DAISY AND KLEINSEE PV FACILITIES –BIODIVERSITY OFFSET NEEDS ANALYSIS

Ecological Impact And Offset Needs Analysis for the proposed Kleinsee PV Cluster located near Kleinsee, Northern Cape Province:

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1. SCOPE & BACKGROUND

Energy Team (Pty) Ltd is proposing to develop the Kleinsee PV cluster, located near Kleinsee in the Northern Cape Province. The cluster would comprise the Daisy Solar PV Facility with a capacity of up 360 MW and the Kleinsee PV Facility with a capacity of up 200 MW. During the public participation phase of the development authorisation process, SANParks and provincial nature conservation officials have voiced concern regarding the cumulative impact of the above develoments and the possible impact of the developments on the future expansion potential of the Namakwa National Park. As a result, this offset needs analysis was initiated in order to address concerns regarding the potential impact of the Kleinsee PV Cluster on the future ability of the Namakwa National Park to expand into this area as well as general cumulative impacts likely to be associated with the current PV developments and already authorised wind energy facilities present in the immediate area.

In terms of the draft Biodiversity Offset Guideline (Government Gazette 46088 (Notice No. 1924) on 25 March 2022 in terms of Section 24J of the National Environmental Management Act, 1998 (Act No. 107 of 1998), "*A biodiversity offset is required when a proposed listed or specified activity, or activities, is/are likely to have residual negative impacts on biodiversity of moderate or high significance. These negative impacts could affect biodiversity pattern (e.g. threatened ecosystems, species or special habitats), ecological processes (e.g. migration patterns, climate change corridors enabling shifts in species distributions over time, or wetland function), ecosystem services (e.g. provision of clean water) or a combination of all three."* The central question of the current study is therefore the degree to which the Kleinsee PV Cluster would generate residual impacts on biodiversity either singly or in combination that are considered to be of moderate or high significance. A secondary question that would follow on from the above would then be, if there are indeed medium or high residual impacts, what type and nature of offset would be most appropriate for the development in context of the site, the surrounding landscape and associated biodiversity patterns and processes operating in the area?

This Ecological Offset Needs Analysis has the following broad aims:

- Summarise and outline of the current framework for biodiversity offsets. A summary of the most relevant sections of the Draft National Biodiversity Offset Guideline is provided, highlighting the relevant sections as they pertain to the current development.
- Provide a summary of the biodiversity features present within the Kleinsee PV cluster, highlighting unique, threatened or otherwise significant species, ecosystems and processes within the area that may be negatively impacted by the development.
- Provide an analysis of the residual and cumulative impacts of the development on specific species of concern, ecosystems and general biodiversity patterns and processes, as well as the impact of the development of the ability to meet conservation targets for the affected ecosystems.

- If relevant, explore potential offset areas in terms of the draft national offset guidelines and the regional conservation context to ensure that identified offset areas meet the like for like offset criterion, but also occur in an area where their long-term sustainability can be ensured.
- Identify any further actions and priorities required for taking the offset process forward.

2. FRAMEWORK FOR BIODIVERSITY OFFSETS

The draft National Biodiversity Guideline provides recognition of the importance and economic value of the biodiversity of the country. The need for an offset policy framework is predicated on the recognition that this biodiversity is being negatively impacted by human activity with negative consequences both for the environment and human well-being. The guidelines suggests that "*biodiversity offsetting has the potential to encourage more rigorous consideration of feasible development alternatives which avoid and minimise negative impacts on biodiversity, to help remedy and counterbalance the degradation and loss of biodiversity through increased protection and appropriate management, and to help South Africa to meet its international biodiversity and protected area targets. Biodiversity offsetting can therefore play a role in ensuring that biodiversity and ecological infrastructure can continue to provide the ecosystem services on which people depend for their livelihoods, and contribute to the achievement of the environmental right in section 24 of the Constitution*."

The desired outcome of biodiversity offsets is to ensure the following:

1. That biodiversity is secured in the long term through the protection and appropriate management of ecosystems and species.
2. 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.
3. That ecological infrastructure and the services and benefits it provides are maintained and where necessary restored.
4. 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 basic principles and tenets that underlie offsets and their practical implementation required to achieve the above goals are outlined below. The majority of this is taken directly or synthesised from the draft National Biodiversity Offset Guidelines (2022).

- **Offsets are the final option in the mitigation hierarchy** - Biodiversity offsets must only be considered once all the foregoing steps in the mitigation hierarchy have been considered to their full and feasible extent. The mitigation hierarchy dictates that the degradation and loss of biodiversity must be avoided, or where impacts cannot altogether be avoided, they should be minimised and the area adversely impacted by relevant activity should be rehabilitated. When, after taking the aforementioned mitigation measures, there are likely to be residual negative impacts on biodiversity of medium to high significance, they must be offset.
- **Ecological equivalence (like-for-like) is the preferred offset type** – Only when offsets remain the only mechanism to manage residual negative impacts and in order to counterbalance a residual impact, biodiversity offsets should comprise - or benefit - the same or similar biodiversity components as those components that would be negatively affected by the development. Trading-up offset types, or biodiversity offsets which secure priority areas of greater importance or priority to biodiversity conservation than the area being impacted, may however be considered under certain circumstances in order to contribute to conservation objectives.
- **Residual impacts on irreplaceable biodiversity cannot be offset** – Where there are no options left in the landscape to counterbalance a residual impact in accordance with the ecological equivalence (like-for-like) principle (see above), that residual impact cannot be offset. That is, there would be a residual impact on irreplaceable biodiversity, which would prevent national biodiversity targets from being met. In these cases development would generally not be acceptable and the impacts should be avoided. Ecological compensation for residual impact which cannot be offset should only be considered only in highly exceptional circumstances, when there are imperative reasons for overriding public interest. Ecological compensation requirements should be punitive in scale and cost
- **Additionality** - Biodiversity offset interventions must be additional to, or over and above, biodiversity conservation measures that are already required by law, or that would have occurred had the biodiversity offset not taken place.
- **The quality and quantity of residual impacts on biodiversity must be considered in decision making involving biodiversity offsetting** – When considering the significance of the residual impact to be counterbalanced by an offset intervention, the nature of the impacted biodiversity (e.g. whether it is part of a priority area), its threat status and protection level, ecological condition, and the size of the impacted area must be considered at the very least.

- **Biodiversity offsets should embody the ecosystems approach and promote connectivity in the wider landscape** - Biodiversity offsets should ideally involve the integrated management of land, water and living resources in a way that promotes ecological functionality and persistence. Biodiversity offsetting should therefore take a landscape-scale, rather than a site-specific view, to enable consideration of cumulative impacts, to promote connectivity between biodiversity priority areas.
- **Biodiversity offsets must result in long-term security and management of priority biodiversity** - Biodiversity offsets should contribute to the long-term security of biodiversity priority areas and maintain or improve their ecological condition, thereby resulting in tangible and measurable positive outcomes for biodiversity conservation 'on the ground'. Biodiversity that is in good ecological condition promotes human well-being in the long term.
- **Biodiversity offset design must be defensible and transparent** - The measure of the size and significance of the residual impacts on biodiversity caused by a proposed activity, as well as the design and implementation of biodiversity offsets, should be based on the best available biodiversity information and sound science, and should incorporate local, traditional and conventional knowledge and values as appropriate. Offsets must consider all significant residual impacts on biodiversity including direct, indirect and cumulative impacts. The scope of assessment must include the due consideration of impacts on priority biodiversity areas; impacts on biodiversity pattern (compositional and structural aspects of biodiversity, at the genetic, species or ecosystem level) and ecological processes (the functions and processes that operate to maintain and generate biodiversity); and impacts on ecosystems or species on which there is high dependence for health, livelihoods, safety and wellbeing. The Biodiversity Offset Report and audits of the offset performance, as well as biodiversity offset registers, should be made publicly available.
- **Offsets must follow a risk averse and cautious approach** - A biodiversity offset must be designed in a risk-averse and cautious way to take into account uncertainties about the measure of the extent and significance of the residual impacts (including uncertainties about the effectiveness of planned measures to avoid, minimize and rehabilitate impacts), and the uncertainties relating to the successful outcome and/ or timing of the biodiversity offset intervention.
- **Offsets must be fair and equitable** - The determination of residual impacts, and the design and implementation of biodiversity offsets to counterbalance these impacts, must be undertaken in an open and transparent manner, providing for stakeholder engagement, respecting recognised rights, and seeking positive outcomes for affected parties. Biodiversity offsets should not displace negative impacts on biodiversity to other areas, or cause significant negative effects that in turn would need to be remedied.

- **Offset intervention timing** - Implementation of a biodiversity offset should preferably take place before the impacts of the activity occur, or as soon thereafter as reasonable and feasible.
- **Biodiversity offsets must be measurable, auditable and enforceable** - The required outcomes of a biodiversity offset must be practically measurable on the ground. Once the development is underway, residual impacts should be monitored and measured to ensure that the counterbalancing offset remains adequate. The offset's counterbalancing adequacy must, in turn, be monitored and audited in terms of clear and measurable management, performance and desired outcome targets, and provision must be made for corrective or adaptive actions where needed to ensure that targets are achieved.

2.1 WHEN IS AN OFFSET REQUIRED?

A biodiversity offset is required when a proposed listed or specified activity, or activities, is/are likely to have residual negative impacts on biodiversity of moderate or high significance. These negative impacts could affect biodiversity pattern (e.g. threatened ecosystems, species or special habitats), ecological processes (e.g. migration patterns, climate change corridors enabling shifts in species distributions over time, or wetland function), ecosystem services (e.g. provision of clean water) or a combination of all three.

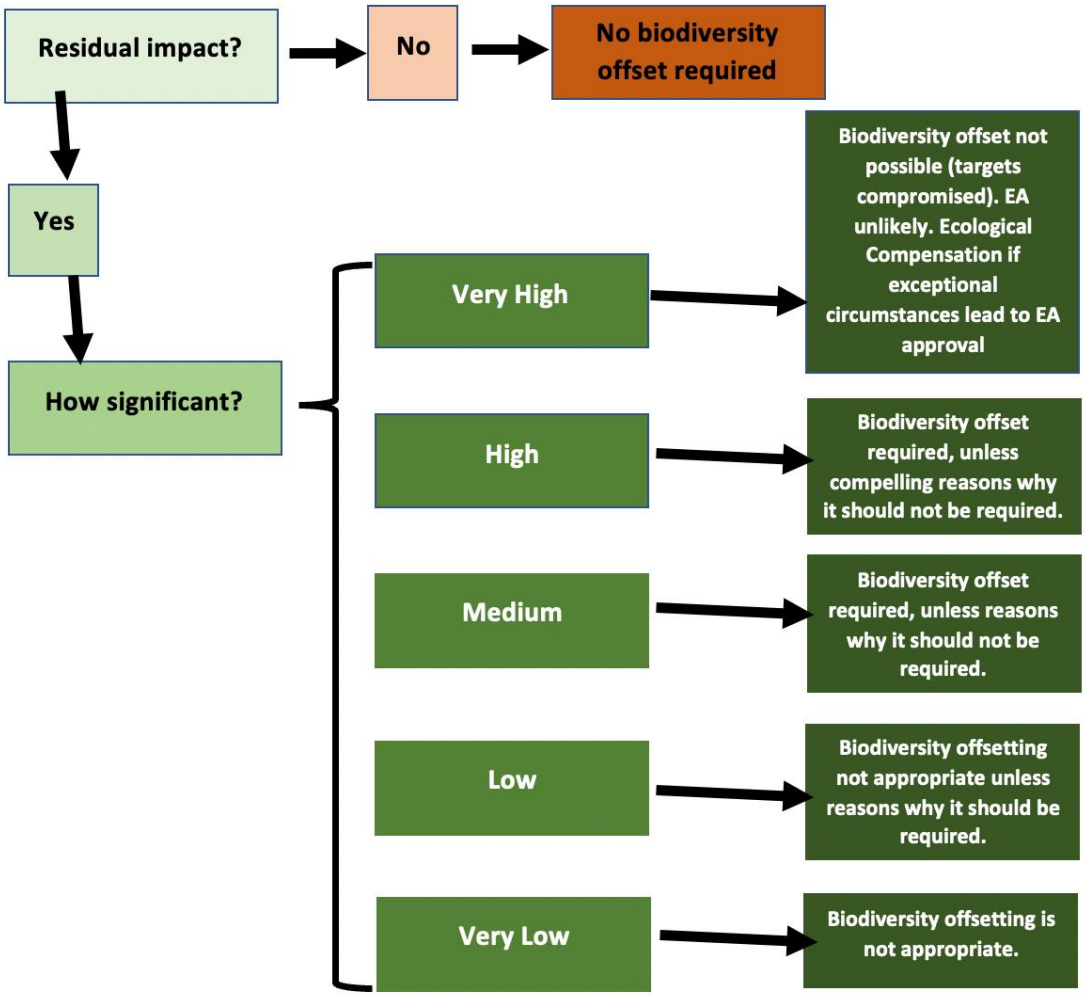

Figure 1. Flow diagram illustrating the process to determine whether an offset should be considered for a development or not.

Residual Impacts

A residual biodiversity impact is the impact of an activity, or activities, on biodiversity that remains after all efforts have been made to avoid and minimise the impacts of the activity, or activities, and to rehabilitate or restore the affected area to the fullest extent possible.

As part of an EIA, an EAP or a specialist is required to predict the possible negative impacts of an activity, or activities, on biodiversity, including direct impacts, indirect impacts, and cumulative impacts. After those impacts have been identified, the EAP or specialist must investigate alternative project locations, designs, technologies, scales and layouts to determine if and how potentially significant negative impacts on biodiversity could be avoided or minimised. The EAP or specialist must also determine if, and how successfully, impacted areas could be rehabilitated or restored.

If predictions in the EIA state that all negative impacts on biodiversity cannot be avoided, and/or that impact minimisation and rehabilitation or restoration of the affected area cannot, with a high degree of certainty, fully mitigate the impacts of the activity, or

activities, on biodiversity, the proposed development would have residual negative biodiversity impacts.

Impact Significance & Thresholds

Where residual negative biodiversity impacts are evaluated to be of medium or high significance, a biodiversity offset would be required. Biodiversity offsets are unlikely to be required when the residual negative impacts of a proposed activity, or activities, on biodiversity are evaluated to be of low significance. Biodiversity offsets are not appropriate when an activity, or activities, will have residual impacts on biodiversity of very high significance, including when residual negative impacts will result in loss of irreplaceable biodiversity.

Sufficient rigour and adherence to specific guidance on assessing biodiversity impacts and evaluating their significance must be demonstrated to the CA, drawing in particular on the applicable biodiversity and species protocols, used in conjunction with the National Environmental Web-based Screening Tool (Screening Tool). The report generated through the Screening Tool could give an early indication of the significance of the possible negative impacts of an activity, or activities, on biodiversity.

The approach for assessing impact significance for the purposes of this guideline is firstly, determining the biodiversity importance of the area negatively impacted by a proposed activity, or activities and the implications of the impacts – expressed in the guideline as a set of biodiversity thresholds, and secondly, determining if other factors related to impact significance render the impact of higher or lower significance than the threshold suggests.

There are no hard and fast rules for determining the biodiversity importance of an area and the implications of negative impacts on those areas. The thresholds given in Table 1 contain broad guiding factors to make such a determination. However, more nuance may well be required in the circumstances of a particular application for EA. Significance assessments should also take into account, for instance, the extent to which impacts would be reversible (i.e. if the pre-impact biodiversity could be reinstated within at most a 30-year period) and/ or would lead to irreplaceable loss of resources (i.e. a permanent loss of biological diversity).

Table 1. Biodiversity thresholds, impact significance and implications for mitigation and biodiversity offsets as provided in the Draft National Biodiversity Offset Guidelines.

Threshold: the importance of biodiversity and/ or ecological infrastructure	**Impact Significance Rating**	**Implications for mitigation and offsets**
'Exclusionary' threshold: residual impacts in this category cannot be fully compensated by offsets because of the high threat status or irreplaceability of affected biodiversity or ecosystem services. Impacts	Very High	Activity should not be Authorised except in exceptional circumstances. If an

in this category would generally be unacceptable and could lead to – • irreversible and irreplaceable loss of ecosystem or species, such as impacts on – • Critical Biodiversity Areas: Irreplaceable (CBA 1), especially where the feature(s) driving the designation as a CBA 1 is significantly negatively affected or will be compromised beyond its Biodiversity Target; • Critically Endangered ecosystems outside of CBAs; • confirmed habitats of Critically Endangered species, • where those areas have not been included in CBA 1s; and • Ramsar sites; and • irreplaceable loss of key ecological corridors recognised as important for evolutionary processes and climate change adaptation where no spatial options to safeguard these processes exist; and • irreversible or irreplaceable loss of highly valued ecological infrastructure at national or provincial scale and/or where there is a high level of dependence on the associated ecosystem services by local communities for livelihoods and health, and no feasible substitutes.		application is authorised, ecological compensation is required unless there are reasons why ecological compensation should not be required.
Threshold of major potential concern: residual impacts in this category could lead to – • loss of vulnerable or potentially irreplaceable biodiversity in areas of recognised importance, such as – • Critical Biodiversity Areas: Optimal (CBA 2); • Endangered ecosystems outside of CBAs; • Natural forests; • Strategic Water Source Areas;	High	Biodiversity offsets are likely to be required, unless there are compelling reasons why a biodiversity offset should not be required.

• buffer zones around protected areas and protected area expansion zones identified in protected area management plans; • the Coastal Protection Zone; • areas seawards of development setback lines, and where development setback lines have been determined, within 1 km of the High Water Mark; or • areas within 100 meters of a watercourse; or • irreversible loss or deterioration of valued ecosystem services at provincial level.		
Threshold of potential concern: Residual impacts in this category could lead to – • irreversible loss of vulnerable biodiversity, such as - • Ecological Support Areas; • Strategic Water Source Areas; • Ecological infrastructure that provides highly significant ecosystem services, which is not within a SWSA and is not identified as an ESA; • conservation areas; • Vulnerable ecosystems or species; or • areas that have two or more of the following characteristics: Threatened Ecosystem, confirmed habitat for Threatened Species; or important ecological process area or corridor; or • irreversible loss or deterioration of valued ecosystem services at local level.	Medium	Biodiversity offsets are likely to be required, unless there are reasons why a biodiversity offset should not be required.
Threshold of Low concern: Residual impacts in this category include – • Other Natural Areas; or • impacts on Not Threatened or Least Concerned ecosystems or species, where those species or ecosystems do not – • support Protected or Threatened ecosystems or species;	Low	Biodiversity offsets are unlikely to be required, unless there are reasons why a biodiversity offset should be required.

• constitute important ecological process areas or corridors; or • provide important ecosystem services.		
Threshold of negligible concern: Impacts in this category are on highly modified areas.	Very Low	Biodiversity offsets will not be required.

The different thresholds mentioned above have different implications for impact significance:

- If an exclusionary threshold is breached, impact significance is Very High and the proposed project is therefore fatally flawed and should not be approved. Biodiversity offsetting would not be feasible when there is loss of irreplaceable biodiversity, although ecological compensation would be required when such loss is considered justifiable under exceptional circumstances, unless there are reasons, based on the factors in the paragraph below, that ecological compensation should not be required.
- If a threshold of major concern is breached, impact significance is High and a biodiversity offset would be required unless there are compelling reasons based on the factors in the paragraph below that a biodiversity offset should not be required.
- If a threshold of potential concern is breached, impact significance is Medium and a biodiversity offset would be required, unless the factors in the paragraph below suggest that no biodiversity offset should be required under the circumstances.
- If a threshold of low concern is breached, impact significance is Low and a biodiversity offset would not be required, unless other factors suggest that a biodiversity offset should be required.
- If a threshold of negligible concern is breached, impact significance is Very Low and no biodiversity offset would be required.

3. KLEINSEE PV CLUSTER BASELINE ANALYSIS

In this section, the regional context and features in and around the Kleinsee PV Cluster site are analysed, starting at a broad scale and filtering down through ever-finer scales to the habitats of significance present at the site and finally the Species of Conservation Concern (SCC) that have been observed within the affected area and the significance of their presence. It is important to note that the site is described in detail in the respective EIA Reports and these details are not repeated in full here but rather those aspects of specific relevance to the possible need for an offset are highlighted and discussed.

3.1 BROAD-SCALE VEGETATION TYPES

According to the national vegetation map (Mucina & Rutherford 2006 and 2018 SANBI Update), the Kleinsee PV Facilities are confined to the Namaqualand Strandveld vegetation type (Figure 2). The description of this unit as appears in Mucina & Rutherford (2006) is not repeated here, but rather the vegetation as observed in the field is illustrated and described in detail in the next section.

The PV footprint areas are confined to a large tract of Namaqualand Strandveld. This vegetation type occurs in the Northern and Western Cape Provinces from the southern Richtersveld as far south as Donkins Bay. Especially in the north of this unit it penetrates up to 40km inland and approaches the coast only near the river mouths of the Buffels, Swartlintjies, Spoeg, Bitter and Groen Rivers. In the south of the unit it is variably narrow and approaches the coast more closely. It consists of flat to undulating coastal peneplains with vegetation being a low species richness shrubland dominated by a plethora of erect and creeping succulent shrubs as well as woody shrubs and in wet years annuals are also abundant. It is associated with deep red or yellowish-red Aeolian dunes and deep sand overlying marine sediments and granite gneisses. Mucina and Rutherford list eight endemic species for this vegetation type. About 10% of this vegetation type has been lost mainly to coastal mining for heavy metals and it is not currently listed. There are no other vegetation types near to the development footprint, which agrees with observations from the field which did not identify any other vegetation units in the affected area.

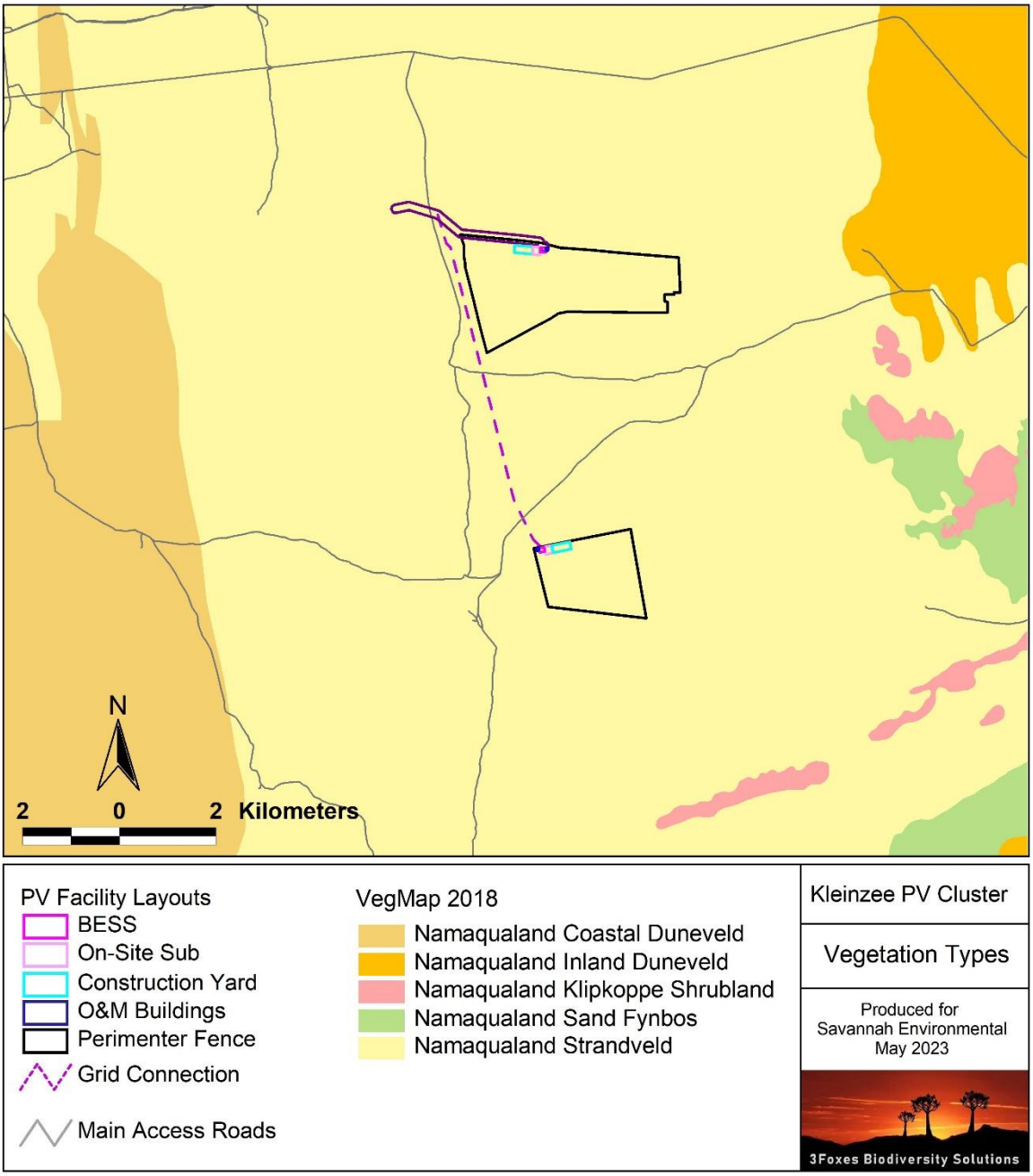

Figure 2. Vegetation map of the study area according to the 2018 update of the Mucina & Rutherford (2006) vegetation map.

3.2 FINE-SCALE VEGETATION DESCRIPTION

The actual plant communities as observed at the site are detailed and described below. This information is considered to be of greater reliability and weight than the VegMap as it represents actual ground-truthed information from the site. The fine-scale vegetation map for the study area is depicted below in Figure 3 and the plant communities identified are illustrated and discussed thereafter.

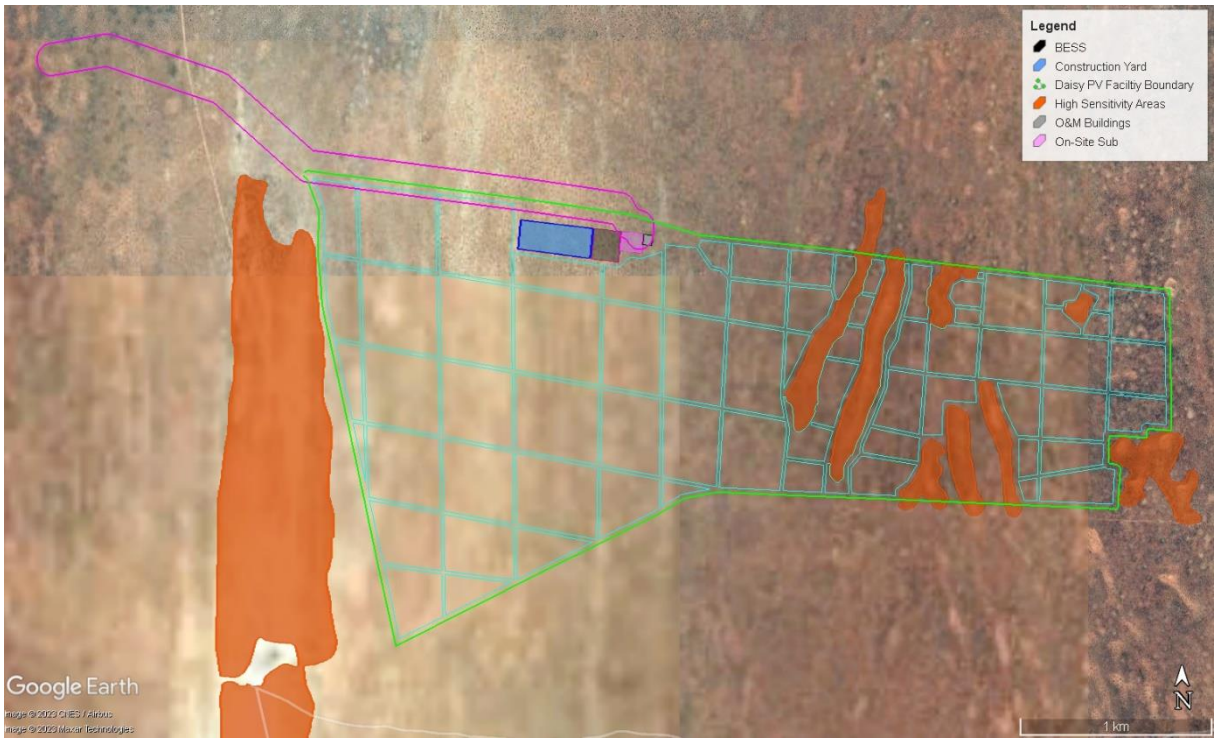

Figure 3. Fine-scale map of the plant communities identified within study area based field assessment and in-field mapping of features and vegetation patterns.

Namaqualand Strandveld

The majority of the Daisy PV Facility site and the whole of the Kleinsee PV Facility site consist of vegetation considered to represent typical Namaqualand Strandveld. This habitat is considered relatively low sensitivity on context of the area and is considered the habitat/plant community type most suitable for development in the area as it is relatively widespread and depending on local conditions usually has a relatively low abundance of plant SCC. Typical and dominant species present include *Zygophyllum morgsana*, *Tripteris oppositifolia*, *Asparagus capensis*, *Othonna sedifolia*, *Hermannia sp.*, *Lebeckia spinescens*, *Eriocephalus racemosus*, *Searsia longispina*, *Leipoldtia sp.*, *Cladoraphis cyperoides*, *Salvia lanceolata*, *Tetragonia spicata*, *Ruschia sp.*, *Helichrysum hebelepis*, *Wahlenbergia asparagoides* and *Asparagus lignosus*.

Figure 4. Typical Namaqualand Strandveld vegetation on gently undulating sandy plains which represents the majority of the Daisy Solar PV Facility footprint.

Figure 5. Typical Strandveld vegetation within the Kleinzee PV Facility. The effects of the preceding drought are however still apparent as can be seen from the abundance of dead shrubs in the middle- and foreground.

Figure 6. The dunes within the Daisy Solar PV Facility site are generally quite low and frequently, but not always less-vegetated than the surrounding plains. There are however considered important features for fauna and flora.

Namaqualand Duneveld

Within the Daisy PV Facility there are some dunes present with somewhat different vegetation from the surrounding plains (**Figure 6**). The vegetation of these dunes can be considered similar to the Namaqualand Inland Duneveld vegetation type. Namaqualand Inland Duneveld is restricted to the Northern Cape Province where it occurs within the Namaqualand Sandveld in two patches—one between Kotzesrus northwards to Groen River while the other is located between Wallekraal and Hondeklipbaai. It is associated with aeolian, deep, loose, red to yellowish sand, forming medium (1–3 m) to high (3–6 m) dunes. Although it is classified as Least Threatened, it is not well-protected and is vulnerable to disturbance, overgrazing and alien invasion. Due to the vulnerability of this habitat to disturbance as well as the observed presence of several species of concern, it is considered sensitive. Typical and dominant species present include *Zygophyllum morgsana*, *Searsia longispina*, *Tripteris oppositifolia*, *Cladoraphis cyperoides*, *Othonna sedifolia*, *Conicosia pugioniformis*, *Asparagus lignosus*, *Eriocephalus racemosus*, *Asparagus capensis*, *Lycium cinereum*, *Lebeckia spinescens*, *Tetragonia spicata* and *Diospyros ramulosa*.

3.3 IMPACT ON PLANT SPECIES OF CONSERVATION CONCERN

A walk-through of each PV facility footprint was conducted as part of the assessment for each PV facility in order to assessment identity, distribution and abundance of plant species of concern within each development footprint. For the Kleinsee PV facility, this amounted to over 14km of walked transect and over 20km within the Daisy PV Facility. A single plant species of concern was confirmed present within the Kleinsee PV Facility site, namely *Wahlenbergia asparagoides* (VU) which is occasional across most of the site. Within the Daisy PV Facility, two plant species of concern were confirmed present, namely *Wahlenbergia asparagoides* (VU) which is common across most of the site and *Helichrysum tricostatum* (NT), which was uncommon and occasional within the site.

Wahlenbergia asparagoides occurs at a low density within the Kleinsee PV Facility and is a relatively common species in the wider area. The development would result in the loss of approximately 2.5% of the local population which is in tern, estimated to represent less than 0.2% of the global population. The development is therefore considered unlikely tog compromise the local of regional population of this species and the impact of the Kleinzee PV Facility on *W.asparagoides* is considered acceptable with low residual impacts.

In terms of the impact of the Daisy PV facility on *Wahlenbergia asparagoides* it is estimated that the development would result in the loss of approximately 5% of the local population of this species, it is estimated that this represents less than 0.25% of the global population of *W.asparagoides*. The development is therefore considered unlikely to compromise the local of regional population of this species and the impact of the Daisy PV Facility on *W.asparagoides* is considered acceptable with moderate to low residual impacts. In terms of the impact of the Daisy PV Facility on *Helichrysum tricostatum*, this species was confirmed present within the site at a low density. The population size within the Daisy PV Facility footprint is estimated at 35 individuals, which based on the species account and known distribution does not represent a large number of individuals relative to the overall population size. In addition, the majority of *Helichrysum tricostatum* plants within the site are located within the dune habitat which has been excluded from the development footprint. Based on this assessment, the impact of the development of the Daisy Solar PV Facility on *H.tricostatum* is therefore considered acceptable and would not compromise the local or regional population of this species.

Figure 7. *Wahlenbergia asparagoides*, left and *Helichrysum tricostatum*, right were the only two red-listed species observed within the Kleinsee PV Cluster development footprint.

3.4 FAUNAL COMMUNITIES

The faunal communities of the wider Kleinsee PV Cluster area have been well investigated through camera trapping, small mammal live trapping, pitfall trapping and searching on the current and adjacent properties. A number of listed species would potentially occur in the area and have been listed below in Table 1, along with the potential impacts of the proposed Kleinsee PV Cluster on these species. There are no listed fauna that are likely to be significantly impacted by the current Kleinsee PV Cluster developments. This is due largely to the lack of suitable habitat within the sites for most of these species or the marginal nature of the site within the broader range of these species.

Table 2. Listed fauna which may occur in the vicinity of he Kleinsee PV Cluster site and the potential impact of the development on these species.

Species	Status	Presence within PV Cluster	Potential Impact
Leopard *Panthera pardus*	VU	Unlikely due to farming landuse. It is possible that Leopard occasionally pass through this area, although this is seen as unlikely given the lack of cover the area offers.	Low as this species is not likely to be present on the site.
Littledale's Whistling Rat *Parotomys littledalei*	NT	Potentially present in the area, but not observed within the sites. Since the burrows of this species are conspicuous and are easily observed, the abosence of this species from the area is	Very Low as not considered to be present.

		considered to have a high confidence.	
African Clawless Otter *Aonyx capensis*	NT	Very unlikely to be present as this species is associated with aquatic environments which do not occur in proximity to the site.	Very Low as this species is not considered likely to be present.
Grants' Golden Mole *Eremitalpa granti granti*	VU	This subspecies is confined to the west coast of southern Africa, from St Helena Bay northwards to Port Nolloth (and possibly as far north as Alexander Bay), and inland to Garies and the Biedouw Valley. This species is associated with loose coastal sands and as such, this species is considered potentially present at the Daisy PV site and less likely at the Kleinsee PV site.	Some habitat loss and fragmentation due to access roads is possible for this species. However, as this species occurs along more than 600km of coastline, it is unlikely that the Kleinsee PV developments would result in a significant impact on this species, even if present.
Speckled Padloper *Chersobius signatus*	VU	This species is associated with rocky outcrops and as such is highly likely to occur in the affected area which is restricted to sandy habitats.	An impact on this species is considered highly unlikely.
Desert Rain Frog *Breviceps macrops*	VU	This species occurs in Strandveld vegetation up to 10 km from the coastline. As the PV facilities are 18km from the coast, it is unlikely that this species is present.	This species is considered unlikely to be present as pitfall trapping on the nearby Kap Vlei WEF site found only the Namaqua Rain Frog present.
Namaqua Dwarf Adder *Bitis schneideri*	NT	Occurs from mouth of the Olifants River in the Western Cape, South Africa, northwards to Lüderitz Bay in southwestern Namibia. Associated with loose coastal sands and considered unlikely to occur within the Kleinsee PV facility footprint and possibly present within the Daisy PV facility footprint but unlikely.	Not observed at the site or any of the adjacent wind farm sites. Considered unlikely to be present. Snakes are however still usually able to utilize the areas within PV facilities, provided they are not persecuted by humans.

3.5 KLEINSEE PV CLUSTER SITE SENSITIVITY ANALYSIS

The ecological sensitivity map for the proposed Daisy Solar PV Facility site is illustrated below in Figure 8. The ecological sensitivity as illustrated represents the sensitivity of the features as observed and assessed in the field. The main sensitive feature of the Daisy PV Facility site are the dunes present in the east of the site, with the majority of the site being typical Strandveld considered lower sensitivity. The dune areas as ground-truthed in the field and mapped below, have been avoided by the development footprint. This avoidance is considered to represent an important mitigation measure at the site as it would ameriolate a number of potential impacts including erosion potential from disturbance of the the loose dune soils and impacts on plant and animal SCC which tend to be associated with or concentrated within the dune environment. Within the Kleinsee PV facility, no significant differences in overall ecological sensitivity were observed across the site as the vegetation is relatively homogenous with no major differences present, with the result that a sensivity map for the Kleinsee PV Facility site was not produced.

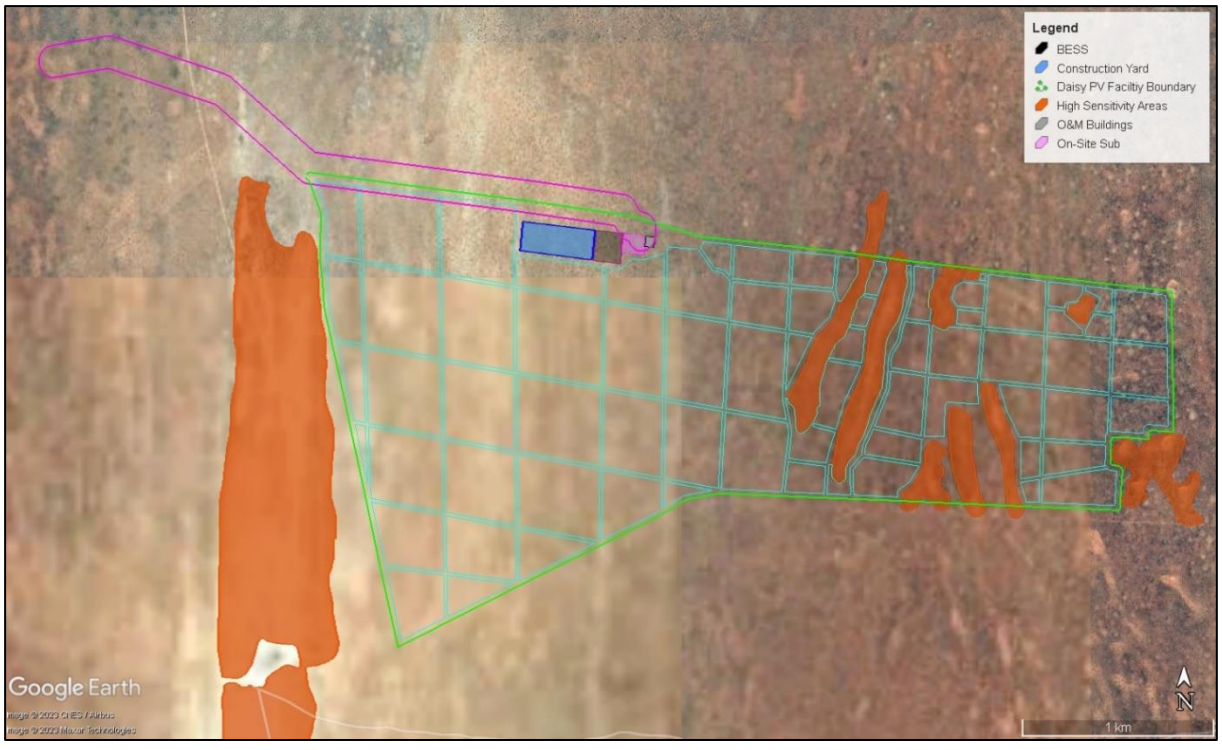

Figure 8. Ecological sensitivity map for the proposed Daisy PV Facility study area, showing that the development footprint avoids all areas considered to be high sensitivity.

3.6 CONSERVATION PLANNING CONTEXT

In this section, the relevant conservation planning tools for the broad area are illustrated and discussed. The most important of these are the Northern Cape Conservation Plan (2016) and the NC-PAES (2017). These maps indicate biodiversity priority areas required to maintain species richness and ecological processes in the first instance and areas that should be targeted for formal conservation expansion in the second. The two above-mentioned plans are not entirely independent of one another as all areas demarcated as Conservation Expansion Focus Areas, are classified as Tier 1 or Tier 2 CBAs and some of the CBAs are demarcated with the specific purpose in mind of maintaining development-free corridors between existing conservation areas to facilitate future expansion of conservation areas into these corridors. The location of NC-PAES Focus Areas is designed so as to ensure the minimum land requirement to meet conservation targets but also to avoid isolated target areas and append these onto existing conservation areas where possible.

The relevant section of the Northern Cape Conservation Plan which maps CBAs for the Northern Cape is illustrated below in Figure 9. The map illustrates that the Daisy PV Facility site falls entirely outside of any CBAs or ESAs, while the Daisy PV Facility site lies largely within a CBA 2, with a small proportion of ESA in the north of the site. As such, it is clear that the Daisy PV Facility does not impact on CBAs or ESAs and further consideration of the Daisy PV Facility in this regard is not necessary. The Kleinsee PV Facility however lies within a CBA 2 and would result in the loss of approximately 300 ha of habitat loss within the CBA 2, with the remainder of the PV footprint within the ESA. The Terrestrial Biodiversity Theme assessment for the Kleinsee PV Facility found that the site has a relatively low abundance of SCC and no significant biodiversity features present with the result that the site is not considered irreplaceable. Similar Strandveld habitat is widely available in the area and is also well-represented within the Namakwa National Park. The development is therefore considered highly unlikely to compromise the ecological functioning of the affected CBA, given that it has not been identified as being of particular significance for broad-scale ecological processes. Consequently, the overall impact of the Kleinsee PV development on CBAs and broader scale ecological processes is considered to be relatively low.

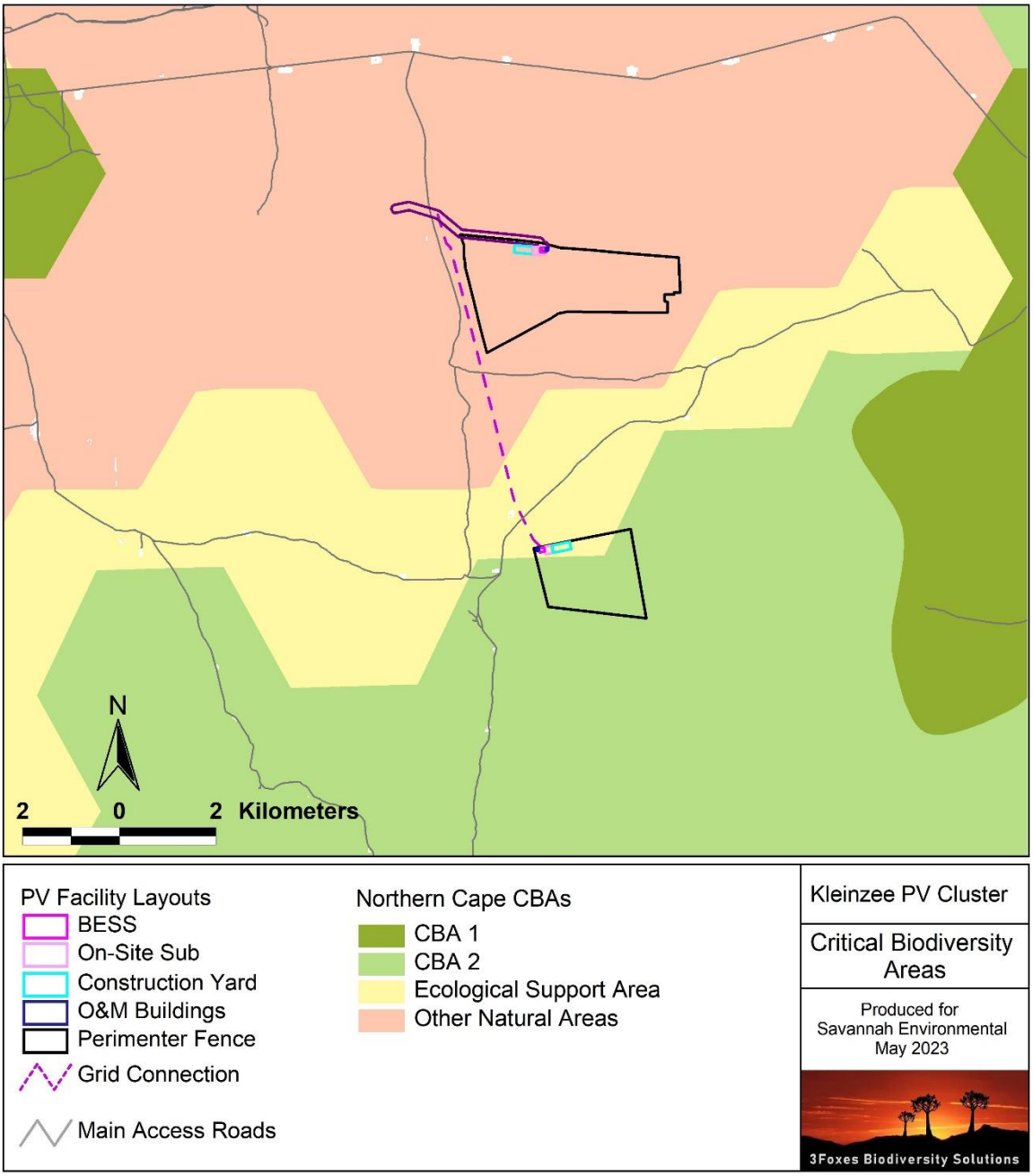

Figure 9. Critical Biodiversity Areas map for the study area, showing that the proposed Daisy PV Facility is located entirely outside of any CBAs or ESAs, while the Kleinsee PV Facility is located largely within a CBA 2 with a small portion of ESA in the north.

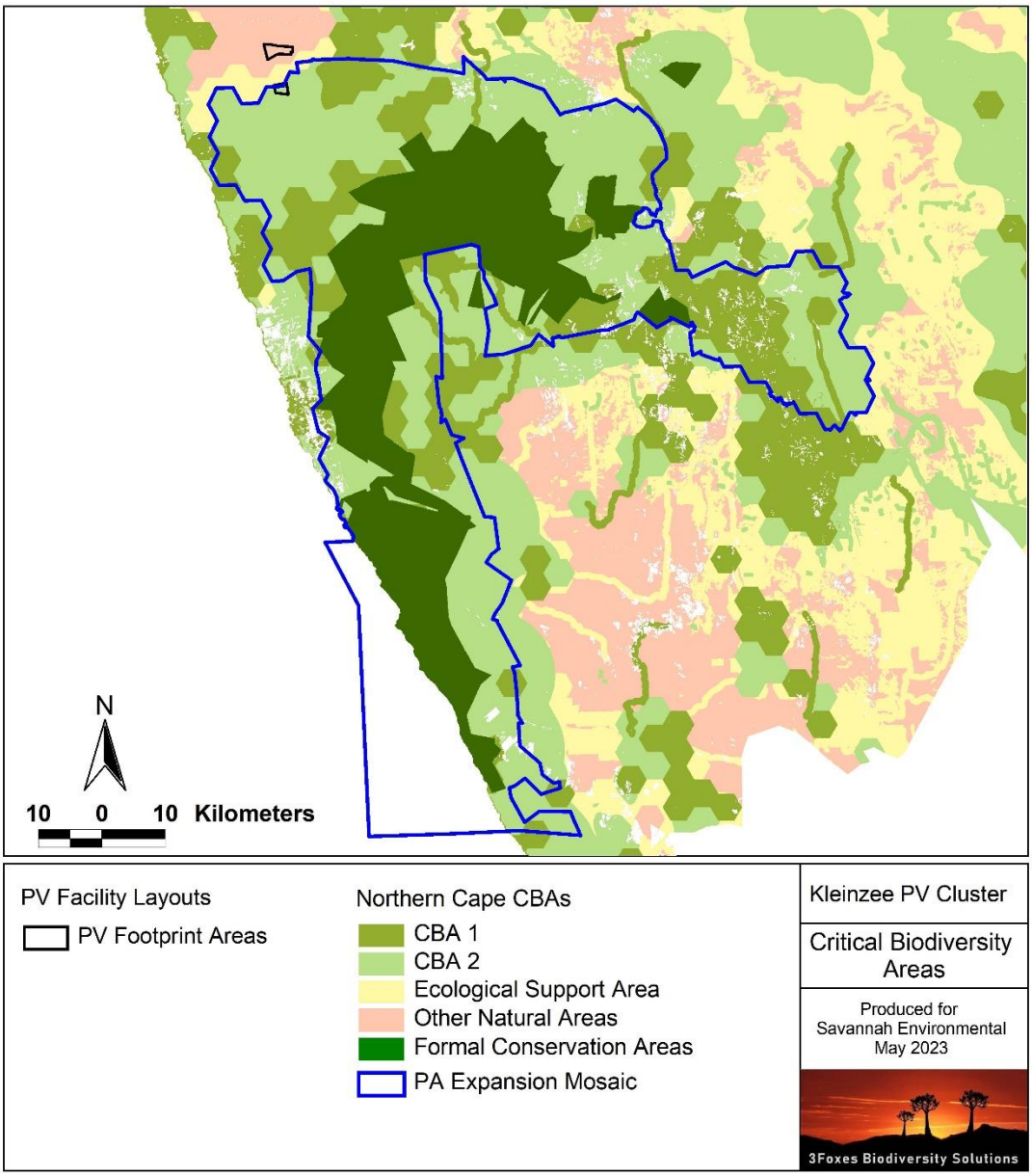

Figure 10. Northern Cape CBA Map with formal protected areas and the Namakwa National Park Expansion Area also shown.

The Kleinsee PV Facility site falls largely within the proposed expansion area for the Namakwa National Park (Figure 10). Development of the site would place some limitations on the future expansion of traditional formalised conservation into the affected area. The extent of this limitation is however considered to be insignificant. The Namakwa National Park currently protects 14% of the total extent of the Namaqualand Strandveld vegetation type. The expansion mosaic area includes an additional 36% of the overall extent this vegetation type of which the Kleinsee PV Facility would comprise less than 0.6%. Taken as a whole, the presence of the Kleinsee PV Facility would reduce the available combined extent of Namaqualand Strandveld within the Park and the expansion area by 0.4%. Since the affected area is on the margin of the expansion area and does not include any high-value habitats, the area affected by the PV plant could easily be substituted by another

neaby areas of Namaqualand Strandveld, with little impact on the overall integrity and efficiency of design of the park expansion area. The impact of the Kleinsee PV Facility on potential future expansion of the Namaqua National Park is therefore considered minimal.

3.7 CUMULATIVE IMPACTS

There are several approved wind energy developments in the area surrounding the Kleinsee PV Cluster site (Figure 11). These proposed projects include the 300MW Kap Vley WEF project east of the site, the 140MW Namas WEF and the 140MW Zonnequa WEF which include or abut the current project areas. The Komas and Gromis WEFs were previously initiated east and south of the current project area but the final EIA for either has not been submitted with the result that these project have not been authorised as as such are not included in the current consideration of cumulative impact. Futher afield there is the 300MW Eskom Kleinzee WEF west and north of the site and the Project Blue WEF located northeast of Kleinsee. The overall footprint of these approved facilities is approximately 700ha, distributed across an area of approximately 100 000 ha. The current projects would add significantly to this footprint with the Kleinsee PV project adding an additional 310 ha of habitat loss and the Daisy PV Facility an additional 600 ha. However, in this regard it is important to make a distinction between the nature of impact associated with wind energy developments and solar energy developments. The footprint of wind energy facilities is dispersed across the landscape and there are additional edge effects particularly for fauna associated with turbine noise and other associated types of disturbance. Solar energy development has a more intense, localised disturbance and signficantly impacts biodiversity within the development footprint, but edge effects can be reduced to a low level. As such, the footprint of PV facilities is more clearly defined and locally concentrated and provided that the location of the PV footprint is suitably chosen, then impacts tend to be relatively low when assessed at the landscape level. In terms of the current situation, cumulative impacts on fauna and flora in the area are a concern given that numerous facilities have been approved within a relatively small area. However, as suggested above, these impacts need to be interrogated with consideration of both the distribution and type of development occurring in the area. In this regard it can be seen that the larger relative footprint of the PV facilities is likely to have a greater negative impact on plant species of concern in the affected area whereas, it is likely that faunal impacts are likely to be greater due to the wind energy facilities due to their extensive road network which causes fragmentation and their greater associated noise and disturbance footprint.

In terms of vulnerable plant species, the overlap between the wind energy facilities and the current PV developments is relatively low as the PV facilities are located largely within different habitats to the wind energy facilities which tend to favour the areas of higher-lying ground, while the PV facilities are located in relatively low-lying areas that are avoided by wind energy facilities. As a result, there is some differentiation between the PV facilities and wind energy facilities with regards to cumulative impacts on plant species of concern. The only species which is likely to be affected by both types of development is Wahlenbergia asparagoides which is relatively common and widespread and even with the

combined impact of wind and solar energy development in the area is highly unlikely to be significantly impacted at the population level.

In terms of fauna, there would be some fragmentation of habitat as a result of renewable energy development, but ultimately, wind energy development is likely to be a greater cause for concern than PV development given the localised nature of PV development and the relatively long access roads with hardened surfaces that are associated with wind energy facilities. Species likely to be vulnerable to wind energy development in the area include most subterranean species including golden moles and burrowing skinks. It is also possible that the Namaqua Dwarf Adder would also be vulnerable as this species would be vulnerable to predation while traversing wind farm access roads. The PV facilities are unlikely to cause significant long-term fragmentation as many species would still be able to traverse the PV fields provided some residual vegetation is allowed to remain, while the larger species of the area are likely to be able to move around or avoid the PV footprint areas. Since the PV facilities are not located in areas that appear to have a high significance for faunal movement or migration, an impact on these broad-scale ecological processes is unlikely.

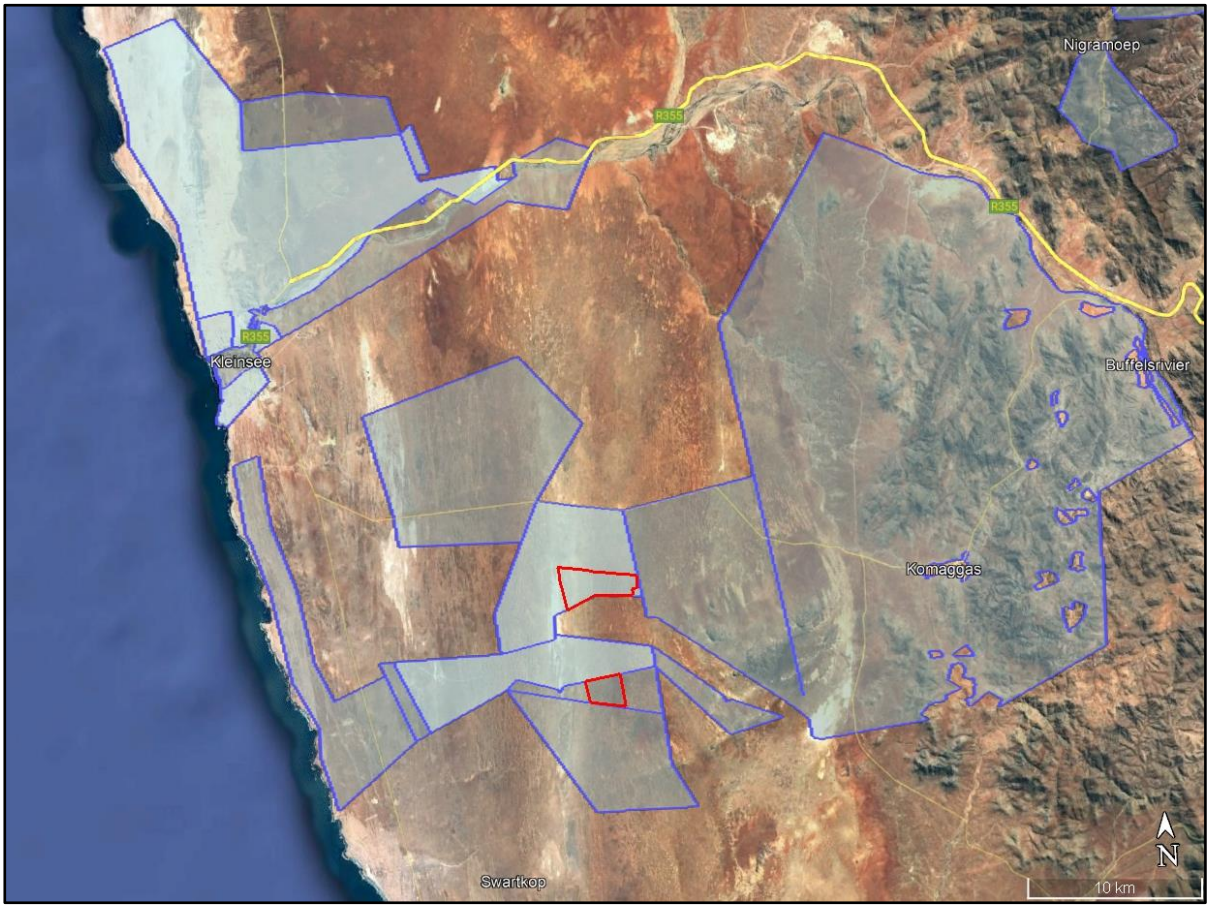

Figure 11. Map of other proposed renewable energy developments in the vicinity of the Kleinsee PV cluster. It is important to note that the actual developments would not occupy the whole of the indicated land portions, but only a small proportion.

4. EVALUATION OF RESIDUAL IMPACTS & IMPACTS ON IRREPLACEABLE BIODIVERSITY

In terms of the requirements for an offset study, it is required to evaluate the adequacy of measures considered and adopted to avoid, minimize and rehabilitate potentially significant negative impacts on biodiversity. Any development must ensure that there are no residual impacts of very high significance that could lead to irreplaceable loss of biodiversity and/ or priority ecosystem services. In other words, an offset does not negate the need to reduce on-site impacts to an acceptable level.

In terms of impacts associated with the Daisy PV Facility, a faunal compliance statement was recommended as a result of the outcome of the Site Verification Report which did not find any fauna of concern within the development footprint and considered it unlikely that any of the listed fauna known from the area are regularly present within the affected area. In addition, since the site lies outside of all CBAs, ESAs, Strategic Water Source Areas etc. and ultimately the sensitive dune areas were not directly impacted by the development, a Terrestrial Biodiversity Compliance Statement was also produced for the development application. As such, impacts on terrestrial fauna and biodiversity more generally were considered to be relatively low and in terms of the guidelines, a range of mitigation and avoidance measures were recommended to manage and reduce impacts associated with the development. Species assessments were however produced for two plant species, namely *Wahlenbergia asparagoides* and *Helichrysum trichostatum*. The impacts of the development on these two species are listed below (Table 3). The only impact considered not be low after mitigation is the impact of habitat loss on *Wahlenbergia asparagoides*, which is assessed as medium after mitigation. However, it appears that the abundance of this species has likely been underestimated in the area as this species is considered to be relatively common and widespread within the typical strandveld habitat of the area. The impact of the development on this species is estimated as a loss of approximately 0.25% of the population. This is not considered highly significant and would not compromise the local or regional population of this species. As such, the impact of the Daisy PV facility on this species is considered acceptable.

Table 3. Pre- and post mitigation impacts associated with the proposed Daisy PV development as assessed in the ecological study for the development.

Impact	Before Mitigation	After Mitigation
Impact on *Wahlenbergia asparagoides*		
Construction-Phase Impact on *Wahlenbergia asparagoides*	Medium	Medium

Operational-Phase Impact on *Wahlenbergia asparagoides*	Moderate	Low
Cumulative impacts on *Wahlenbergia asparagoides*	Medium	Low
Impact on *Helichrysum trichostatum*		
Construction-Phase Impact on *Helichrysum tricostatum*	Moderate	Low
Operational-Phase Impact on *Helichrysum tricostatum*	Moderate	Low
Cumulative impacts on *Helichrysum tricostatum*	Low	Low

In terms of the Kleinsee PV Facility (Table 4), impacts on listed plant species are considered relatively low and it is only *Wahlenbergia asparagoides* that would be impacted to a moderate degree by this development. Similarly, there do not appear to be any fauna of concern that would be present and impacted by the Kleinsee PV facility with the result that a faunal compliance statement has been prodiced to inform the EIA application. However, of greatest potential concern regarding the Kleinsee PV Facility is the location of the majority of the footprint within an area demarcated as a CBA 2 and expansion area for the Namaqua National Park. However, as discussed on this report as well, the overall footprint of the development represents a very small proportion of the affected CBA and PAES Focus Area and given the location of the site on the very edge of the PAES and CBA, it would not significantly constrain the future expansion of the Park into this area and since the site is relatively homogenous with no significant features of concern, it can reasonably and easily be substituted with another area of Namaqualand Strandveld if necessary.

Table 4. Pre- and post mitigation impacts associated with the proposed Kleinsee PV development as assessed in the ecological study for the development.

Impact	Before Mitigation	After Mitigation
Impact on *Wahlenbergia asparagoides*		
Construction-Phase Impact on *Wahlenbergia asparagoides*	Medium	Medium
Operational-Phase Impact on *Wahlenbergia asparagoides*	Moderate	Low
Cumulative impacts on *Wahlenbergia asparagoides*	Medium	Low
Impacts on Terrestrial Biodiversity		
Construction-Phase Impact on CBAs and ESAs	Moderate	Low

Operational-Phase Impact on NPAES Focus Areas	Moderate	Low
Operational Phase impacts on CBAs and ESAs	Low	Low
Decommissioning Phase impacts on CBAs and ESAs	Low	Low
Cumulative Impacts on Terrestrial Ecology	Low	Low

Based on the above analysis of impacts associated with the Kleinsee PV Cluster, it is clear that the Daisy PV facility lies outside of the area that needs to be considered with regards to the future expansion of the Namaqua National Park and there do not appear to be any impacts associated with this facility that would warrant an offset. In terms of the Kleinsee PV Facility, this site is considered relatively homogenous with few notable features present, but lies within a CBA 2 and NPAES Focus Areas and planned expansion area for the Namaqua National Park. However, since this impact has been assessed as being low after mitigation, there is little evidence to suggest that an offset should be considered for this development either.

5. CONCLUSIONS AND RECOMMENDATIONS

This study was initiated at the request of SANParks on the basis that the Kleinsee PV Cluster would potentially have an impact on the future potential expansion of the Namaqua National Park. In terms of the two developments comprising the cluster, the Daisy PV Facility lies outside the park expansion mosaic and would not have any impact on either CBAs or the expansion potential of the park. The habitat within the Daisy PV Facility is however considered more sensitive than that within the Kleinsee PV Facility on the basis of the dunes present and a higher abundance of plant species of concern. However, the dunes have been avoided under the final layout and the impact on plant SCC is considered acceptable. As such, the Daisy PV Facility does not meet the criteria for an offset when considered in isolation. The Kleinsee PV Facility lies within an area that is considered relatively low sensitivity on account of the homogenous nature of the vegetation and the low abundance of plant SCC. It does however lie largely within an area of CBA 2 and Namakwa National Park expansion mosaic. The analysis however reveals that the area that would be occupied by the PV facility represents 0.2% of the overall extent of Namaqualand Strandveld and would decrease the availability of Namaqualand Strandveld within the park expansion area by 0.4% which is not considered to represent a high significant impact. This potential impact is further ameriolated by the location of the Kleinsee PV Facility along the margin of the expansion mosaic with the result that the facility would not significantly constrain the future expansion of the Park into this area and as the site is relatively homogenous with no significant features of concern, it can reasonably and easily be substituted with another area

of Namaqualand Strandveld from the area if necessary. Based on these results, there is insufficient basis to warrant an offset for the Kleinsee PV Facility when considered in isolation. Additional factors that also weigh in this direction would be the fact that the affected properties have not been identified thus far as potential receving areas for biodiversity offsets and both the Daisy and Kleinsee PV Facilities lie outside of the areas idenfiied for future park expansion in the Draft Namaqua NP Management Plan (2024 – 2033).

The project area has been the focus of numerous renewable energy development applications and there are several approved WEFs in the area, raising the potential for cumulative impacts on fauna and flora. However, in this regard the wind farm applications cover a relatively large area that includes a wide variety of different vegetation types and habitats, with the result that cumulative impact has thus far been distributed quite widely across these different features. Furthermore, the areas targeted by the wind farms represent somewhat different habitats from the areas likely to be affected by the Kleinsee PV Cluster as the wind energy facilities tend to favour the areas of higher-lying ground, while the PV facilities are located in relatively low-lying areas that are avoided by wind energy facilities. As there do not appear to be any species of fauna and flora that would be specifically vulnerable to cumulative impact on the current affected area, and there are no specific ecological processes that are likely to be signficantly disrupted, cumulative impacts associated with the Kleinsee PV Cluster are considered acceptable.

This terrestrial biodiversity offset needs analysis therefore makes a clear finding that an offset for the Kleinsee PV Cluster is not considered necessary or appropriate when the facilities are considered each on their own or when considered together for cumulative impact.