution, and invasive alien plant infestation were identified as major risks. Implementation of recommended standard best practice mitigation measures will however lower the impact significance ratings. All impacts will be reduced to either a negligible or low impact significance.



**Figure 13** Watercourses and wetlands delineated in the study area (Afzelia, 2021)

### 3. RELEVANT OFFSET POLICIES AND GUIDELINES

A range of biodiversity offset guidelines have emerged in South Africa in recent years, with the country having over a decade of experience in designing and implementing biodiversity offsets and mainly in response to a growing recognition of the need to remedy residual adverse impacts of development, according to Brownlie *et al.* (2017). Provincial biodiversity offset guidelines have been developed for the Western Cape (DEADP, 2015) and KwaZulu-Natal (EKZNW, 2013) whilst the first edition of the National Offset Policy (DEA, 2017) is under preparation. Whilst the National Policy has yet to be finalized, considerable progress has been made in preparing a Draft National Biodiversity Offset Guideline (DFFE, 2021a) that has also been used to inform offset planning. An overview of key elements of these guidelines that were used to inform offset planning for this development are summarised here.

#### 3.1. Overview of Western Cape Offset Guidelines

The Western Cape Biodiversity Offset Guideline was developed in 2005, revised in 2007 and updated in 2015. Land-intensive development poses a significant threat to the province's remaining biodiversity and the conservation of biodiversity and important ecosystem services must be prioritised. A biodiversity offset policy is especially important for the Western Cape since the province contains exceptional biodiversity that is unique globally; and its ecosystems support socio-economic development and delivery of important services such as the reliable supply of clean water, ecotourism, and coastal protection (DEADP 2015).

The objective of biodiversity offsets, through the development authorisation and associated EIA process, is to ensure that residual impacts on biodiversity and ecosystem services are compensated by applicants in such a way that biodiversity targets are not undermined, ecological integrity is maintained, and development is sustainable (DEADP 2015). Spatial planning at all levels is important for highlighting land conservation priorities and providing guidance on the spatial framework wherein economic development should take place. Such policies or plans inform the use of biodiversity offsets as an instrument for environmental management and provide a useful tool to help meet provincial and national biodiversity targets (DEADP 2015).

Biodiversity offsets are considered as the last resort option in a hierarchy of possible mitigation measures, after steps have first been taken to avoid and then minimise significant negative impacts. Offsets may be considered to compensate for residual biodiversity impacts by securing priority habitat for biodiversity conservation in perpetuity and ensuring its effective management for a defined timeframe.

According to DEADP (2015) the trigger for biodiversity offsets is the significance of residual negative impacts of development, usually assessed during the EIA phase. When residual impacts on biodiversity are of moderate to high significance, offsets for biodiversity loss would be needed, while at low significance, there would be no need for biodiversity offsets. When residual impacts on biodiversity are of very high significance, offsets cannot fully compensate for the loss of biodiversity, and it is likely that the proposed activities would lead to loss of irreplaceable

biodiversity or priority ecosystem services. In this case the no-go alternative should be selected, unless the need and desirability of project is deemed to be of overriding public interest and there are no reasonable and feasible alternatives that could avoid or minimise impacts, compensation for these impacts would be required in the form of priority areas secured and managed for conservation.

According to DEADP (2015) the biodiversity offset system in the Western Cape is based on compensation in the form of 'like or better' habitat, and in some instances, monetary compensation may be appropriate. Monetary compensation may comprise contributions to an accredited biodiversity conservation trust for the sole purpose of acquiring and managing priority habitat for biodiversity, and/or providing funds to expand or manage public protected areas. In the Western Cape, offset requirements are linked to biodiversity targets to meet provincial and national biodiversity conservation obligations. Offsets are calculated by multiplying the measure of residual biodiversity loss by a basic offset ratio linked principally to the conservation status of the affected ecosystem:

- A 30:1 ratio for areas considered to be irreplaceable in terms of achieving biodiversity targets (e.g., Critical Biodiversity Areas) and for Critically Endangered ecosystems;
- From 10:1 to 30:1 ratio for Endangered ecosystems;
- From 1:1 to 4:1 ratio for Vulnerable ecosystems; and
- No offset for 'least threatened' ecosystems.

The area determined by the basic offset ratio is then adjusted by a range of context-specific considerations, including:

- The condition of the impacted habitat;
- The significance of residual impacts on threatened species;
- The significance of residual impact on special habitats;
- The significance of residual impact on important ecological corridors or process areas; and
- The significance of residual impact on biodiversity underpinning ecosystem services with socio-economic or heritage value.

The long-term security of an offset is critical to achieve the intended benefits to biodiversity and support the sustainability of the development project. According to DEADP (2015) a careful offset design process must therefore be followed and should include:

- Measuring the residual negative impacts on biodiversity to determine an appropriate offset;
- Determining the most appropriate type of offset: 'like for like habitat', 'trading up' (where habitat of a higher priority for biodiversity conservation than that affected by development is targeted as an offset) or monetary compensation;
- Determining the size and optimum location of the offset required to compensate for residual negative impacts on biodiversity;

- Checking the feasibility of securing offset site(s) and deciding on the best way to secure the offset: e.g., through the Stewardship Programme, conservation servitude, or as a donation to a statutory conservation authority (i.e., CapeNature or SANParks) or an accredited Public Benefit Organization; and
- Reaching in principle agreement with landowners on the offset.

The Competent Environmental Authority or CapeNature, as the provincial biodiversity agency, can call for biodiversity offsets during public participation in a Basic Assessment, Scoping or EIA process. In addition, they could comment on the proposed scope of specialist studies and the Terms of Reference for these studies (including offsets), and/ or on the adequacy of considering alternatives and proposed mitigation (including offsets), during the public participation stages (DEADP 2015).

Should the application for environmental authorisation be accepted conditional on an offset, then a detailed Offset Report and Offset Agreement would need to be prepared, together with an Offset Management Plan, providing details of how the offset site would be secured, financial requirements and provision, and implementation arrangements. These documents would need to be reviewed and accepted by CapeNature and the Competent Environmental Authority before the proposed activities could commence (DEADP 2015).

### **3.2. Draft National Biodiversity Offset Guidelines**

A Draft National Biodiversity Offset Policy (DEA, 2017) was developed and gazetted for comment in Government Gazette No. 40733, 31 March 2017. Following stakeholder comment, a revised draft Overall Policy on Environmental Offsetting was distributed to key biodiversity offset stakeholders (DEA, 2018). The principal objective of environmental offsetting as articulated in this draft Overall Policy is *“to slow and progressively reverse ecological deficit through counterbalancing human induced negative effects on the environment that remain after every effort has been made to avoid, minimise and then rehabilitate impacts through avoiding, minimising and rehabilitating impacts or impacted areas elsewhere.”* The draft Overall Policy sets out broad principles on environmental offsetting and recommends the development of more detailed sector-specific environmental offsetting guidance.

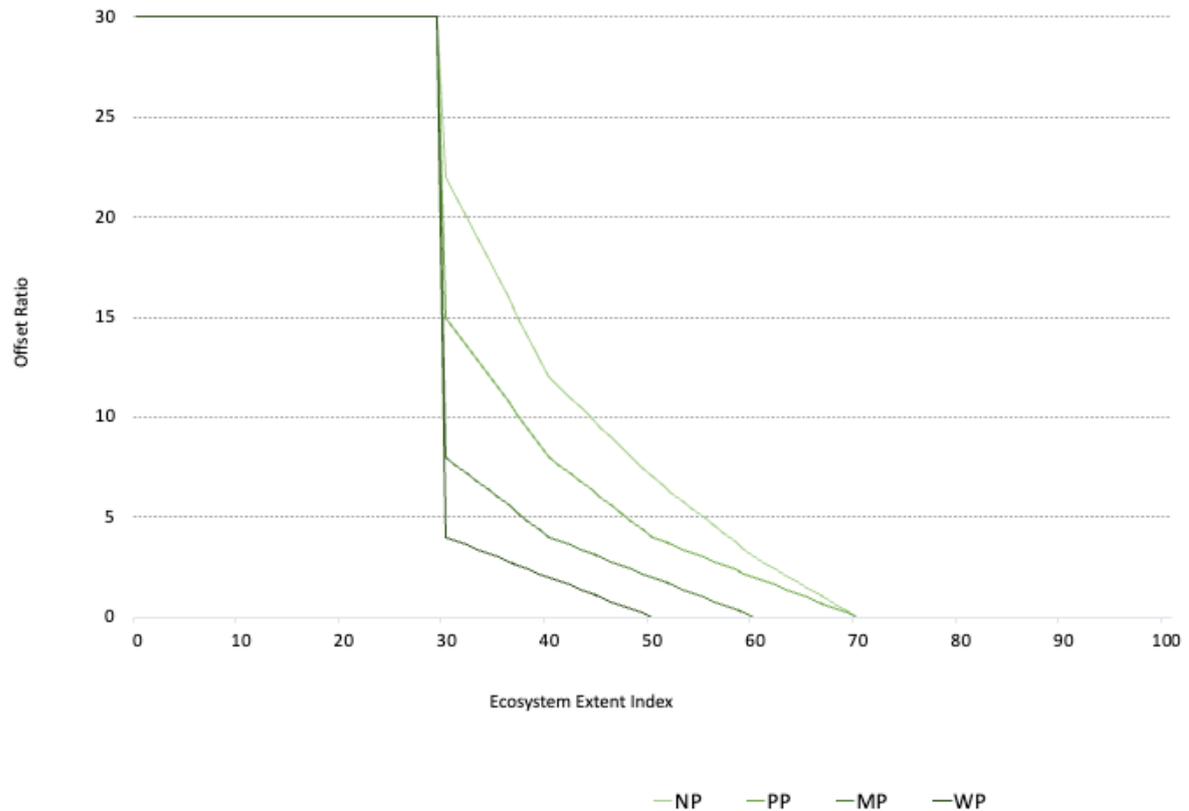
Following further consultation, a decision was taken by DFFE to prepare an implementation guideline for biodiversity offsets as contemplated in section 24J of the National Environmental Management Act, 1998 (NEMA). The Draft National Biodiversity Offset Guideline (DFFE, 2021a) effectively replaces Annexure A to the draft Overall Offset Policy and is one of the sector-specific guidelines contemplated in the draft Overall Offset Policy. It is aligned with the principles of the draft Overall Offset Policy and is designed to give practical guidance on biodiversity offsetting in the environmental authorisation application process contemplated in NEMA. This National Biodiversity Offset Guideline will soon be released for comment, and whilst this has not been finalised, represents the most advanced draft national guideline available.

The desired outcomes of biodiversity offsets as articulated in the draft National Biodiversity Offset Guideline are particularly relevant and aim to ensure the following:

- *That biodiversity is secured in the long term through the protection and appropriate management of ecosystems and species.*
- *That efforts to secure biodiversity in the long term contribute to the expansion of South Africa's protected area network, and are focussed in areas identified as biodiversity priorities, with particular emphasis on the consolidation of priority areas and securing effective ecological links between priority areas.*
- *That ecological infrastructure and the services and benefits it provides are maintained and where necessary restored.*
- *That the cumulative impact of the authorised activity, or activities, and land and resource use change does not:*
  - *result in the loss of irreplaceable biodiversity or jeopardise the ability to meet biodiversity targets;*
  - *lead to any ecosystem with a threat status of Vulnerable or Least Concern becoming Endangered, or any Endangered ecosystem becoming Critically Endangered;*
  - *cause an irreversible decline in the conservation status of species and the presence of special habitats; and*
  - *cause a significant loss in ecosystem services.*

The Draft National Biodiversity Offset Guidelines recommend offset ratios in respect of the preferred ecologically equivalent ('like-for-like') offsets. The approach to determining a basic biodiversity offset ratio have been adjusted in the is based on biodiversity targets, which are, in turn, based on remaining Ecosystem Extent, Ecosystem Protection Level (EPL), and Ecosystem Threat Status (ETS) (Figure 14). The following general rules have been applied when setting offset ratios:

- A 30:1 ratio applies in –
  - Critically Endangered ecosystems regardless of their Ecosystem Extent or EPL;
  - ecosystems with an Ecosystem Extent of 30% or less, regardless of their EPL or ETS; and
  - the case of ecological compensation.
- Sometimes biodiversity offsets are required for an activity, or activities, that are likely to have significant residual negative impacts on ecosystems with an Ecosystem Extent of 70% or greater. In those instances, a biodiversity offset ratio would need to be set based on the information before the decision-maker.
- For ecosystems with an Ecosystem Extent greater than 30% and less than 70%, the basic biodiversity offset ratio is adjusted according to the EPL of a given ecosystem (as shown in Figure 12). There are, however, exceptions to this general rule:
  - If the relevant ecosystem type's ETS is Endangered, the minimum biodiversity offset ratio is 10:1; and when it is Vulnerable, its minimum biodiversity offset ratio is 5:1.
  - If the area is a CBA 1, the ratio is 30:1, and if it's a CBA 2, the ratio must be adjusted the basic biodiversity offset ratio should be adjusted by increasing it by a factor of 1.5 up to a maximum of 30:1



**Figure 14** Biodiversity offset ratios based on Ecosystem Extent and EPL (DFFE, 2021a)

The Draft National Biodiversity Offset Guidelines is yet to be formally endorsed by the Government, and in the absence of a finalised and formally legislated national policy on biodiversity offsets, South Africa has relied on existing legal provisions in various pieces of environmental legislation as the basis for offset requirements, supported by provincial offset guidelines where available. Offset or compensation requirements are also not explicit in South Africa's environmental law, however, environmental management principles in the National Environment Management Act, No. 107 of 1998 (NEMA), which enables the inclusion of biodiversity offsetting as a condition of authorisation, particularly in terms of "*the need to remedy adverse effects on biodiversity and ecosystems after avoidance and minimisation*" (Brownlie *et al.*, 2017). Additional legislation that influences and/or supports biodiversity conservation and the use of offsets include the Protected Areas Act (of 2003) and National Environmental Management: Biodiversity Act (of 2004).

### 3.3. Key Definitions

As indicated, biodiversity offsets are a relatively new concept in South Africa, and the definitions for various terms are also in flux. Key definitions relative to this report are outlined below with reference to the Draft National Biodiversity Offset Policy (DFFE, 2021a).

- *“biodiversity offset”, for the purposes of this guideline, means the measurable outcome of compliance with a formal requirement contained in an environmental authorisation to implement an intervention that has the purpose of counterbalancing the residual negative impacts of an activity, or activities, on biodiversity, through increased protection and appropriate management, after every effort has been made to avoid and minimise impacts, and rehabilitate affected areas<sup>3</sup>.*
- *“Biodiversity Offset Management Plan” means a plan setting out the management actions to be taken at a biodiversity offset site to achieve and maintain specific conservation outcomes in the long term.*
- *“biodiversity offset site” means a suitable area in the landscape which meets the offset requirements in an environmental authorisation and is secured for biodiversity conservation in the long term.*
- *“mitigation” means to avoid negative impacts, and where they cannot altogether be avoided, to minimise and remedy them, including through rehabilitation, restoration, and/or offsetting.*
- *“residual negative impacts” means negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years.*

## 4. MITIGATION HIERARCHY ASSESSMENT

### 4.1. Introduction to the Mitigation Hierarchy

Best-practice dictates that offset investigations include a ‘Mitigation Hierarchy Assessment’ to determine what additional steps can be put in place before resorting to biodiversity offsets. An overview of the mitigation hierarchy is outlined here and is then followed by recommendations to strengthen existing mitigation measures to reduce negative impacts on biodiversity.

The protection of ecosystems and biodiversity generally begins with the avoidance of adverse impacts and where such avoidance is not feasible; to apply appropriate mitigation in the form of reactive practical actions that minimizes or reduces impacts. Mitigation requires proactive planning that is enabled by following the ‘mitigation hierarchy’ (see

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<sup>3</sup> Note that the concept of “ecological compensation” is included under the “Offsets” definition in this report since compensation requirements are effectively addressed in the same way as biodiversity offset measures. Here, “ecological compensation” means the outcome of measurable actions to protect, restore and manage priority biodiversity, aimed at compensating for residual negative impacts on irreplaceable biodiversity and ecological infrastructure where these impacts cannot be offset and which should, instead and in the first instance, be avoided.

Figure 15). The application of the mitigation hierarchy is intended firstly, to avoid disturbance and/or loss of ecosystems, and where this cannot be avoided, to minimise, rehabilitate, and then finally offset any remaining significant residual impacts. The mitigation hierarchy is inherently proactive, requiring the on-going and iterative consideration of alternatives in terms of project location, siting, scale, layout, technology, and phasing until the proposed development can best be accommodated without incurring significant negative impacts to the receiving environment. In the case of particularly sensitive ecosystems, where ecological impacts can be severe, the guiding principle should generally be “anticipate and prevent” rather than “assess and repair”.

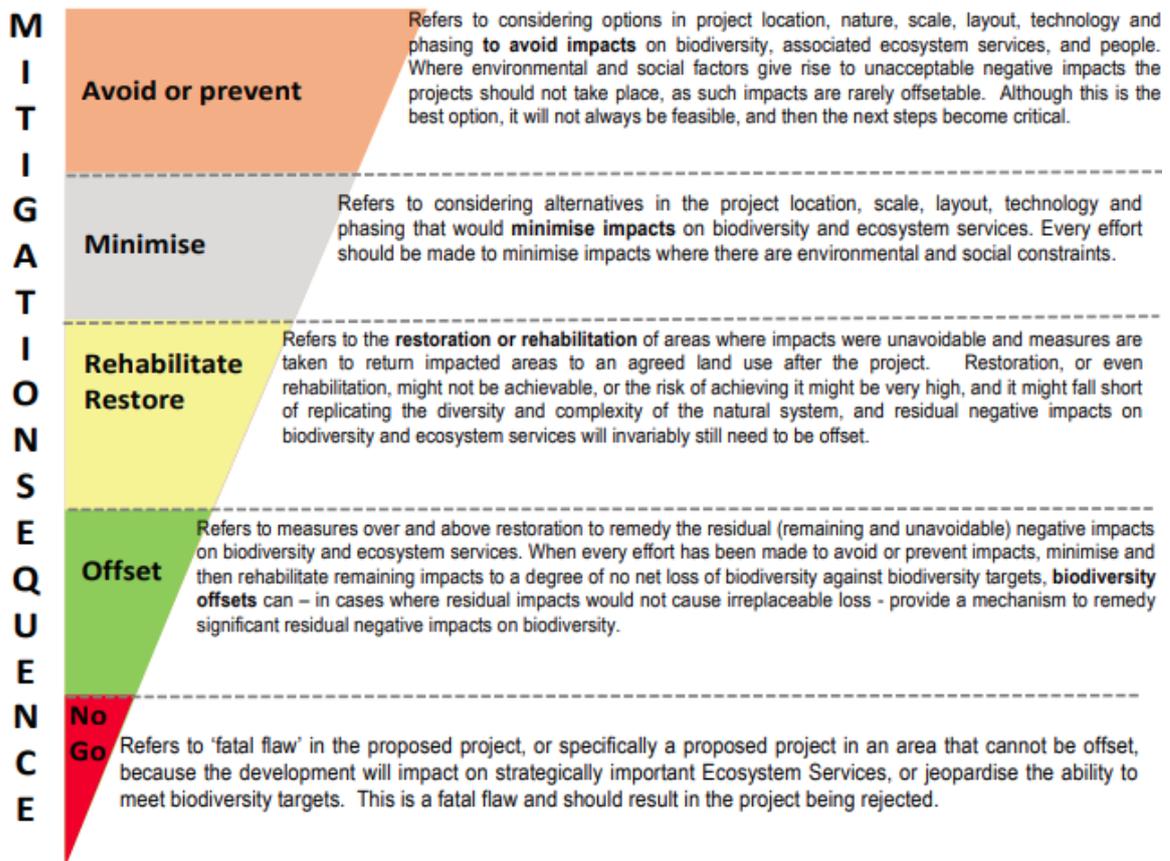


Figure 15 Placing offsets in the environmental impact mitigation sequence in South Africa (DEA, 2017)

## 4.2. Need and desirability of the proposed project

Whilst the application of the mitigation hierarchy is fundamentally important, it is also critical for decision makers to evaluate the need and desirability of the application and if impacts to CBA1 areas are indeed warranted from a social and economic perspective. A motivation letter<sup>4</sup> has been prepared by the applicant with this in mind and includes the following key motivational elements:

- Sand of the Zandberg Mine is of excellent quality and sold to the building, civil and construction industries in the Western Cape Province.
- Sand is free of organic matter and contaminant sources (seeds) that can cause cavities in plaster.

<sup>4</sup>Zandberg Sandput (EDMS) BPK. Motivation letter for the extension of Zandberg Sandbut (Pty) Ltd sand mining activities on portion 4 of the farm Zandberg Fontein No 97 in Robertson Magisterial District of the Western Cape Province.

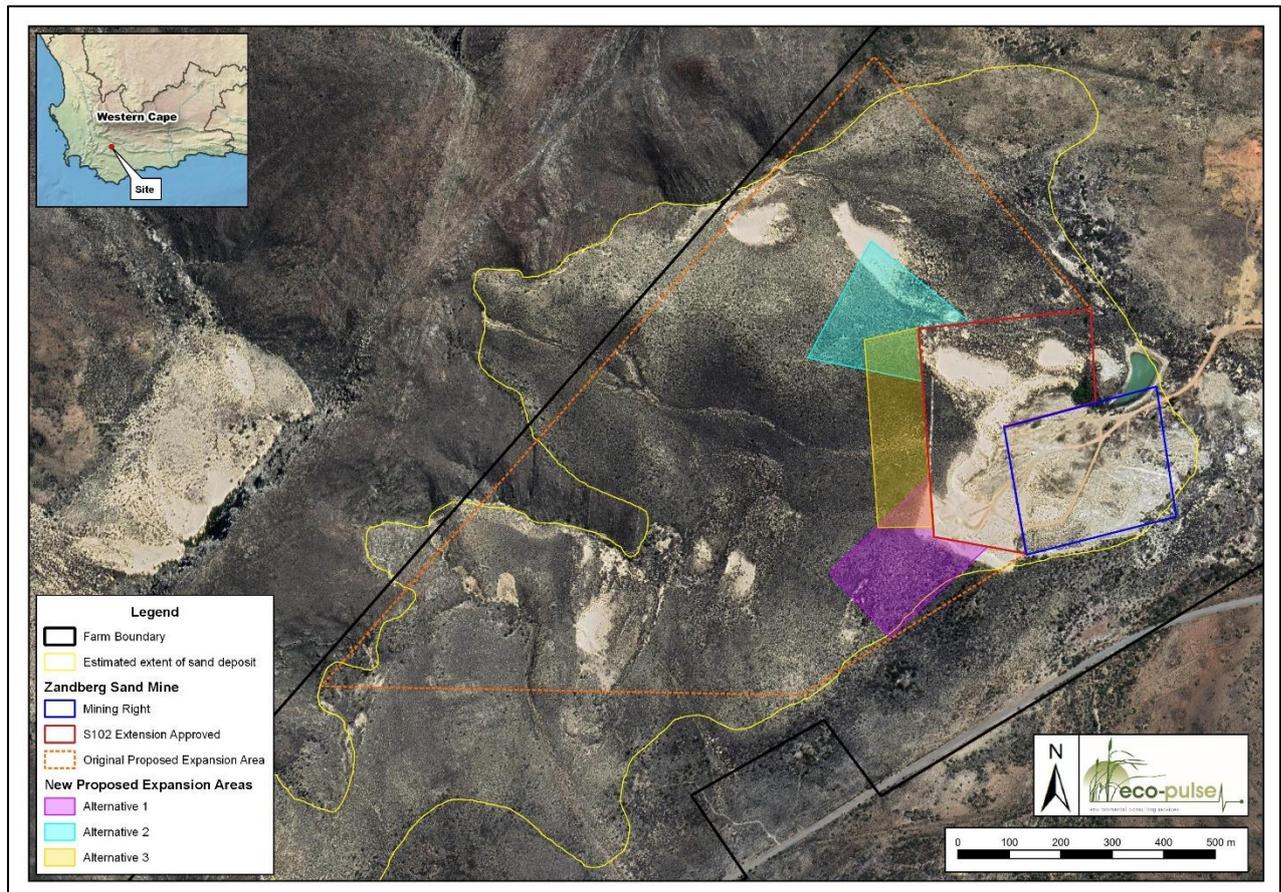
- Only other legally operated sand mine in the area is in Worcester some 60km away – insufficient capacity to meet current demands.
- Operations support a range of companies (transport, cement & brick manufactures, building) that contributes to job and income generation in the broader area.
- Offers a cost-effective source of sand in the local area to support a broad spectrum of economic development.
- Expansion of the existing mine is required to meet future demand in the area.

### **4.3. Application of the Mitigation Hierarchy**

Given that the proposed development will impact on a pristine portion of a highly restricted vegetation type, which is classified as a CBA1 and soon to be listed as Critically Endangered, certain measures were included in the project planning to reduce the significance of impacts prior to pursuing offset actions. These are briefly outlined here and strengthened where deemed feasible and appropriate.

#### **4.3.1. Avoidance and minimisation of impacts**

Due to the nature of the sand deposit that is of interest to the applicant, i.e., its presence being a direct result of the ancient wind-blown deposit of Breede River sand, complete avoidance of the Breede Sand Fynbos vegetation is not possible. Therefore, the first step was to vastly reduce the area proposed for the mine expansion from the initial proposal of 27 ha out of ~85 ha, to the currently proposed 4 ha. Subsequently, through an iterative process that considered the site sensitivity at a finer scale, the three alternative areas for the mine expansion were suggested. This included a location immediately southwest of the approved area (Alternative 1), one immediately northwest and up-slope of the approved area (Alternative 2), and one immediately west of the approved area (Alternative 3) (Figure 16). The three alternatives were then assessed by the biodiversity specialists (refer to Section 2.5), and the preferred alternative, which was deemed less sensitive than others, was chosen.



**Figure 16** Location and extent of alternatives mining extension areas considered.

Key considerations for the preferred alternative from a biodiversity perspective included the following:

- Limiting disruption to landscape connectivity;
- Avoiding areas with higher plant diversity, and high occurrence and abundance of plant SCC;
- Avoiding areas where populations of butterfly species are confirmed to occur;
- Avoiding any sensitive watercourses;
- Limiting edge effects by expansion of the existing mining areas and considering the configuration of the new mining areas in relation to the mined areas; and
- Limiting edge effects by avoiding areas high up the slope where access would be more difficult.

Taking the above mitigation into consideration, operational requirements that were key for the feasibility of the project were included:

- Depth of the deposit;
- Accessibility of the new mining area; and
- Operational aspects such as height of the work face.

#### **4.3.2. Rehabilitation measures to minimise impacts**

In addition, the most critical mitigation measure will be the rehabilitation of the site once the mining is complete, both in the existing mining footprint and new areas. According to Nkurenkuru (2021), after decommissioning, a continuous vegetation layer will be the most important aspect of ecosystem functionality, as a weakened or absent vegetation layer not only exposes the soil surface but also lacks the binding and absorption capacity that creates the buffering functionality of vegetation to prevent or lessen erosion and the destabilization of the dune plume as a result of floods and wind.

According to Nkurenkuru (2021), there is good potential for rehabilitation of mined areas to a state that supports most of the species characteristic of Breede Sand Fynbos. There is evidence of natural recovery even on steep slopes after ~5 years, but specifically, the existing mined-out areas (in the southern part of the site that was part of the original MR), which was left to restore passively, has good vegetation cover, and supports many species characteristic of Breede Sand Fynbos. This includes many individuals of some Red List species that occur in the surrounding Breede Sand Fynbos and North Sonderend Sandstone Fynbos. The fact that rehabilitated areas can facilitate the natural colonisation and persistence of Breede Sand Fynbos SCC, together with the fact that a suitable amount of Breede Sand Fynbos is available on site for biodiversity offsetting, will greatly mitigate the impacts of the proposed mining activities in the long-term.

To facilitate the rehabilitation process, topsoil must be retained and stored in an appropriate manner. Once an area has been mined, the topsoil should be replaced as soon as possible so that rehabilitation can start. The topsoil should be of the same type and quality as that of an equivalent benchmark site; in this case, pristine Breede Sand Fynbos found on the site. Based on observations made on site, the recommended depth of soil is between 50 cm – 100 cm. Re-establishing sand fynbos can prove to be difficult; however, hand sowing can be used to increase the chances of fynbos reestablishment. See the botanical report for recommended species to be used, which are characteristic of Breede Sand Fynbos. It is imperative that, while vegetation is establishing, soil erosion and compaction is carefully monitored and controlled. Designated access routes should be clearly established, and only these routes should be used so that soils are not unnecessarily compacted.

Alien plant control across the site (in previously mined areas as well as newly disturbed areas) is also a vital component of the rehabilitation process. During all alien plant control operations, damage to the environment must be prevented or minimised. It is also crucial that follow up control (removing seedlings, saplings, and coppice regrowth) is regularly done for at least three consecutive growing seasons for any area in which invasive species were removed. All areas must be continually monitored, and species lists updated, as re-invasion from neighbouring properties is a distinct possibility.

From a faunal perspective, the recovery of a suitable suite of Breede Sand Fynbos plant species will be key for butterflies (refer to the butterfly report for a plant species list), while maintenance of a good cover of sand in the rehabilitation process (50 cm – 100 cm) will help restore burrowing habitat for fossorial animals.

## 5. RESIDUAL IMPACTS & ASSOCIATED OFFSET TARGETS

The need for a biodiversity offset is evaluated based on the significance of residual impacts to biodiversity, including direct, indirect, and cumulative impacts. In particular, the impacts to the vegetation and the achievement of conservation targets are notable and was assessed as part of the botanical assessment for this site. A brief overview of the findings from the botanical assessment, preliminary faunal assessment, butterfly assessment, and wetland assessment is provided here and is then followed by a quantification of residual impacts and quantification of offset targets associated with the loss of habitat based on best-practice guidance.

### 5.1. Overview of impacts of alternative layouts

As summarised in section 2.5.1, the botanical assessment recognised that the site falls within a CBA1 according to the WCBSF and that the site represents one of the largest remaining blocks of pristine Breede Sand Fynbos with minimal disturbance. The entire project area is therefore regarded as highly sensitive from a botanical perspective.

Alternative 3 is preferred environmental alternative for mining extension over Alternatives 1 and 2. The most significant impacts flagged across alternatives are associated with:

- the destruction of vegetation and plant species of conservation concern (SCC);
- impacts on broad-scale ecological processes; and
- impacts on butterfly SCC (Table 2).

Whilst anticipated impacts have not been rated as highly, disturbed areas may also become prone to erosion and invasion with invasive alien plants, jeopardizing recovery potential. Cumulative impacts include the potential to affect the attainment of conservation targets for the vegetation type and ecosystem at a provincial and national level, compromising ecological functioning of the greater landscape, and the disruption to the connectivity of the landscape for fauna and flora, thereby impairing their ability to respond to environmental fluctuations.

Impacts to terrestrial fauna range from Low to Medium significance and are least significant under Scenario 3. Impacts on butterfly SCC can be mitigated by avoiding Alternatives 1 and 2 and were given a low-medium (negative) significance rating for Alternative 3. Impact ratings for butterfly SCC remain high (negative) significance for Alternatives 1 and 2 after mitigation however. **Alternative 3 is therefore the preferred alternative from an environmental perspective even through Alternative 2 was preferred from a mining perspective (2).**

**Table 2:** Summary of impact ratings of different alternatives.

Impact	Alternative 1	Alternative 2	Alternative 3
Destruction of vegetation and plant SCC	Medium	High	Medium
Impact on drainage lines	Low	Medium	Low
Increased erosion risk & destabilisation of dune plume	Low	Medium	Medium
Increased Invasive Alien Plant (IAP) species	Low	Low	Low
Cumulative: Reduced ability to meet conservation targets	Medium	Medium	Medium
Cumulative: Impact on broad-scale ecological processes	Medium	High	Medium
Impact on terrestrial fauna and habitat	Low-medium	Medium	Low
Impact on butterfly SCC	High	High	Low-medium
<b>Ranking of Alternatives</b>	<b>2</b>	<b>3</b>	<b>1</b>
<b>Preferred Mining Alternative</b>	<b>3</b>	<b>1</b>	<b>2</b>

## 5.2. Residual Impacts & Offset Targets

Based on the specialist assessments undertaken, the loss of pristine Breede Sand Fynbos vegetation is a significant negative impact from a botanical and ecological perspective. Impacts to fauna have been flagged as a concern, especially butterfly SCC, however these impacts can be reduced significantly by selecting Alternative 3, and the vegetation offset was deemed suitable and sufficient to compensate for negative impacts on fauna (Cossypha Ecological, 2021; Dave Edge & Associates, 2021). Residual impacts were therefore calculated on the extent of vegetation that would be impacted by the development (4 ha). The offset target is then calculated by multiplying the residual impact by a ratio of 30:1. This ratio applies for impacts to “Good” condition sites falling within the CBA1 category in terms of the WCBSP. As the site was assessed to be pristine and fulfils the CBA criteria, this basic target is applicable, therefore the **final offset target for the proposed development is 120 hectares**.

**Table 3:** Calculation of residual impacts and associated offset targets for the Zandberg site.

Area Impacted (ha)	4
Offset Ratio	30:1
Required Offset Target (ha)	120

According to the Western Cape Biodiversity Offset Guideline (DEADP, 2015), where a proposed development would transform or result in loss of CBAs, then the applicant must demonstrate that it is feasible to meet all the biodiversity targets for which the affected CBA has been selected, elsewhere in the landscape. In this instance, approximately 3% of the Breede Sand Fynbos on site would be impacted by the proposed development, which is approximately 0.13% of the remaining habitat, and would not prevent conservation targets from being achieved.

## 6. BIODIVERSITY OFFSET SITE SELECTION

The overriding principle of site selection is that, where possible, and as the highest priority for biodiversity offsetting, biodiversity offsets should be used to protect and maintain the irreplaceable elements of our biodiversity and natural heritage. The following principles have therefore been developed as part of the Draft National Biodiversity Offset Guideline (DFFE, 2021) and must guide site selection:

- Biodiversity offset sites should be selected for ecological equivalence (the like for like principle) or, where appropriate, there could be “trading up” to select an area of relatively high or more urgent conservation priority.
- Selection should be guided as far as possible by existing biodiversity priority areas in the landscape (for example, the CBA and ESA network, Freshwater Ecosystem Priority Areas, and focus areas for protected area expansion) and/or areas identified as strategic from an ecological infrastructure perspective (such as Strategic Water Source Areas).
- Biodiversity offsets should strive to secure the best examples of the features which have been impacted and to improve connectivity in the landscape between protected and priority areas for biodiversity.
- The final selection can be influenced by the reasonable consideration of factors other than the biodiversity value of the different candidate biodiversity offset sites, such as: ease of the management of the site by a relevant management authority; threats to conservation due to conflicting land use rights, claims or land use classification.

For this project, an area of approximately 169 ha within the farm portion was delineated and has been proposed as the biodiversity offset area (see Figure 17). This area complies with site selection guidelines outlined above and is deemed to be **adequate for addressing offset obligations** for the following reasons:

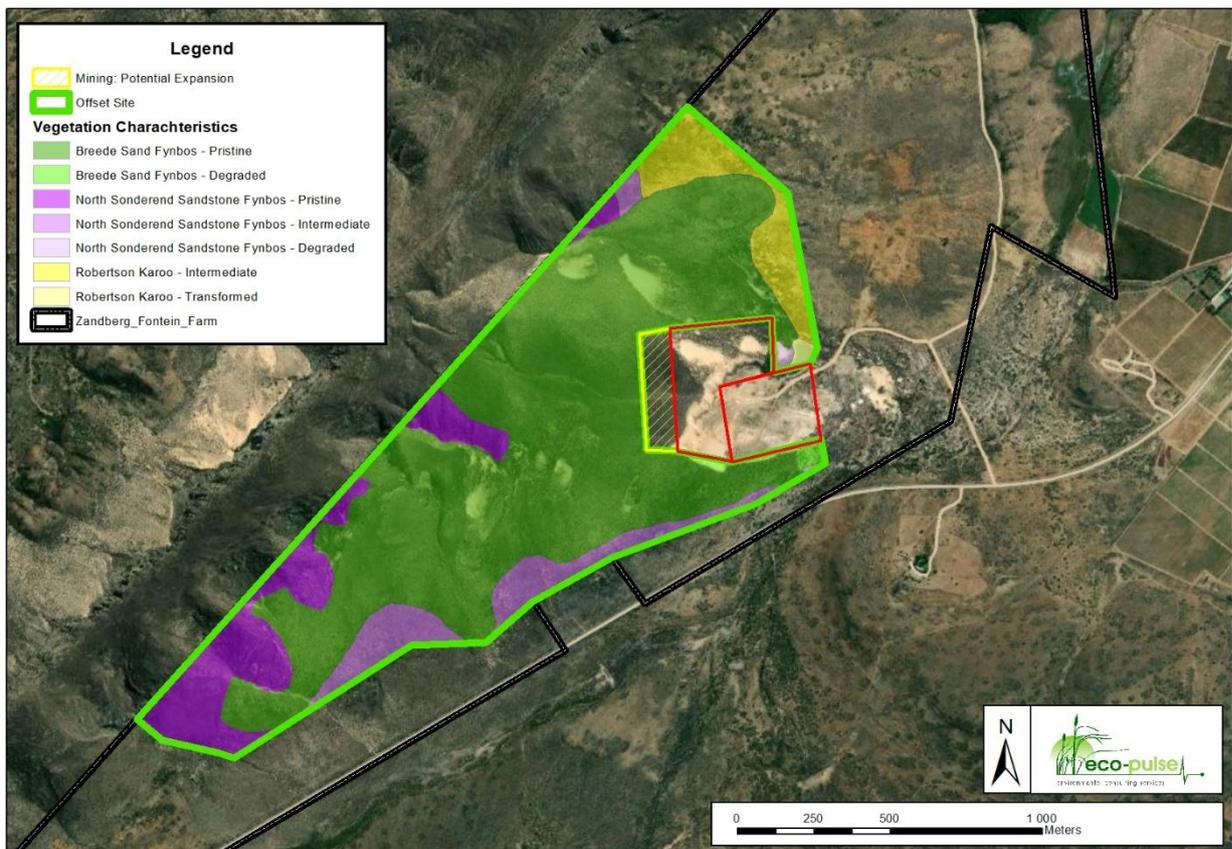
- The biodiversity offset site falls entirely within a CBA1 and is a priority for conservation action<sup>5</sup>;
- The biodiversity offset site contains 119.24 ha of pristine Breede Sand Fynbos (like for like) and also includes a small (1.48 Ha) of degraded Breede Sand Fynbos, with rehabilitation potential;
- The biodiversity offset site also includes approximately 35Ha of North Sonderend Sandstone Fynbos and 12Ha of Robertson Karoo vegetation, which can be considered additional conservation gains; and
- The biodiversity offset site will preserve important populations of butterfly SCC.

In addition to these considerations, a number of practical considerations have also been integrated as part of the site selection process. A brief overview of these considerations and how they relate to the proposed offset area are summarised below:

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<sup>5</sup> Note that whilst the property has not been identified in the National Protected Area expansion strategy, two properties directly to the north of the site have been identified as high priority sites in Cape Nature’s conservation action priority map (CAPMap), namely 0/101 Zandberg and 39/100 De Goree. The proposed nature reserve borders directly on to these properties and therefore there is potential for connectivity with future conservation areas.

- **Landownership:** The biodiversity offset site is not owned by the applicant but by Zandbergfontein Trust. The Directors of the Trust have however indicated their willingness to enter into an offset agreement to secure and manage the offset area;
- **Vegetation management:** The vegetation within the biodiversity offset site is pristine and existing threats to the site are limited, with very little evidence of encroachment of alien invasive plants in target area;
- **Impacts to farming practices:** The land is currently not used for any active farming activities and as such, would have no material impact on current farming practices;
- **Fencing:** The farm portion is currently fenced, and the target areas can be demarcated with beacons, therefore no additional fencing is required;
- **Overall management:** Future management costs would be low.



**Figure 17** Proposed biodiversity offset site with associated vegetation attributes.

**Table 4:** Summary of vegetation characteristics associated with the proposed biodiversity offset site.

Vegetation Characteristics	Area (Ha)
Breede Sand Fynbos - Pristine	119.24
Breede Sand Fynbos - Degraded	1.48
North Sonderend Sandstone Fynbos - Pristine	22.18
North Sonderend Sandstone Fynbos - Intermediate	13.49
North Sonderend Sandstone Fynbos - Degraded	0.62
Robertson Karoo - Intermediate	11.51
Robertson Karoo - Transformed	0.60
<b>Grand Total</b>	<b>169.12</b>

## 7. OUTLINE OF RECOMMENDED OFFSET ACTIONS

This section of the report provides an overview of offset activities that will need to be implemented to ensure that desired offset outcomes are achieved. This includes some detail on institutional and financial arrangements that will need to be put in place together with an overview of activities that will need to be completed during the “Establishment” and longer-term “Management” phase. Planned activities then feed directly into the implementation plan (Section 8) and were also used to inform financial estimates for offset implementation (Section 9).

### 7.1. Formalizing Institutional & Financial Arrangements

While letters of commitment have been obtained from the applicant (Zandberg Sandput (Pty) Ltd) and landowner (Zandbergfontein Trust), it is critical that institutional and financial arrangements are formalized prior to development commencing to ensure that long-term conservation outcomes are achieved in practice. As such, **it is recommended that a suspensive clause be added to the conditions of Environmental Authorization that specifically requires the applicant to formalize financial and institutional arrangements for the offset sites prior to development commencing.**

Further details of the proposed institutional and financial arrangements are outlined in Figure 18, below. This clearly outlines the applicants’ responsibilities post-authorization to fund initial establishment costs, prepare the biodiversity offset management plan and formalize an offset implementation agreement with the landowner before development commences. Thereafter, the landowner, and the appointed Management Authority, would ensure appropriate management of the site with funds made available by the applicant.

### 2. Mobilization

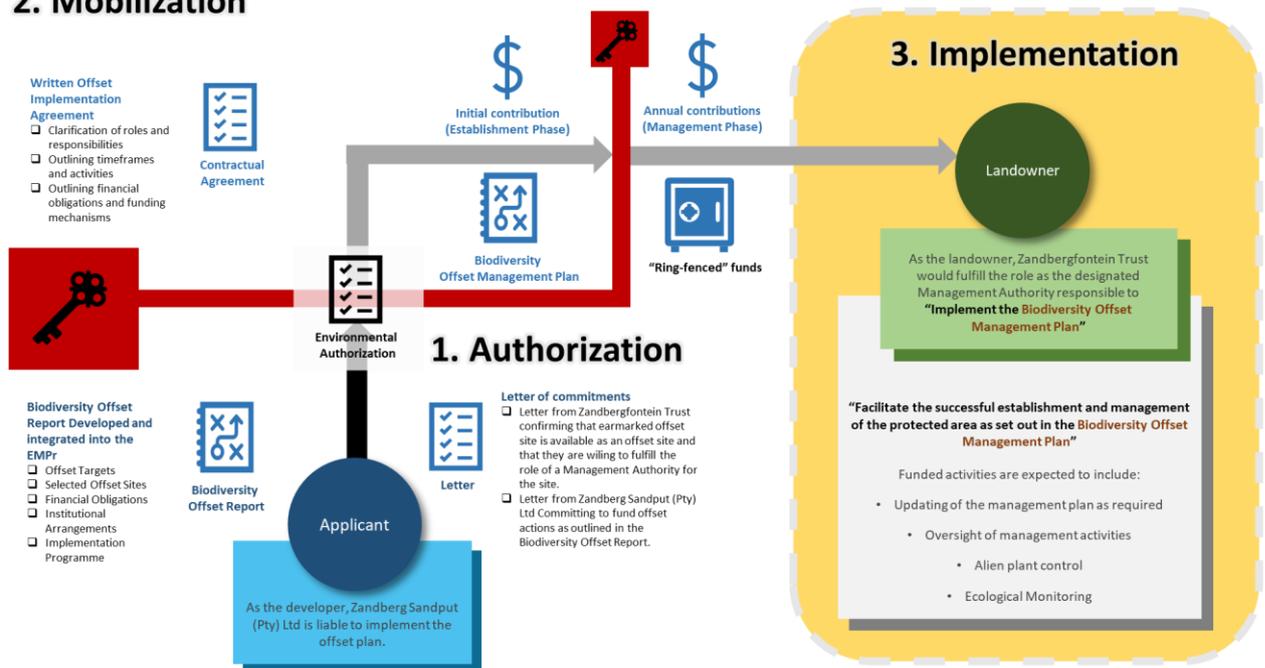


Figure 18 Overview of proposed financial and institutional arrangements.

## 7.2. Offset Establishment

Prior to the development commencing, the offset establishment phase should be concluded. This effectively involves the formalization of institutional arrangements for offset implementation, declaration of the site as a protected area and the preparation of a management plan and baseline monitoring report. An overview of proposed activities is summarised below:

### Land Acquisition

**Purchase of landholdings:** Not relevant in this instance since earmarked landholdings are already owned by the Zandbergfontein Trust.

### Securing Legal Protection of the Biodiversity Offset Site

- **Formalising boundaries of offset areas:** Preparation of an SG approved “proclamation diagram” by a registered land surveyor to delineate the earmarked offset area.
- **Biodiversity Offset Management Plan:** Preparation of an operational management plan for the biodiversity offset site in line with the NEM:PAA requirements. This sets out the specific measures that must be undertaken to achieve the required biodiversity outcomes on the biodiversity offset site.
- **Formalize Biodiversity Offset Implementation Agreement:** An implementation agreement will then need to be formalized between the applicant (Zandberg Sandput (Pty) Ltd) and landowner (Zandbergfontein Trust) who will also act as the Management Authority for the Nature Reserve, once established. As per the draft National Biodiversity Offset Guidelines (DFFE, 2021a), the Biodiversity Offset Implementation Agreement must contain the following clauses:
  - The required outcomes of the biodiversity offset which need to be achieved.
  - The primary activities that need to be conducted to achieve the outcomes of the biodiversity offset as per the Biodiversity Offset Management Plan. The Biodiversity Offset Management Plan (or in this case Biodiversity Offset Report) can also just be appended to the Biodiversity Offset Implementation Agreement and referred to in the agreement.
  - The timeframes within which the primary activities specified in the Biodiversity Offset Management Plan must be completed to achieve the outcomes successfully.
  - Descriptions of the roles and responsibilities of the parties to the agreement. As already stated, implementing party must be responsible for implementing the activities specified in the Biodiversity Offset Management Agreement, and the EA holder must be responsible for supporting the implementing party financially or otherwise in doing so. While the implementing party will implement the Biodiversity Offset Management Plan, the EA holder must ultimately be liable for achieving the outcomes of the biodiversity offset.
  - An undertaking on the part of the EA holder to make the funds necessary for the implementation of the biodiversity offset available to the implementing party. As stated below, the finances necessary for implementing an offset can be made available by means of the payment of a lump sum into a designated

financial vehicle, or regular payments to the implementing party for the latter's services performed at specified milestones of the biodiversity offset implementation process.

- When the EA holder will make regular payments (i.e. not a lump sum payment) to the implementing party at specified milestones of the biodiversity offset implementation process, the EA holder, if it is a private entity, must undertake to provide the implementing party with a guarantee of finances necessary to implement the relevant biodiversity offset.
- A description of the structures that must be set up for monitoring the effectiveness of the activities undertaken to achieve the required outcomes, and joint decision-making regarding corrective and/or adaptive steps that need to be taken, if necessary. Ideally, the relevant conservation authority should be part of that structure if it is not the implementing party.
- Any auditing and reporting requirements of the EA holder: the EA holder must appoint, and pay for, an independent auditor to undertake periodic performance audits and to submit audit reports to the relevant conservation authority.
- **Technical support and application for PA establishment:** Compilation of documentation necessary for PA application and submission to MEC for gazetting.
- **Submission to deeds office:** Attorney to prepare notarial deeds for submission to Deeds office.
- **Public Participation:** Advertising intention to declare offset area as a protected area in 2 newspapers.
- **Demarcation of the biodiversity offset site:** Demarcation of offset area with suitable marker poles.

#### Ecological Monitoring

- Expected to include visual habitat assessments and targeted monitoring of butterfly species on an infrequent (e.g., 5-year basis).

### 7.3. Offset Management

Once the biodiversity offset site has been formally secured, the offset management phase will begin. In this instance, it is envisaged that the offset area will continue being managed as part of the existing farming operations of Zandbergfontein Trust. Costs for site management would however be accounted for separately and would either be funded directly by the applicant or via a Trust established for this purpose. At this stage, it is envisaged that Zandbergfontein Trust (or any future landowner) would act as the delegated Management Authority for the offset site and take on responsibilities for ensuring that site management requirements as outlined below are implemented.

#### Site Management:

- **Management Planning:** Updating the Biodiversity Offset Management Plan regularly as required.
- **Management support:** This includes oversight of site management including maintaining site demarcations, managing activities on the site and preventing illegal activities as outlined in the Management Plan.
- **Equipment - Vehicles:** It has been assumed that no vehicles would be required to oversee management as the site is only accessible by foot.

- **Equipment - Management:** As above, there is no need for additional equipment to ensure effective management of the biodiversity offset site.

#### Management Activities

- **Invasive plant control – maintenance:** Apart from some targeted clearing of degraded areas, alien clearing costs are expected to be very limited in this context where IAP infestation levels are very low. A walkthrough of the area twice a year to hand-pull any seedlings has however been included for budgetary purposes.

#### Monitoring and Reporting

- **Ecological monitoring:** Vegetation and other monitoring (e.g. butterfly surveys) required as per the management plan
- **Management Review and Reporting:** METT Assessment to be undertaken in collaboration with Cape Nature.

## 8. INDICATIVE COSTING AND FINANCING REQUIREMENTS FOR IMPLEMENTING OFFSET ACTIONS

An estimate of costs associated with implementing offset activities are outlined in Table 5, below. This suggests that an Initial Capital allocation of R410 000 would be required to formalize the establishment of the biodiversity offset site as a protected area, with associated management plan. Committed operational budget of R18 000 p.a. is then likely to be required to cover operational management costs over-and above existing costs of general farm management and increasing with inflation (CPIX) on an annual basis. If management costs are secured up-front, this would require an investment of some R440 000 to cover 30 years of management costs. This is based on investment return of 1% above inflation.

**Table 5:** Summary of anticipated costs associated with securing and managing the biodiversity offset site.

Budgeting  
spreadsheet  
(Offset Planning)

Site Details	Offset Name	Zandberg Sandput
	Ownership	Zandbergfontein Trust
Offset Area	Property Name	Area (Ha)
	Portion 4 of the Farm Zandberg Fontein No 97	169
	<b>Total Area (Ha)</b>	<b>169</b>
<i>Phase</i>	<i>Activity</i>	<i>Cost Estimate</i>
Establishment Phase (Prior to development)	LAND ACQUISITION	R0
	SECURING LEGAL PROTECTION OF THE OFFSET SITES	R397 700
	MONITORING AND REPORTING	R15 000
	<b>Cost Estimate</b>	<b>R412 700</b>
	<b>Cost/Ha (Establishment Phase)</b>	<b>R2 440</b>
Management Phase (Estimated Annual Management Costs)	SITE MANAGEMENT	R10 000
	MANAGEMENT ACTIVITIES	R4 900
	MONITORING AND REPORTING	R3 000
	<b>Cost Estimate</b>	<b>R17 900</b>
	<b>Cost/Ha/Annum (Management Phase)</b>	<b>R106</b>

Note: Additional details of cost estimates are included in Annexure 1 of this report.

## 9. DRAFT PROGRAMME FOR IMPLEMENTATION

The need to implement the offset obligations actions as described in this report, are expected to be included as conditions of the Environmental Authorization for this development. It will however be important that an implementation programme be agreed to and be monitored to ensure that actions are implemented in a timeous fashion. A preliminary implementation programme has therefore been prepared in Table 6 below that includes key mitigation measures to address biodiversity impacts and offset activities as set out in Section 8, above. Indicative timelines and responsibilities for implementation is also documented.

**Table 6:** Summary of anticipated costs associated with securing and managing the biodiversity offset site.

Action	Primary responsibility	Supporting Role	Establishment Phase	Operational Phase
<b>Mitigation Measures</b>				
A pre-construction walk-through of the final mining footprint should be conducted, by a suitably qualified botanist, for plant SCC that will be affected. Search and rescue of shrubs might not be feasible; however, most geophytes are easy to relocate.	Botanist or Horticulturalist	Applicant		
A layer of topsoil must be stripped and stockpiled separately during site preparation and replaced over disturbed areas (preferably between 50 cm – 100 cm deep) upon strip completion.	Applicant			
Phased mining and vegetation clearance is preferred where small strips are mined at a time. Vegetation in areas outside of active mining strips must not be disturbed until mining progresses towards said areas.	Applicant			
Alien species must be removed from the site as per NEMBA requirements.	Applicant			
Rehabilitate all mined areas, including previously mined areas covered by existing mining right applications (See guidance in specialist botanical study).	Applicant	Botanist or Horticulturalist		
<b>Biodiversity Offset Activities</b>				
<b>Establishment Phase</b>				
Formalising boundaries of the biodiversity offset site	Applicant			
Biodiversity Offset Management Plan	Applicant	Consultant		
Formalize Biodiversity Offset Implementation Agreement between applicant and landowner	Applicant	Zandbergfontein Trust		
Technical support and application for PA establishment (submitted to MEC)	Applicant	Consultant		
Submission to deeds office	Applicant	Consultant		
Public Participation (declaration)	Applicant	Consultant		
Demarcation of the biodiversity offset site	Applicant	Zandbergfontein Trust		
Public Participation (management plan)	Applicant	Consultant		
Ecological Monitoring	Applicant	Consultant		
<b>Management Phase</b>				
Overseeing effective site management	Zandbergfontein Trust			
Monitoring and reporting	Zandbergfontein Trust	Consultants		

## 10. RECOMMENDED CONDITIONS OF AUTHORIZATION

Appropriate and carefully framed conditions are vital components of ensuring sound environmental management and to aid with compliance and enforcement. As such, the following specific conditions should be reviewed and refined by the competent authority if a decision is taken to grant authorization for this proposed development:

- A biodiversity offset site as indicated in Figure 17 of the Biodiversity Offset Plan and securing a minimum of 120Ha of Breede Sand Fynbos must be formally proclaimed as a Contract Nature Reserve prior to development commencing<sup>6</sup>.
- Institutional and financial arrangements must be formalised through appropriate legal agreements to ensure that the applicant can meet offset obligations. Such agreements must be checked and approved by Cape Nature prior to development commencing.
- Relevant actions from the draft offset implementation programme must be incorporated into the EMPr to monitor compliance with EA conditions.
- A Biodiversity Offset Management Plan must be prepared for the offset site and must be approved by Cape Nature prior to development commencing.
- The Applicant is responsible for all financial costs associated with offset establishment and effective management for a minimum of 30 years or until receipt of a closure certificate, as contemplated in the Mineral and Petroleum Resources Development Act, 2002.

## 11. REVIEW & UPDATING OF THIS REPORT

Whilst this Biodiversity Offset Report provides clarity on recommended offset obligations, actions and associated EA Conditions, it is still subject to stakeholder review and inputs from Cape Nature and the Regulating Authority. Should substantive changes be required in response to comments received, the report will be updated and be re-submitted to the Regulating Authority for approval. Once approved, it is envisaged that key implementation requirements linked with the Establishment Phase will be tracked by the ECO as part of auditing the compliance against the EMPr prior to development commencing. Thereafter it is envisaged that Cape Nature will provide a longer-term supporting role in ensuring that management of the biodiversity offset site is effective in securing biodiversity values of the site.

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<sup>6</sup> Note that a presentation of the proposed offset site was made to the PAES and Stewardship Review Meeting, chaired by Cape Nature on 2<sup>nd</sup> of February 2022. At this meeting, there was general support for the declaration of the offset site as a Contract Nature Reserve. Input on costs for offset implementation was also provided which was used to update cost estimates accordingly.

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## 13. ANNEXURES

### Annexure 1. Detailed breakdown used to inform offset cost estimates

1 ESTABLISHMENT PHASE (Cost Estimate for first 3 years)											TOTAL COSTS
Item	Activity	Description	Unit	Zandberg Sandput	Quantity	Note (Quantity Estimate)	Cost / Unit	Basis for unit cost estimate	Cost estimate	Un-adjusted	
<b>1.1 LAND ACQUISITION</b>											<b>R0</b>
	Purchase of landholdings	Cost estimate to purchase the land required to secure offset sites.	Item	0	0.0	N/A		Earmarked landholdings are already owned by proponent	R0		
<b>1.2 SECURING LEGAL PROTECTION OF THE OFFSET SITES</b>											<b>R397 700</b>
	Formalising boundaries of offset areas	Preparation of an SG approved "proclamation diagram" by a registered land surveyor to delineate the earmarked offset area.	Item	1	1.0	Once-off	R20 000	Cape Nature indicated that costs typically range from R15 000 to R30 000	R20 000		
	Public Participation	Advertising intention to declare offset area as a protected area in 2 newspapers.	Item	1	1.0	Once-off	R180 000	Estimate provided by Cape Nature which includes advertising in three national newspapers (R60 000x3)	R180 000		
	Biodiversity Offset Management Plan	Preparation of an operational management plan for the offset site in line with the NEM:PAA requirements. This sets out the specific measures that must be undertaken to achieve the required biodiversity outcomes on the biodiversity offset site.	Item	1	1.0	Once-off	R30 000	Estimated consultant fees. Sets out any required demarcation, rehabilitation or restoration, ongoing conservation management activities and ecological outcomes required of the offset, as well as monitoring, adaptive or corrective management, auditing and reporting requirements. It furthermore specifies the roles and responsibilities of different parties for these activities and outcomes.	R30 000		
	Formalize Biodiversity Offset Implementation Agreement	Cost estimate to prepare agreement.	Item	1.0	R1.00	N/A	R50 000	Estimate based on discussions with Mark Botha (Offset Specialist & experience with drafting legal agreements of this nature)	R50 000		
	Technical support and application for PA establishment (submitted to MEC)	Compilation of documentation necessary for PA application and submission to MEC for gazetting.	Item	1	1.0	Once-off	R10 000	Estimated consultant fees	R10 000		
	Submission to deeds office	Attorney to prepare notarial deeds for submission to Deeds office.	Item	1	1.0	Once-off	R8 000	Cape Nature indicated that costs were typically between R6000 and R10 000.	R8 000		
	Public Participation	Advertising intention to declare offset area as a protected area in 2 newspapers.	Item	1	1.0	Once-off	R90 000	Estimate provided by Cape Nature which includes advertising in three languages (Management Plan, 12 months after declaration) (R20 000 to R40 000) x 3	R90 000		
	Demarcation of site	Demarcation of offset area with suitable marker poles.	Item	1	53.3	1 Marker / 150m	R182	Estimate based on installation of 2.1m and 140mm diameter tar-treated marker poles spaced at 1/150m with the following dimensions. Cost estimated based on R150/pole, labour costs of R1000, R500 painting and R200 transport costs. These are proposed rather than concrete markers as they can be easily transported by hand rather than requiring the use of a vehicle that would disturb natural vegetation.	R9 700		
<b>1.3 MONITORING AND REPORTING</b>											<b>R15 000</b>
	Ecological Monitoring	Baseline assessments as defined in the Management Plan	Item	1	1.0	Once-off	R15 000	Expected to include visual habitat assessments and targeted monitoring of butterfly species on an infrequent (e.g. 5 year basis). Costs informed by costs for butterfly specialists to undertake baseline surveys.	R15 000		
<b>TOTAL</b>										<b>R412 700</b>	

2		MANAGEMENT PHASE (Cost Estimate for ongoing management)							TOTAL COSTS
Item	Activity	Description	Unit	Zandberg Sandput	Quantity	Note (Quantity Estimate)	Cost / Unit	Basis for unit cost estimate	Un-adjusted
2.1		<b>SITE MANAGEMENT</b>							<b>R10 000</b>
	Management Planning	Updating the Biodiversity Offset Management Plan regularly as required	Item	0.1	0.1	Every 10 years	R20 000.00	Updating on Management Plan (simple process) - Estimated Consultancy Fees	R2 000
	Management support	Manager responsible for overseeing site management	Item	1	1.0	Annual cost	R6 000.00	Regular visits (once every second month) to area will be necessary to investigate area, supervision of labourers during alien plant control.	R6 000
		Office administration	Item	1	1.0	Annual cost	R2 000.00	Allocation of costs towards office administration (bookkeeping etc) and correspondence with Cape Nature as needed.	R2 000
		Field ranger	Item	0	0.0	Allocated staff	R0.00	No requirement - risk are very low	R0
	Equipment: Vehicles	Vehicle for staff providing management support (4x4 single cab)	Item	0	0.0	Once-off	R0.00	No additional vehicle requirements - all access by foot.	R0
		Running costs	Item	0	0.0	Annual cost	R0.00		R0
		Insurance	Item	0	0.0	Annual cost	R0.00		R0
	Equipment: Management	Radios	Item	0	0.0	Once-off	R0.00	No additional requirements. Existing farm radios and equipment to be used for any management patrols.	R0
		PPE	Item	0	0.0	Annual cost	R0.00		R0
	2.2		<b>MANAGEMENT ACTIVITIES</b>						
	Invasive plant control - maintenance	Low/light infestations	Hectares	1.0	2.0	Annual cost per site	R2 450.00	Based on a daily rate of R350pp and a team of 7 people to walk through and clear any alien plants present. An additional allocation of R2000 for herbicide has been allocated. Given low levels of infestation, this is likely to be required every second year.	R4 900
2.3		<b>MONITORING AND REPORTING</b>							<b>R3 000</b>
	Ecological monitoring	Vegetation and other monitoring required as per the management plan	Item	0.2	0.2	Each site	R15 000	Expected to include visual habitat assessments and targeted monitoring of butterfly species on an infrequent (e.g. 5 year basis). Costs informed by costs for butterfly specialists to undertake	R3 000
<b>TOTAL</b>								<b>R17 900</b>	