



Terrestrial Biodiversity Specialist Assessment Report

Proposed Diepwalle Tented Camp, Knysna, Western Cape



Prepared for:

Cape EAPrac



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Prepared by:



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March 2023



Executive summary

Biodiversity Management Services was appointed by Cape EAPrac to conduct a Terrestrial Biodiversity Species Specialist Report for the proposed tented camp to be situated in the Diepwalle section of the Garden Route National Park outside Knysna. The proposed site is situated in a small forest clearing (approximately 0.5 ha) with a small artificial pond and associated Southern Afrotemperate Forest. The proposed tented camp development is around the edge of the clearing and into the fringes of the Southern Afrotemperate Forest. The development will be run on a seasonal basis, and all removable pieces will be removed out of season. The camp will consist of 15 guest tents on platforms and associated infrastructure for cooking, dining and staff accommodation. The terrestrial biodiversity sensitivity theme identified by the Department of Forestry, Fisheries and the Environment environmental screening tool was “Very High” and identified four key environmental features needing evaluation, necessitating the completion of this report. The area has undergone transformation in the past, and clearing of alien invasive plants is evident, yet it remains in a relatively natural state. In this report we identify three distinct habitat types important for animals and these are listed throughout the report as Mature Southern Afrotemperate Forest, Densely Vegetated Clearing and Woody Pond. Descriptions of habitat types are based on visual assessment of the study site and incorporated aspects of habitats important for species and biodiversity.

The four key environmental features that were identified were FEPA sub-catchments, National Forest Inventory, Strategic Water Source Areas and The Garden Route National Park. Each of these habitat features was evaluated in terms of their conservation importance, functional integrity and site ecological importance in the scope of the proposed development. Although all the features were listed as ‘Very High’ by the screening tool, the findings of this report identified a low site ecological integrity for FEPA sub-catchments, a moderate site ecological integrity for strategic water source areas and a high site ecological integrity for both the national forest inventory and the Garden Route National Park. However, even with a high site ecological integrity, it is unlikely the proposed development would negatively impact the area or any of the identified environmental features.

Several mitigatory measures are discussed here that will assist the proposed development in minimising any negative impacts that might occur. These mitigatory measures include, raised boardwalks, down lighting and how lighting is used, keeping the environmental footprint to a minimum, eliminating the need for a generator, appointment of an ecological control officer, management of the access road, animal friendly refuse facilities, clearing of alien vegetation and dense vegetation within the clearing and finally site decommission.



Overall, it is my expert opinion that the site is suitable for the proposed development and the development will cause minimal disturbance to the environmental features and biodiversity within the area. The nature of the development is such that it will cause minimal impact and the site will remain in a relatively natural state during times when the camp is running and decommissioned.



List of Acronyms

ADU	Animal Demography Unit
AIP	Alien Invasive Plants
CI	Conservation importance
DFFE	Department of Environment, Forestry and Fisheries
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EWT	Endangered Wildlife Trust
FEPA	Freshwater Ecosystem Priority Areas
FI	Functional integrity
GRNP	Garden Route National Park
IBA	Important Bird and Biodiversity Area
IUCN	International Union for the Conservation of Nature
NFEPA	National Freshwater Priority Areas
QDS	Quarter Degree Square
SABAP	Southern African Bird Atlas Project
SDP	Site Development Plan
SEI	Site Ecological Integrity



Contents of this specialist report

Contents of this specialist report that complies with the legislated requirements as described in the protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity, published in government notice No. 320 of 2020.

SPECIALIST REPORT REQUIREMENTS ACCORDING TO Government notice No. 320		SECTION OF REPORT
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page1
3.1.2	A signed statement of independence by the specialist;	Page 7
3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Page 16
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Page 15
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Page 8
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Page 40
3.1.7	Additional environmental impacts expected from the proposed development;	Discussed throughout
3.1.8	Any direct, indirect development; and cumulative impacts of the proposed development;	NA
3.1.9	The degree to which the impacts and risks can be mitigated;	Page 34
3.1.10	The degree to which the impacts and risks can be reversed;	Page 39
3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	Page 40
3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Page 34
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	NA
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Page 40



	3.1.15	Any conditions to which this statement is subjected.	NA
3.2		The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	
3.3		A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	



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1. Specialist contact details and *Curriculum vitae*

Contact Details: Biodiversity specialist

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 Qualifications PhD Nature Conservation
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Curriculum vitae – Dr C Brooke

1. Tertiary qualifications

Degree	Institution	Research theme or modules	Time period
Doctor of Philosophy, Nature Conservation	Nelson Mandela University	Medium to large mammalian fauna of the Palaeo-Agulhas Plain: Predicting habitat use and range distribution	2018-2021
Master of Science, Nature Conservation (<i>cum laude</i>)	Nelson Mandela University	Energy maximisation strategies of different African herbivores in a fire dominated and nutrient poor grassland ecosystem	2016-2017
Baccalaureus of Technology, Nature Conservation	Nelson Mandela Metropolitan University	Plant studies IV; Research methodology; Fresh water management IV; Conservation management I; Principles of management I; Resource management IV	2015
National Diploma, Nature Conservation	Nelson Mandela Metropolitan University	Plant studies I, II and III; Animal studies I, II and III; Conservation Ecology I, II and III; Resource Management I, II and III; Soil science; Conservation communication I and II; Conservation development; Conservation administration; Computer usage	2012-2014



2. Work experience

Company	Company details	Job description	Time period
Full time positions:			
Biodiversity Management Services (Pty) Ltd	43 Mosel Road, Mosel, Kariega, 6229	<i>Company director</i>	16 August 2022 – Current
Fathala Nature Reserve	Fathala Nature Reserve, Region de Fatick, Senegal, West Africa	<i>Conservation student:</i> Worked with all aspects of reserve management, including maintenance of infrastructure, monitoring of mammals, administration, guiding and planning of reserve activities.	01 December 2013 – 01 December 2014
Raptors View Wildlife Estate	Raptors View Home Owners Association Office, 14 Safari Junction, Hoedspruit, 1380	<i>Management assistant:</i> Worked with reserve management maintaining infrastructure and the wildlife estate. Duties included maintaining infrastructure, erosion control, animal management and culling, monitoring, problem animal control and security.	01 December 2010 – 31 January 2012

Non-permanent positions:			
Nelson Mandela University	School of Natural Resource Management, Nelson Mandela University, George Campus, Madiba Drive, George, 6530	<i>Supplemental instruction</i> Offered SI for ecology I and ecology III Part-time lecturer (Animal Studies 3) Part-time lecturer (Natural Resource management II and Game Ranch Management II)	January 2016 - November 2018 January 2019- July 2019 February 2021- July 2022

3. Scientific output

Book Chapters
1) Venter, J.A., Vermeulen, M.M & Brooke, C.F. (2019). Feeding ecology of large browsing and grazing herbivores. In Gordon, I.J. & Prins, H.T., editors. Ecology of Ungulate Browsing and Grazing II, Springer International Publishing.
Peer reviewed Journal Publications
1) Bugir, C.K., Brooke, C.F., Hayward, M.W., (submitted). Prey preferences of Anatomically Modern Humans (<i>Homo sapiens sapiens</i>). Submitted to the Journal of Human Evolution.
2) Lardo, L.E., Sutherland, C., Brooke, C.F., Tenan, S., Keith, M., Somers, M.J., Peel, M., Huebner, S., Romero, L., Swanepoel, L., Frits, H., Venter, J.A., (submitted). Regional variation in mammalian species richness and occupancy across South Africa's protected areas. Submitted to Ecological Applications.
3) Martens-Brooke, F.R., Brooke, C.F., Prima, M-C., Schabo, D.G., Farwig, N., Rösner, S., Pheiffer, M.B., Downs, C.T., Venter, J.A., (submitted). Connectivity of priority areas of Cape Vultures (<i>Gyps coprotheres</i>) from the south-east population of South Africa Submitted to Emu - Austral Ornithology.
4) Reeves, B., Brooke, C.F., Venter, J.A., Conradie, W. (2022) The reptiles and amphibians of the Mpofu-Fort Fordyce Nature Reserve complex in the Winterberg Mountains, Eastern Cape Province, South Africa. South African Journal of Wildlife



Research, 52: 143-145 doi:10.3957/056.052.0134
5) Brooke, C.F., Marean, C.W., Wren, C.D., Fritz, H., Venter, J.A. (2022). Using functional groups to predict the spatial distribution of large herbivores on the Paleo-Agulhas Plain, South Africa during the last glacial maximum. <i>Journal of Quaternary Science</i> . DOI: 10.1002/jqs.3430
6) Brooke, C.F., Marean, C.W., Wren, C.D., Fritz, H., Venter, J.A. (2021). Predicting large herbivore biomass for the last glacial maximum on the extinct Palaeo-Agulhas Plain (South Africa) using modern ecological knowledge of African herbivore assemblages and rainfall. <i>Quaternary Research</i> 1-14. doi:10.1017/qua.2021.23
7) Fortin, D., Brooke, C.F., Lamirande, P., Frits, F., McLoughlin, P.D., Pays, O. 2020. Quantitative spatial ecology to promote human-wildlife coexistence: a tool for integrated management of anthropogenic landscapes. Submitted to <i>Frontiers in Sustainable Food Systems</i> , section Agroecology and Ecosystem Services, 4:230
8) Brooke, C.F., Fortin, D., Kraaij, T., Fritz, H., Kalule-Sabiti, M.J., Venter, J.A. 2020. Poaching impedes the selection of optimal post-fire forage in three large grazing herbivores. <i>Biological Conservation</i> , 241: 108393. doi.org/10.1016/j.biocon.2019.108393
9) Venter, J.A., Brooke, C.F., Marean, C.W., Fritz, H., Helm, C.W. 2019. Large mammals of the Palaeo-Agulhas Plain showed resilience to extreme climate change but vulnerability to modern human impacts, <i>Quaternary Science Reviews</i> . doi: 10.1016/j.quascirev.2019.106050
10) Brooke, C.F., Kraaij, T & Venter, J.A. 2018. Characterizing a poacher-driven fire regime in low-nutrient coastal grasslands of Pondoland, South Africa. <i>Fire Ecology</i> , 14(1):1-16. doi: 10.4996/fireecology.140101016
Presentations at conferences and symposia
1) Martens-Brooke, F.R., Brooke, C.F., Prima, M-C., Schabo, D.G., Farwig, N., Rösner, S., Pfeiffer, M.B., Downs, C.T & Venter, J.A., 2021., Connectivity of priority areas of Cape Vultures (<i>Gyps coprotheres</i>) from the south-east population of South Africa. South African Wildlife Management Association Symposium. Wildlife management in the 21st century: Adapt or die? Berg-en-Dal Camp Rest Camp, Kruger National Park, Mpumalanga.
2) Brooke, C.F., 2021. Large herbivore populations and densities on the Palaeo-Agulhas Plain: understanding an extinct southern Cape ecosystem. South African Wildlife Management Symposium: Wildlife management in the 21 st century: Adapt or die? Berg-en-Dal Rest Camp, Kruger National Park, Mpumalanga.
3) Brooke, C.F., 2021. Large herbivore populations and densities on the Palaeo-Agulhas Plain: understanding an extinct southern Cape ecosystem. SASQUA online series 2021, session 5: Southern South African palaeoecology and climate models.
4) Venter, J.A., Brooke, C.F., Marean, C.W., Fritz, H., Helm, C.W. 2019. Large mammals of the Palaeo-Agulhas Plain: Conceptual reconstruction of large mammal communities and their habitats, 41 st Fynbos Forum: Eliminating barriers to conservation, Baardskeedersbos, Western Cape, South Africa.
5) Brooke, C.F., Marean, C.W., Harris, J.A., Venter, J.A. 2019. Using the present to uncover the past: Reconstructing the ecology and behaviour of extinct large mammals on the Palaeo-Agulhas Plain (south coast, South Africa). South African Wildlife Management Symposium: Sustainable landscapes for wildlife conservation, Wilderness Hotel, Western Cape, South Africa.
6) Venter, J.A., Brooke, C.F., Marean, C.W., Fritz, H. & Helm, C.W 2019. Conceptual reconstruction of large mammal assemblages of the Palaeo-Agulhas Plain reveals resilience to climate change but vulnerability to modern humans. 29th International Congress for Conservation Biology (ICCB 2019), Kuala Lumpur, Malaysia.
7) Venter, J.A., Brooke, C.F., Marean, C., Fritz, H. & Helm, C. 2019. Conceptual reconstruction of large mammal communities on the Palaeo-Agulhas Plain. Annual Meeting & Centennial celebration of the American Society of Mammalogists, Hyatt Regency Washington on Capitol Hill, Washington DC, United States of America
8) Brooke, C.F., Marean, C., Harris, J.A. & Venter, J.A. 2019. Using the present to uncover the past: Reconstructing the ecology and behaviour of extinct large mammals on the Palaeo-Agulhas Plain (south coast, South Africa). Society for American Archaeology 51 st Annual meeting, Albuquerque Convention Centre, New Mexico, United States of America.
9) Brooke, C.F., Marean, C. & Venter, J.A. 2019. Large mammals of the Palaeo-Agulhas Plain: predicting habitat use and population densities. SASQUA XXII Biennial Congress, Point Hotel, Mossel Bay, South Africa
10) Venter, J.A., Brooke, C.F. & Marean, C. 2018. Large mammals of the Palaeo-Agulhas Plain: Conceptual reconstruction of assemblages and habitats. Southern African Wildlife Management Symposium: Managing small and fragmented populations, Klein Kariba, Limpopo Province, South Africa.
11) Brooke, C.F., Fortin, D., Kraaij, T. & Venter, J.A. 2018. Niche separation of large ungulates: foraging to maximise instantaneous or daily digestible energy. Savanna Science Network Meeting, Skukuza, Mpumalanga, South Africa.
12) Brooke, C.F., Fortin, D., Kraaij, T., Kalule-Sabiti, M.J. & Venter, J.A. 2017. Foraging ecology of large ungulates in a vegetation mosaic affected by anthropogenic fire and poaching on Mkambati Nature Reserve, Eastern Cape, South Africa. Southern African Wildlife Management Association Symposium: Wildlife management in the face of global change, Goudini, Western Cape Province, South Africa.
Poster presentations
1) Brooke, C.F., Kraaij, T. & Venter, J.A. 2016. Fire and herbivory dynamics in the low nutrient coastal grasslands of Mkambati Nature Reserve, Eastern Cape South Africa, 51st Annual Congress of the Grassland Society of Southern Africa, Wilderness, Western Cape Province, South Africa.



Grant funding			
<p>Brooke, C.F 2021-2022. Late Pleistocene large mammal use of the Palaeo-Agulhas plain: The facilitation role of mega-herbivores and the implications for modern rewilding of landscapes.</p> <p><i>Position:</i> Principle investigator</p> <p><i>Project funder:</i> NRF</p> <p><i>Project Funding:</i> R610 000</p>			
<p>Brooke, C.F., Marean, C.W., Wren, C.D., Venter, J.A. 2019. Large mammals of the Palaeo-Agulhas Plain: Predicting habitat use and range distribution.</p> <p><i>Position:</i> Principle investigator</p> <p><i>Project funder:</i> Past Africa</p> <p><i>Project Funding:</i> R28 550</p>			
<p>Brooke, C.F., Kraaij, T. & Venter J.A. 2016-2017. Energy maximisation strategies of different African herbivores in a fire dominated and nutrient poor grassland ecosystem.</p> <p><i>Position:</i> Principle investigator</p> <p><i>Project funder:</i> Dormehl-Cuninham Scholarship</p> <p><i>Project funding:</i> R 21 298</p>			
Teaching experience			
2021-2022	Nelson Mandela University	Taught Natural Resource Management (second year students) for Nature Conservation students and Game Range Management II (second year students) to Game Ranch Management Students.	
2019	Nelson Mandela University	Taught Animals III/Game Health III (second year students) for Nature Conservation and Game Ranch Management Students.	
2016-2017	Nelson Mandela University	Taught Supplemental instruction to undergraduate students for ecology I (one semester) and ecology III (three semesters).	
Student supervision			
Nkosi, N	BTech (Nature Conservation) Nelson Mandela University, co-supervisor	Ungulate responses to old agricultural fields in Gondwana Game Reserve	Completed 2019
Mieny, K	Honours (Wildlife Management) University of Pretoria, co-supervisor	A preliminary assessment of the seasonal difference and influence of megaherbivores on the diets of large herbivores in Sanbona Wildlife Reserve	To be completed November 2022
Moderation			
2019	Nelson Mandela University	Moderated final examinations for Animals I/Game Health I (first year students) for Nature Conservation and Game Ranch Management. Nelson Mandela University	

4. Professional membership and service

Association	Details	Time period
SACNASP	Professional Natural Scientist	2022-Current



South African Wildlife Management Association	Student member	2018-current
Society for American Archaeology	Student member	2019

5. Other courses

List of courses completed

Snake ID & snakebite treatment; Advanced snake handling; Basic ArcGIS; Hidden Markov Models; Agent based models using the MARS platform; Agent based models in social ecological systems, Introduction to data analysis in R, data collection and management; Introduction to multivariate statistics.

6. Projects undertaken

Projects	
Soil Erosion control – planning working with and training local communities to tackle soil erosion resulting from overgrazing and deforestation in northern Malawi	2023
Terrestrial Biodiversity Specialist Report – Proposed Western Bypass, George	2023
Animal Species Specialist Report – Proposed Western Bypass, George	2023
Research assistance – Cape Parrot Project population counts and nest monitoring	2022
Herpetofauna surveys – Karoo National Park and Mpofu and Fort Fordyce Nature Reserves (conducted annually)	2017-2019



2. Details and Expertise of the specialist

Dr Christopher Brooke is an environmental consultant and director of Biodiversity Management Services (Pty) Ltd. Christopher obtained his MSc (*Cum Laude*) from Nelson Mandela University with a project focussed on how large herbivores respond to frequent fires (maximising highly nutritious forage) and the threat of poaching in Mkambati Nature Reserve, Eastern Cape, South Africa. Thereafter, Christopher completed his PhD at Nelson Mandela University with a thesis modelling the population dynamics and drivers of large mammals on the Palaeo-Agulhas Plain (now submerged off the coast of South Africa). Christopher has since undertaken a postdoc where he is working to understand the effects of Megaherbivores in the Fynbos and Karoo biomes and how this facilitates habitat for other species. Christopher has also been involved in various other projects dealing with terrestrial vertebrates (herpetofauna, avifauna, large carnivores etc.) and the introduction and management thereof. In addition, Christopher has also undertaken various short courses (through Nelson Mandela University) pertaining to GIS and statistical analysis of ecological data. Since the conception of Biodiversity Management Services Christopher has partaken in several Terrestrial Biodiversity and Animal Species Specialist assessments and is involved in habitat management in areas across Africa.



Declaration by the specialist

I Dr Christopher Brooke declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. “the Protocols”) and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
 - o any decision to be taken with respect to the application by the competent authority; and;
 - o the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the specialist

Biodiversity Management Services

Company Name

Date: 14/08/2023



3. Introduction

3.1. Background

Cape EAPrac has been appointed by South African Trading Enterprises (Pty)Ltd. to conduct an EIA for the proposed construction of a seasonal tented camp in the Diepwalle forest (outside Knysna) in the Garden Route National Park (GRNP). The site was selected as it has been previously disturbed, and historically used as a sawmill site and movie set. The proposed development footprint covers an area of approximately 0.59 ha and encompasses a forest clearing, forest fringe, mature growth Southern Afrotemperate Forest and a small artificial dam. The area falls within the Knysna municipality and Garden Route district municipality of the Western Cape. Biodiversity Management Services has been appointed by Cape EAPrac to conduct a terrestrial biodiversity specialist assessment for the proposed site. Biodiversity Management Services has completed this report under the guidance of Conservation Management Services, Ken Coetzee. The terrestrial biodiversity specialist report is necessary as the DFFE screening tool identified the area as a 'very high priority' for biodiversity under the relative terrestrial biodiversity theme. The screening tool further identified four key sensitivity features within this environment. To this end a terrestrial biodiversity specialist assessment was conducted to determine the feasibility of the project, the best placement of infrastructure to minimize impact on the environment, as well as suggest monitoring and mitigation measures that need to be implemented should the applicant (South African Trading Enterprises) be successful with their application for environmental authorisation.

3.2. Conditions relating to this report

The findings, observations, results and recommendations are based on the authors best scientific and professional knowledge. The conditions and limitations relating to this report were subject to the availability of suitable up to date literature regarding species distribution and occurrence, land use history and the ecology of the area. Fieldwork was conducted in February 2023 (see Approach and Methodology) as this was considered a good time with the high likelihood of finding species and suitable habitats. It is a time when migratory species would have been present, temperatures were warm and water was readily available (although several days without rain prior to the survey meant the leaf litter and soil surface were relatively dry), providing suitable habitat for species. Most woody species were easily identifiable, either by having leaves or inflorescences at the time of the survey. It is however possible that some species may have been absent during the sampling period. Importantly due to limited time in field a detailed survey was not conducted, and likely occurrence of species was based on direct observation, known occurrence, habitat suitability, published literature or a combination thereof. The four sensitivity features identified by the screening tool were evaluated using mapping and satellite imagery as well as surveys during the field visit. Evaluation of these sensitivity features is based on the fine scale extent of the study area and how it affects the broader region. Observations of certain



AIP and other indigenous species are uploaded onto iNaturalist (<https://www.inaturalist.org/>) and confirmation of identifications is subject to identification by experts on the platform.

The author (Dr Christopher Brooke) reserves the right to modify aspects of the report, including the recommendations when and if new information may become available within the proposed scope of the development. Although open to comment from Cape EAPrac this report may not be altered or added to without prior written consent of the author.

3.3. Scope of this report

The scope of this report was to conduct a terrestrial biodiversity specialist report for the proposed tented camp in a clearing in the Diepwalle forest, SANParks, Knysna municipality. This report deals with the potential impact of development on the biodiversity and species found in the area. Specific focus is given to four areas identified with very high sensitivity features (FEPA sub-catchments, National forest inventory, Strategic water source areas and Garden Route National Park) as the relative biodiversity sensitivity theme was listed as 'very high' for the study area. The impacts on these environments and the potential mitigating measures that can be implemented to avoid negative impacts across the study area are discussed throughout the report.

3.4. Description of study area

The mission of the GRNP is "An innovative and accessible national park, spanning mountains to marine, conserving the natural and cultural heritage of the Garden Route collaboratively for the benefit of people and the environment" (Garden Route National Park, 2020). The study area is situated within SANParks GRNP in the Diepwalle (deep walls) forest. The site is located approximately 15 km from Knysna off the R399. The site falls within the Southern Afrotemperate Forest vegetation type of the forest biome, a biome that covers only approximately 0.5 % of South Africa's land surface area (Mucina and Geldenhuys, 2006). The study site is situated in a small forest clearing that has historically been subject to various levels of disturbance. This disturbance includes being used as a forestry station in the 1800s, the scene of various film sets more recently and elephant bomas. Although the area falls within the Garden Route National Park and is listed as an IBA, it is not listed as a sensitive (no-go area) by the EWT threatened species no-go mapping tool (Endangered Wildlife Trust, 2023). The road running past the proposed development site is not public access and subject to little traffic. Aside from access to the site the road only serves as an access road to one of SANParks research sites. Importantly, this road is currently a jeep track (twee-spoor road) and with the exception of additional drainage to prevent further degradation, should be kept in as natural state as possible. The Outeniqua hiking trail also runs close to the proposed site (approximately 100 m to the south), it is of little consequence and will not contribute any further disturbance to the area.



Although listed by (Mucina and Geldenhuys, 2006) as Southern Afrotemperate Forest, the area is representative of several different fine scale habitats. For the benefit of understanding animal species habitat requirements, these habitats have been described as Mature Southern Afrotemperate Forest, densely vegetated clearing and woody pond (Table 1 and Figure 1-3). Bordering the Mature Southern Afrotemperate Forest and densely vegetated clearing there is little signs of ecotonal vegetation, however AIP's have been removed historically and may be acting in this regard.

Table 1: Description of the habitat types within the study area.

Habitat type	Transformation	Invaded by IAP
Mature Southern Afrotemperate Forest	Very light transformation around the forest fringe. This includes remains of cut AIP and signs of old infrastructure	Little to none. <i>Acacia stricta</i> (hop wattle) seedling were noted on the forest fringe at the location to tent 8 and could signify the potential for reinvasion.
Densely vegetated clearing	Heavily transformed. The clearing is now densely vegetated. Many of the species are associated with disturbed areas (<i>Helichrysum</i> sp.)	Several invasive and non-indigenous species were noted at the site. These included garden roses and bramble (<i>Robus</i> sp.)
Woody pond	Transformed. Although the pond is man-made it has become a naturalised feature of the landscape and important for many species.	Little to none. No noticeable IAP's in this habitat, however there is evidence that AIP have previously been removed.





Figure 1: Satellite image of the proposed study area (plate 1) and description of the habitats (based on habitat characteristics) of the study site (plate 2) (“Cape Farm Mapper,” 2016).





Figure 2: View of the clearing that the proposed tented camp will be situated around. The drop-off/pick-up point, kitchen and central walkways will all be situated in this clearing.





Figure 3: View from inside the forest where the tents for the proposed camp will be situated. Relatively open areas with large amounts of small growth trees have been identified for the placement of the tents.

There is very little topographic variation on the study site. The site is characterised by a gentle slope with the highest point of the study site at the western edge (Figure 4). As a result, there are no areas with steep slopes or areas that create unique habitats for specialist animal species. Aside from the artificial pond in the study site there are no nearby watercourses that pose a risk to the site or risk pollution from the site (Figure 4).



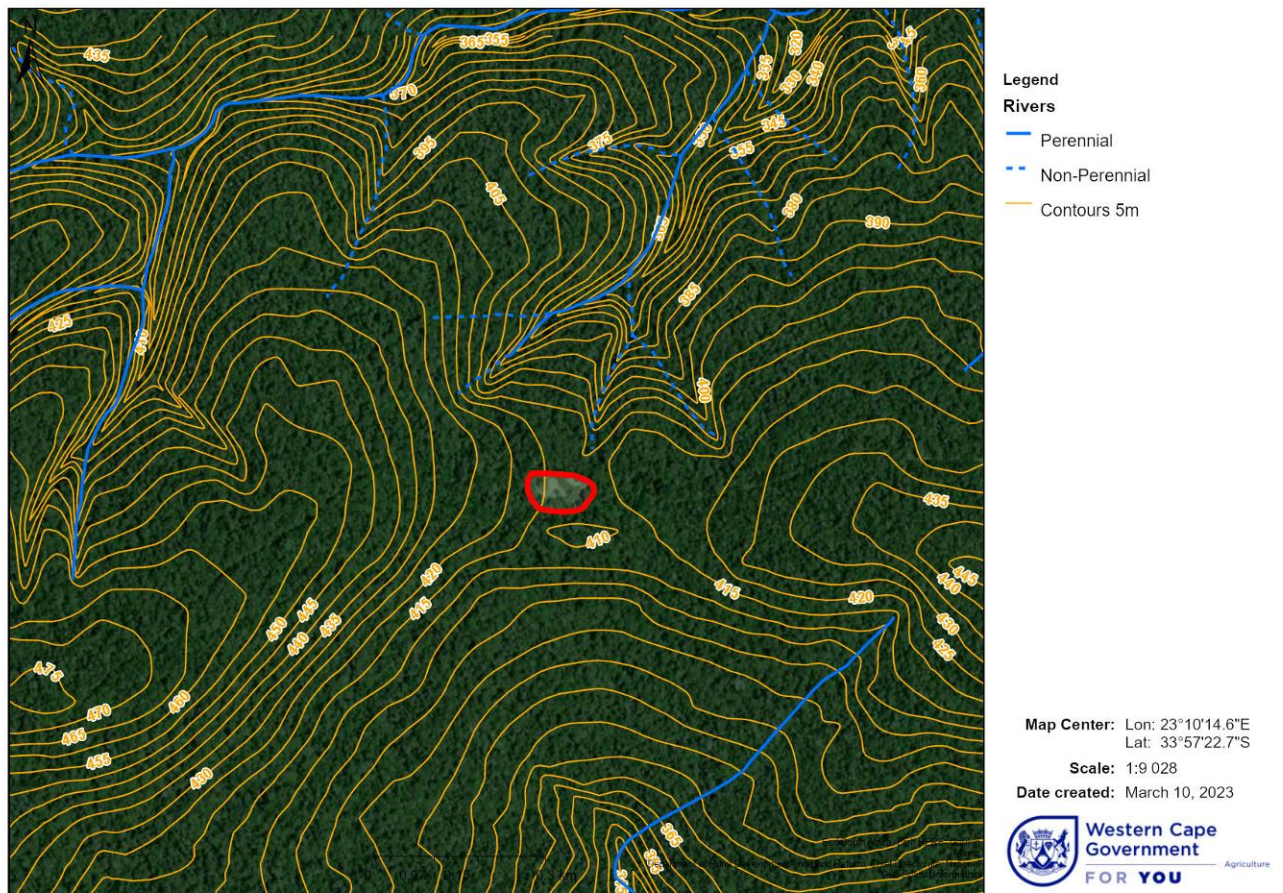


Figure 4: Relative topography and water courses in the broader study area.

The proposed camp will consist of 15 guest tents, one large dining and entertainment area, a kitchen area, several staff tents and a turning area for vehicles (Figure 5). Each guest tent will be on a wooden platform of 5 x 10m. All structures will be constructed on wooden platforms and be completely removable out of season and at the camp decommission. The wooden structures for the tents will be individually places in small forest gaps or alongside the wetland where they will have the lowest environmental impact. The main decks, pool area and yoga deck will be joined by a raised wooden walkway and the paths leading to each tent will remain gravel forest paths. Included in the proposed design are also forest library and quiet zones and areas that need to be set aside for water storage, and power (solar) generation and staff accommodation. The proposed dining and drop-off/pick-up areas are situated alongside an existing wetland (see freshwater specialist report for details) and is an area that is currently used for parking and turning vehicles. Based on the uniqueness of the area and the current queries around the current SDP the area has been assessed in terms of suitable habitat and presence of animal species. Importantly, and alterations to the SDP need to provide the same level of uniqueness and seclusion of the



site but takes into account the environmental considerations that should be worked around. Thus a manual mapping of each tent position is proposed.

Water supply has been suggested wither through a gravity fed pipe from the Diepwalle camp or having water shipped in by tank. On the site water will be stored in wither 5000 or 10 000l tanks. Disposal of water from toilets and septic systems will be trucked out is self-contained sewage systems from chemical toilets. Grey water from showers, cooking facilities and pools will be disposed of by means of a slip path and soakaways outside of and not flowing toward the wetland area.

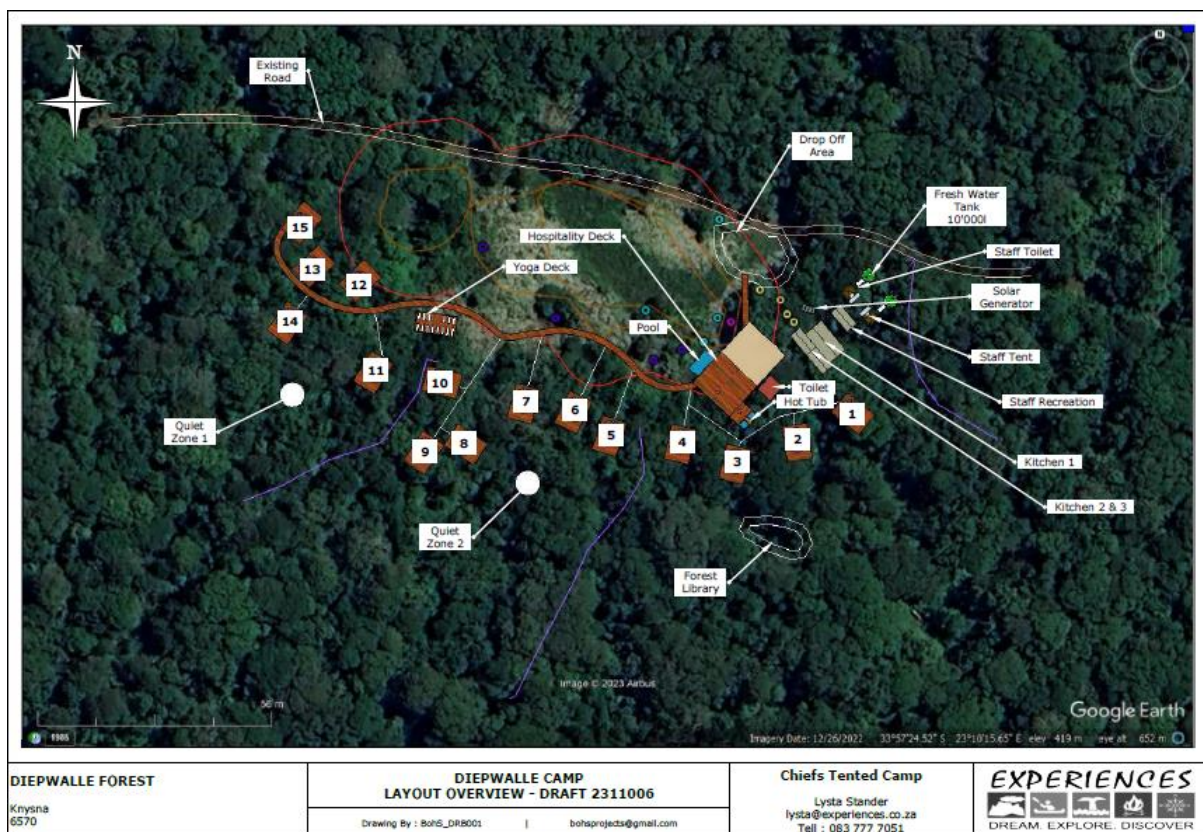


Figure 5: SDP for the proposed Tented camp.

4. Approach and Methodology

Prior to a field site visit a literature review and desktop study was conducted. This investigation made use of several available online resources to determine presence or absence of species as well as habitat sensitivity and environmental conditions at the proposed site of the tented camp. Each of the effected environments identified by the screening tool evaluated in terms of likelihood that they would occur at the site and the best methods for preserving these features if needed. Resources included species specific research for those species identified by the scoping tool, available species distribution and red list data from SANBI. As well as resources on environmental management and sensitivity



and forest management guidelines. Recent satellite imagery for the site was gathered from Google Earth and the proposed layout of the camp overlaid to determine the areas where the highest impact would be likely. The Endangered Wildlife Trust No-Go mapping tool (Endangered Wildlife Trust, 2023) was used to determine if the area was highly sensitive in terms of the environment or key species in the study area. Importantly, the study area did not fall within any no-go areas. The fine scale of the study and relatively small site meant that no site features could be effectively evaluated at a desktop level prior to the site visit.

A site visit was conducted on Thursday 16th February 2023 throughout the course of the day. Only a single survey was conducted at this site as it was relatively small and the habitats identified by the screening tool easily identified. The site visit was combined with the animal species specialist report site visit as well as the freshwater and botanical reports. Plants were identified at the locations of each of the tent and communal area locations provided by the EAP and these were noted (see botanical report for details). The survey took place in summer where temperatures were warm. Warm temperatures were hoped to coincide with increased activity of invertebrates, reptiles and amphibians. However, during our site visit the proposed site was relatively dry and species activity was low. There was however sufficient water in the woody pond for the determination of importance and intactness of that habitat. Due to the size of the area and the environmental conditions during the survey, this single survey was considered sufficient for the proposed study area.

During the site visit, the area was first surveyed from a vantage points along the road and clearing where good visualisations of the area were gathered. During this initial survey key areas such as the woody pond were also noted. Thereafter, each individual area (Mature Southern Afromontane Forest, Densely Vegetated Clearing and the Woody Pond; Figure 6) were surveyed in more detail. During the botanical survey (see botanical report) each tent and the communal area were marked and the focus of our study was around investigating these areas for suitability. During the survey all species were noted if they were present at the site. These species observations included direct observations, auditory observations and species-specific habitat modifications (nests and underground tunnels used by moles etc.) and keystone species can be used as an indicator for key habitats. IAP's, areas that were degraded and old infrastructure that could provide habitat for species was also noted. Habitat information gathered during the site visit was compared to the effected environments identified in the screening tool. For each environmental feature the conservation importance, functional integrity and site ecological importance (based on this assessment) were provided. Based on the animal species specialist report and the botanical specialist report the risk to each species identified by the screening tool was also discussed in the context of biodiversity at the study site.



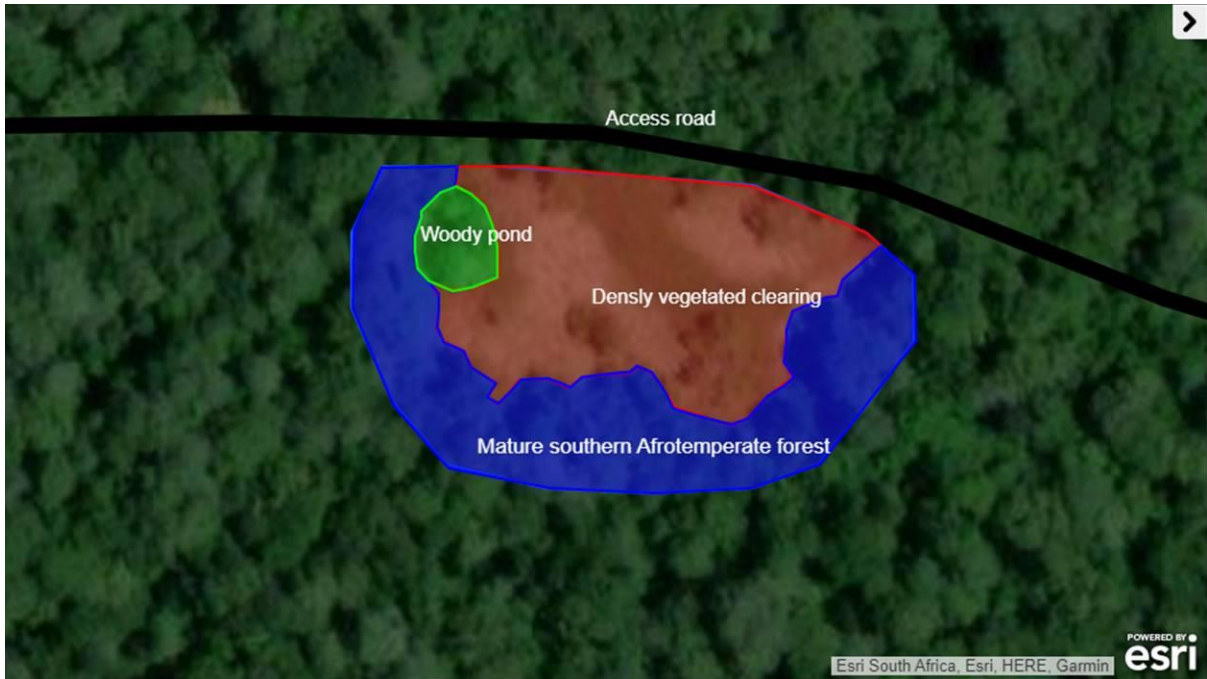


Figure 6: Satellite image of the proposed study area (plate 1) and description of the habitats (based on habitat characteristics) of the study site (plate 2) (“CapeFarmMapper,” 2016).

5. Description of the affected environment and species

This section outlines the important environmental and biodiversity features that are likely to be affected by the construction of the proposed tented camp in the Diepwalle Forest. Here an overview is also provided of the terrestrial animal species and flora found in the area. Importantly, this is not a specialist report on fauna and flora, as specialist reports have been compiled for both animal species, plants and freshwater environments, rather this provides an overview in relation to their contribution to the biodiversity of the area.

5.1. Effected environment

The relevant terrestrial biodiversity sensitivity theme was identified as ‘very high sensitivity’ for the proposed site of the tented camp, noting four of these as ‘very high’ concern (Table 2). These features are FEPA sub-catchments, National forest inventory, Strategic water source areas and the Garden Route National Park. FEPA sub-catchments, NFEPA provides strategic spatial priorities for conserving South Africa’s freshwater ecosystems and supporting the sustainable use of water resources. The National Forest Inventory assists in monitoring changes in forest areas across South Africa. Understanding and maintaining natural forests is important both for the environment and rural livelihoods. Strategic water resource areas are areas that either (a) supply a disproportionate amount of mean annual surface water runoff in relation to their size and are considered nationally important; or (b) have high groundwater recharge or where the groundwater forms a nationally important resource or both; or (c) areas that meet both criteria (a) and (b). Finally the South African



National Parks, Garden Route National Park aims to conserve biodiversity and cultural heritage; contribute to the economy, providing socio-economic benefits, access, ecotourism experiences to the people of SA and the world.

Table 2: Sensitivity features identified by the screening tool and justification given to the state of naturalness of these areas. These areas have all been classified in terms of the site of ecological importance and categorised as Low, Moderate or High.

Screening tool sensitivity	Features	Conservation importance (CI)	Functional integrity (FI)	SEI
Very high	FEPA sub-catchments	<p>Low</p> <p>The area is intact and undisturbed. However, the small study site and low topographic variation suggest that there will be little runoff from the area. The closest non-perennial water source is just north of the proposed tented camp and access road.</p>	<p>Low</p> <p>The area and catchments are intact, however, the proposed tented camp will have little effect on these due to the location and positioning of the camp.</p>	Low
	National forest inventory	<p>High</p> <p>The area is intact and relatively undisturbed. There is confirmation of species listed as near threatened or higher by the IUCN. The area also falls within one of the largest unfragmented patches of indigenous forest in South Africa</p>	<p>Moderate</p> <p>The greater study area represents one of the largest unfragmented patches of indigenous forest in South Africa. However, there has been historical disturbance at the study site. There are also various AIP's present at the site for the proposed tented camp and consideration needs to be taken to clear these.</p>	High
Very high	Strategic	Moderate	Moderate	M



Very high	water source areas	It is unlikely that there will be a disproportionate amount of runoff or high ground water recharge at the study site. Seepage and runoff likely play a key role in ensuing permanent water in the woody pond. The proposed area also falls within a wetland and important wetland associated plants are evident at the study site.	As the study area is partially within a wetland FI for the associated plant species is important. The area is however invaded by several AIP species and consideration needs to be taken to remove these. Additionally, large amounts of moribund <i>Helichrysum sp.</i> dominate the area and selective thinning of these species can be considered important for FI in the area.	
	Garden Route National Park	High GRNP is a protected area complex. This being said the park protects the largest fragments of Southern Afrotropical Forest. The GRNP provides key habitats for protected species listed in this report	High Although fragmented the GRNP has large enough areas to maintain its FI. The proposed tented camp needs to take care not to negatively affect that FI. Importantly, care needs to be taken not to fragment the forest patches more than they are already. The FI of the site has been compromised in the past but recovered to a state now considered to be natural.	High

5.1.1. FEPA sub-catchments

The proposed development will have little impact on the FEPA sub-catchments in the area. The development footprint is small and the area relatively flat. This will ensure that there is no risk of excessive runoff from the proposed site into any catchment. It is highly unlikely that any water from the site will pose a threat to flowing water courses due to its geographical location. Furthermore, there will be no wastewater released from the site directly into the environment. Greywater will be released into already disturbed slip roads



where it is deemed safe by SANParks. Based on this the revised SEI for the proposed site is considered low.

5.1.2. National forest inventory

The forest where the development is situated is one of the largest unfragmented patches of Southern Afrotropical Forest. Furthermore, the area remains relatively undisturbed and there is little influence from humans. The area contains several species of both plants and animals listed as near threatened or higher by the IUCN, and some of these protected plants were noted at the site. As there has been previous disturbance in the area and there are several AIP's present the revised SEI rating has been listed as High. Due to the environmentally conscious nature of the proposed development it is unlikely it will have largescale negative effects on the forest environment.

5.1.3. Strategic water source areas

As there is unlikely to be any excessive runoff from the proposed site it is not necessary that this be listed as a strategic water source area. However, seeping resulting in constant water in the woody pond and the presence of a wetland in the clearing ensured this is a functionally important area and key for biodiversity in the area. Through the removal of *Helichrysum sp.* from the clearing biodiversity in the area may in fact benefit from the proposed development in the area directly surrounding the wetland. Based on this the revised SEI for the proposed area has been listed as moderate.

5.1.4. Garden Route National Park

The GRNP forms a key conservation area in the southern Cape and represents a well conserved functionally intact environment. Care by the proposed development needs to be taken not to negatively effect the naturalness of the area. The proposed project will impact the GRNP through increased human presence in the forest and associated disturbance to the area (including light pollution etc). However, due to the small size of the development footprint and the recommendations to limit negative impacts the overall impact of the proposed development will likely be small. Based on these findings the revised SEI for the area is high.

5.2. Fauna

A study on the animals had been carried out by Dr Christopher Brooke and is independent of this study. However, for the purpose of understanding the biodiversity the Animal Species Specialist Report is summarised here. The relative animal sensitivity for the study site, as identified by the screening tool was 'High sensitivity'. The screening tool also identified seven species of conservation concern and forest invertebrates that could occur at the study site. These species (appendix 1) consisted of three aves, two mammals, one amphibian and one insect. Furthermore, a desktop study in collaboration with a complete list of species found at the site during the survey identified 172 possible invertebrate species, 28 reptiles, 37 mammals, 19 amphibians and 60 aves species. A complete list of records was gathered from the ADU website QDS 3323cc for invertebrates, reptiles, mammals and amphibians



and SABAP2 pentad 3355-2310 for aves. Complete lists are available in Appendices 1-5 in the Terrestrial Animal Species Specialist Report.

Of the seven species identified by the screening tool two species had a high likelihood of occurrence, three had a moderate likelihood of occurrence and two species were unlikely to occur based on known distribution and habitat suitability (Table 3). In addition to the species identified by the screening tool *Myosorex longicaudatus* (long-tailed forest shrew), *Amblysomus corriae* (Fynbos golden mole) and *Panthera pardus* (Leopard) are also listed as near-threatened or higher by the IUCN and likely to be found at the study site.



Table 3: The seven species of concern listed by the screening tool, the scoping report sensitivity score, SANBI red list category following the IUCN guidelines (SANBI, 2023) and Appendix 7, predicted occurrence at the site and basic habitat requirements.

Species	Taxonomic family	Common name	Scoping report sensitivity score	IUCN Red list category	Predicted occurrence in the study site	Habitat requirements	Justification for predicted occurrence
<i>Bradypterus sylvaticus</i>	Locustellidae	Knysna warbler	High	Vulnerable	High	Afromontane forest fringes	Well suited to habitat and known to occur
<i>Circus maurus</i>	Accipitridae	Black harrier	Medium	Endangered	Low	Fynbos and mountain fynbos, high altitude grasslands and into the semi-desert of the karoo	Unsuitable habitat
<i>Afrivalus knysnae</i>	Hyperoliidae	Knysna leaf-folding frog	Medium	Endangered	Medium/low	Wetlands and dams including suitable artificial habitat	Could potentially occur, however has not been previously recorded and habitat not optimal
<i>Stephanoaetus coronatus</i>	Accipitridae	Crowned eagle	Medium	Vulnerable	High	Mature Forest	Habitat suitable and known to occur
<i>Chlorotapla duthieae</i>	Chrysochloridae	Duthie's golden mole	Medium	Vulnerable	Medium	Coastal forest, suburban gardens and pasture lands on alluvial sands and sandy loams	Habitat suitable and signs of moles found. However, these cannot be attributed to <i>C duthieae</i> with certainty



<i>Sensitive species 8</i>	N/A	N/A	Medium	Vulnerable	Medium	Mature Forest/Dense vegetation	Known to occur in the area, however recent anthropogenic pressure appears to be affecting the species
<i>Aneuryphymus montanus</i>	Acrididae	Yellow-winged agile grasshopper	Medium	Vulnerable	Low	Montane fynbos in rocky hillsides	Habitat unsuitable and not found within the study area



The species with a high likelihood of occurrence (*Bradypterus sylvaticus* and *Stephanoaetus coronatus*) are both known to occur and have both been recorded in the area. *B sylvaticus* (Knysna warbler) is well suited to the habitats within the study site. The densely wooded vegetation surrounding the wooded pond and the dense vegetation of the densely vegetated clearing provide ideal habitat for feeding where *B sylvaticus* can forage close to the ground between the dense mat of tangled vegetation (Taylor, 2015). *S coronatus* (Crowned eagle) is also known from observations in the area however are very unlikely to use the area of the clearing as this is not suitable habitat. Furthermore, the nearest *S coronatus* nest is approximately 13.5 km from the study site and as such it is unlikely that the proposed tented camp will have any effect on the species. Species with a moderate predicted occurrence at the study site include *Afrixalus knysnae*, *Chlorotapla duthieae* (Knysna leaf-folding frog and Duthie's golden mole), and sensitive species 8. Although known for the area surrounding the study site *A knysnae* has not been recorded at the woody pond in the study site. Furthermore, there were no records made during the field survey by myself or the aquatic ecologist. The habitat was considered suitable for the species although the water at the time of the survey was possibly turbid. The steep sides of the pond (due to it being man-made and dug out) also do not suit the species (De Lange, 2019). This being said, it is impossible to rule out the occurrence of the species at the study site in future. There was presence of moles at the study, particularly around tents 1-3, however without catching the species it is extremely difficult to identify the species with any certainty. If not *C duthieae* the only other possible species to make these diggings and underground tunnels is *Amblysomus corriae* (Fynbos golden mole). *A corriae* exists in similar areas and similar habitats as *C duthieae* but the two species appear to select for different microhabitats. *A corriae* preferring forest fringes and associated fynbos whereas *C duthieae* prefers deeper forests (Bronner and Mynhardt, 2015). Based on the location of the site (deep in the forest), even though it exhibits characteristics of forest fringe, it is more likely that *C duthieae* is the species responsible for the subsurface tunnels although any confirmation can only be done through trapping and identifying individuals. Sensitive species 8 is also known from the Dipewalle forest and area surrounding the study site, however pressure from humans (likely from dogs at the Diepwalle forest camp) has resulted in this species not being commonly seen in the area. They are sensitive to humans and quick to move off once disturbed (Estes, 2012). If in the area the presence of the camp will likely force them to move into patches of deeper forest and this is likely what has already happened.

Overall, the area is well suited to a wide variety of animal species (some of which are protected and have been discussed). To ensure that the proposed tented camp has minimal impact on the animal species in the area it is important that these species are carefully considered in the planning going forward and mitigation measures are put in place where possible (see Section 9: Mitigatory measures). There were also numerous common species noted around the study site (Figure 7) and knowledge of these species can be used to



promote ecotourism and an understanding of species that are likely to be encountered in the area.



Figure 7: Some of the species found during our field survey. Plates (1) *Lycodonomorphus inornatus* (olive ground snake), (2) *Cassionympha cassius* (rainforest brown butterfly), (3) *Potamochoerus larvatus* (bushpig) droppings and (4) *Hadogenes capensis* (cape rock scorpion).

5.3. Flora

An independent study of the flora of the study site was carried out by Bianke Fouche from Confluent Environmental. However, for the purpose of understanding the biodiversity of the area a brief summary of the findings of the Plant Species Specialist Report as well as



observations made during the field survey are summarised here. The relative plant sensitivity theme identified by the screening tool was 'Medium sensitivity'. The screening tool also identified five species of conservation concern, all with a medium sensitivity (appendix 2). The screening tool identified four species for the study area and listed all species as 'medium' sensitivity. Of the species identified by the screening tool only *Ocotea bullata* was confirmed to occur at the site during the field surveys (Table 4).

Overall, the Mature Southern Afrotropical forest was in a natural state with minimal disturbance extending outside of the woody clearing. However, there were signs of IAP's being removed historically and several species were still present on the forest fringe and in the clearing. Several IAP's were present in the densely vegetated forest clearing at the site these included Brambles (*Rubus sp*). Importantly, brambles were associated with areas where *Helichrysum* was dense. It is recommended that invasive species, such as brambles are removed from the site. This can be done in collaboration with selectively thinning the *Helichrysum* thicket. Opening the dense vegetation can improve aesthetic appeal to the proposed site (see mitigatory measures for details and recommendations for clearing). Again a detailed list of invasive plants that were found at the site is available in the botanical specialist report.



Table 4: The four plant species of concern listed by the screening tool, the scoping report sensitivity score, SANBI red list category following the IUCN guidelines (SANBI, 2023) and Appendix 2, predicted occurrence at the site and basic habitat requirements.

Species	Taxonomic family	Common name	Scoping report sensitivity score	IUCN Red list category	Predicted occurrence in the study site	Habitat requirements	Justification for predicted occurrence
<i>Faurea macnaughtonii</i>	Proteaceae	Terblans beechwood	Medium	Rare	High	Species occurs in forest habitats; however, dispersal is limited	Known to occur in the area and habitat is suitable
<i>Ocotea bullata</i> *	Lauraceae	Black stinkwood	Medium	Endangered	High/ confirmed	Forest species known to be abundant in the area	Species was found at the site during the botanical survey
<i>Amauropelta knysnaensis</i>	Thelypteridaceae	Knysna wood fern	Medium	Vulnerable	High	Species occurs in damp areas in forests	High probability the species may occur in the area due to the suitability of the habitat
<i>Psyrax capensis</i>	Rubiaceae	Cape forest quar	Medium	Vulnerable	High	Forest species known from the Langeberg mountains to Knysna in Southern Afrotemperate Forest.	High probability the species may occur in the area due to the suitability of the habitat



Sensitive species 763	Orchidaceae	Medium	Vulnerable	Meduim	Found in a wide variety of habitats but prefers grassy vegetation in forests.	There is a possibility the species might occur; however, the habitat is not ideally suited.
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6. Landscape connectivity

The proposed study area covers a relatively small footprint (0.5 ha) and as such will have little to no impact on landscape connectivity. It is surrounded on all sides by Southern Afrotemperate Forest, and the fauna and flora communities remain relatively intact and in a natural state.

When considering the development of unfragmented areas, habitat fragmentation from linear infrastructure is one of the most important aspects to consider. Habitat fragmentation occurs when an area is divided into more numerous smaller sections through the construction of roads or other barriers and which hinders movement or dispersal of species (Saunders et al., 1991). The construction of walkways in the proposed camp and leading between the tents poses a potential risk in this regard. Although raised walkways are preferred in this regard they are not without their negative impacts. They will act as direct barriers to large mammals in and around the proposed camp. This may further prevent mammals from gaining direct access to the wooded pond for water. My concern with the construction of raised walkways is what happened when the camp is decommissioned in the off-season? Once the camp has been broken down the walkways and deck stands for the tents will remain, thus creating a negative effect of linear infrastructure even when the camp is inactive. With these concerns in mind, I suggest that portions of the walkways are removable (see section 9: Mitigatory measures for details). This will allow movement of large species through the removed sections when the camp is deconstructed seasonally.

The access road leading to the proposed tented camp poses little risk to landscape connectivity and habitat fragmentation if it is not developed further. Currently the access road is a jeep track (twee-spoor road) which should be sufficient without a large increase in traffic (which there should not be if guests are expected to park at the Diepwalle Forest Camp). Road maintenance will however be required to prevent further degradation and the need for any major intervention that could impact landscape connectivity. Maintenance should be focussed on drainage and diverting water off the road surface and into the natural vegetation in areas where it will not cause further damage.

7. Assessment of impacts

7.1. Fauna

A summary of the occurrence of each species is given in Table 3. However, likely impact of the proposed development on each of these species is given here. The species considered here are only the species that are considered to occur at the site (high or moderate likelihood of occurrence), species that will not occur as a result of unsuitable habitat are not



included as they will not occur in the study area. The impact of the proposed development on each of the sensitive species identified by the screening tool (Table 5).

Table 5: Description of impacts and mitigatory measures for each of the species that are likely to occur at the study site.

Species	Level of impact	Description of impact	Mitigation
<i>Bradypterus sylvaticus</i>	Medium	Species will be impacted by clearing vegetation in the densely vegetated clearing and forest fringe as they require this dense vegetation as habitat for foraging.	Any clearing should be subject to environmental consideration. I recommend that areas that are targets for clearing or AIP removal be done so strategically over time. This will limit the effects on the species as only small portions of habitat will be disturbed at one time.
<i>Afrixalus knysnae</i>	Low	The species is unlikely to occur at the site due to habitat suitability, but should it occur the impact will be low as there will be minimal disturbance surrounding the woody pond.	As the pond is not going to be disturbed by the proposed development and it is unlikely the species will occur, no mitigation measures are necessary.
<i>Stephanoaetus coronatus</i>	Low	Although the species is known in the area, the habitat around the proposed development is not suitable and will likely not be used frequently	As an avian species favouring tall canopy forest there are no mitigation measures necessary for the protection of this species at the proposed site.
<i>Chlorotapla duthieae</i>	Medium	Impact to these species will be most severe during the original commission and final decommission of the proposed camp. During this period the ground will be disturbed to plant poles for	Care needs to be taken to minimize the negative effects of this species during the commission and decommission of the proposed camp. I suggest an ECO be present during



		<p>the walkways and there will be heavy human traffic moving equipment and construction materials</p>	<p>the layout stages. They will need to be able to advise on the best placement for poles and walkways in relation to mole excavations and activity. They will also need to be able a mark out excavation and activity sites and ensure they are not disturbed by human traffic during setup and deconstruction.</p>
<p>Sensitive species 8</p>	<p>Medium</p>	<p>The species will be impacted by the overall disturbance around the site. They are sensitive to disturbance from humans and will likely move away from the site when the proposed camp is active. They will also be impacted by the boardwalk as the boardwalk will act as a barrier to their movement around the clearing.</p>	<p>It will be incredibly difficult to mitigate the effects of humans, however, measures such as not using a generator, turning lights off after a certain time and minimizing noise (no loud music etc) will likely lessen the effect on sensitive species 8. Additionally creating boardwalks with removable sections, or sections raised 1 meter or more above the ground will allow the species to move freely though the area and limit the negative effects of linear infrastructure.</p>

7.2. Flora

A summary of the SEI for each habitat type is provided in Table 6. Impacts were rated as Low (the proposed development will have little to no impact on the habitat type), Moderate (the proposed development will negatively affect the habitat type somewhat) and High (the



proposed development will have severe impact on habitat type). Where impact is listed as High discussion into the mitigating factors and how impacts can be reduced are included (Table 7). The impacts of the proposed development on each of the plant species identified by the screening tool can be found in the botanical specialist report.

Table 6: Evaluation of the Site Ecological Importance (SEI) for each of the described vegetation types.

Habitat type	Conservation importance (CI)	Functional integrity (FI)	SEI
	Moderate	High	High
Mature Southern Afrotropical Forest	The Mature Southern Afrotropical Forest are in good condition and remain intact. There are several indications of historic logging in the area (saw pits). Endangered plants are present at the site, but is a very small area being disturbed and is unlikely to cause any disturbance to the surrounding environment.	The area is intact and has a high FI. The study site is small and will have very little impact on the surrounding landscape FI. Clearing of AIP's (predominantly <i>Acacia</i> species) is evident around the clearing and on the forest fringe. However, <i>Acacia stricta</i> (hop wattle) was noted regenerating on the site and poses a risk of future invasions.	
	Moderate	Low	Moderate
Densely vegetated clearing	The vegetated clearing is likely home to sensitive species (namely <i>B. sylvaticus</i>) although they were not seen during the survey. That being said the vegetated clearing is extremely moribund and has been heavily disturbed in the past.	The densely vegetated clearing is a small area (0.59 ha) and due to historic disturbance has very little FI at a landscape scale. It does however provide habitat for protected species and thus should not be destroyed. Furthermore, although overgrown, much of the densely vegetated clearing is within a wetland and as such protected against development. The dense invasions of <i>Helichrysum sp</i> and bramble (<i>Robus sp</i>) species provide evidence of	



		prior disturbance and suggest that clearing is in an altered state.	Moderate
	Moderate	Low	
Woody pond	The woody pond is likely home to sensitive species (namely <i>B sylvaticus</i>) and could provide habitat for <i>A knysnae</i> although neither were seen during the survey and <i>A knysnae</i> occurrence is unlikely. That being said the woody pond provides important habitat for several other invertebrate and amphibian species. Additionally, it provides an important water source for other species in the area (<i>P porcas</i> spoor was noted in the pond).	The woody pond has a low FI due to the fact it is a man-made feature in the landscape (even though it has become naturalised). The area is extremely small and there is no connectivity between the woody pond and water courses in the area. Importantly, however the woody pond borders a wetland and likely maintains water year round due to the underlying wetland associated soils.	

Table 7: Description of impacts and mitigatory measures for each of the habitat types that are likely to occur at the study site

Habitat type	Level of impact	Description of impact	Mitigation
Mature Southern Afrotropical Forest	Low	Tents will be placed on raised platforms with boardwalks. As a result of this very few trees will need to be removed. Tents are also to be positioned in natural openings within the forest to minimize the negative effects on vegetation	Where vegetation needs to be removed in order to place platforms, only small/immature trees should be removed. In the event that those trees are protected or red listed, removed trees should be replanted elsewhere, and ideally in a restoration site or where they can be



Densely vegetated clearing	Low	A walkway will be built around the periphery of the clearing along with a platform for a dining tent and viewing deck. As much of the clearing is within a wetland there will be very little disturbance to the area.	beneficial to biodiversity. The walkway will be raised above the ground and thus allow for the movement of small animals underneath. It will also cause minimal disturbance to the soil/litter surface once constructed. Mitigation for larger species may involve building in removable sections of walkway to enable species to move through easily when the camp is not running.
Woody pond	Low	The walkway will skirt part of the woody pond, but there will be no development in the direct vicinity of the woody pond.	No mitigation is necessary as there will be very limited activities near the woody pond.

8. Mitigatory measures

Although several sensitivity features were identified by the screening tool in the area of the study site, our surveys revealed that none were at any great or irreparable risk from the proposed development. Our findings have indicated that this area is a key area for protected and endangered animal species, plant species and sensitive environments and any proposed developments in the area need to be cognisant of this. Although the construction of the proposed tented camp is unlikely to have any detrimental effects on any of the species or sensitivity features identified by the scoping tool, it will no doubt have an effect on other (non-threatened species) that were not identified as being at risk by the scoping tool. It is important that the proposed development does not cause any unnecessary disturbance to species in the proposed area. Disturbance that needs to be avoided includes the area of the woody pond where species rely on permanent water for habitat (invertebrates, amphibians etc.), water sources (mammals) and across the core wetland area in the clearing and the core wetland area (Figure 6).



Below are a list of mitigatory measures that should be implemented to minimize the impact of development on animals, plants and sensitive features in the area directly surrounding the proposed development.

- Raised boardwalks – Boardwalks should be constructed with divisions that can be removed when the camp is not in use. Raised boardwalks may have a negative impact on large mammals trying to pass through the camp, however the negative impacts are far outweighed by the fact that there is no continual disturbance on the forest floor. Leaf litter will build up underneath the walkways providing habitat and food for many invertebrates and small mammals. Furthermore, raised walkways will not negatively affect the movement of smaller species on the forest floor. Additionally, species such as *C duthideae* highlighted by the screening tool will only be negatively affected during the initial construction of walkways. However, in order for this to be realised, once walkways have been constructed no person should be walking next to or through the natural vegetation where they can disturb these species.
- Down lighting – Environmental consideration needs to be taken into account with lighting and care must be taken to place lights only in areas where they are essential (light walkways and inside tents/enclosed areas). No artificial lighting should be used for aesthetic purposes such as to light the clearing or artificial dam. Unnecessary lighting will negatively affect wildlife, can disorientate species and cause considerable invertebrate mortalities (insects get disorientated and attracted to lights where they eventually die). Some solutions to this is to use downlighting and motion activated lights. Downlights should be fitted as low as feasibly possible and should produce light on the areas needed. This includes shielding the light so that no light is emitted at an angle greater than 90° (or as near to that is safely possible). Additionally, the lowest lumen lights possible for the desired effect are advised.
- Use of lighting – Ideally there should be a threshold after which all external lighting is switched off. Lighting inside the individual tents, cooking area (when in use) and dining area (when in use) should pose little problem. However, outdoor lighting that can interfere with and disorientate species should be switched off after a certain time or when the specific area is not in use.
- Minimizing the environmental footprint – minimize any unnatural disturbance outside of the demarcated areas for infrastructure and boardwalks. This includes the area surrounding the woody pond. Although the pond is not a natural feature, it has over time become naturalised in the landscape and provides crucial habitat and resources for a variety of species. In this regard it is recommended that boardwalks obscure the pond as little as possible. The original layout would prevent approximately 70% of movement around the pond (Figure 2) and this will drastically inhibit species trying to use the habitat. It is recommended instead that boardwalks skirt only the western edge of the woody pond taking guests through the forest to access their tents rather than through the clearing (Figure 3). It is important to



minimize the environmental footprint and impact on the proposed development as the area has sensitive features (National Forest Inventory and GRNP) that after revision in this report are still listed as high sensitivity in the proposed development footprint. As little disturbance as possible to these areas is advisable.

- Eliminate the need for a generator – using solar is an alternative. If cooking is done at the Diepwalle camp there should be no huge demand for electricity. The use of a generator will cause disturbance to both guests and the environment. Furthermore, placing the generator away from guests in an area where it is thought to cause little disturbance is highly discouraged. Vibrations from the engine negatively affect organisms on or in the ground and noise disturbs numerous species that use auditory cues for feeding and communicating. Important species to consider in this regard are amphibians (frogs), Chiroptera (bats) and many invertebrates. Engine vibrations are well known as a deterrent for moles and other burrowing mammals. Importantly, vibrations and noise from generators can inhibit communication, predator-prey interactions and habitat use in many invertebrate species. Specific to this study will be the effect of the generator on the communication of *A knysnae*, habitat use and disturbance to *C duthideae* and all-round disturbance to forest invertebrates. As an additional measure, in the event there is not enough solar, batteries could be charged and brought into the camp with the multitude of vehicles bringing food, guests and resources into the camp. A proposed mobile generator (mounted on a trailer) as suggested by the developer is a suitable workaround and back-up power source. In a situation where a generator is needed to charge batteries (i.e. in overcast conditions where solar is not feasible), the trailer can be moved to the Diepwalle SANParks camps and batteries can be charged where there will be little disturbance.
- ECO – Appoint and use an environmental control officer. This is especially important during the original layout and construction of the camp to ensure that minimal disturbance possible is caused. This can include having the ECO make minor changes to the camp layout and positioning of any infrastructure where deemed necessary. Importantly, the ECO should ensure the smallest footprint is disturbed as possible and only clearly marked paths are used where areas of low impact have been identified. Additionally, the ECO needs to be cognisant of the sensitive species in the area (especially those living on or under the soil surface) and special attention needs to be given not to disturb these species wherever possible.
- Road management – To minimize disturbance along the road, I suggest the road is not graded (as mentioned by SANParks staff it should be), rather manual repairs be done where needed and the 'two-track road' is maintained. Keeping the road in as natural a state as possible is important as it limits the effects of linear infrastructure on animal species in the area, and although only a small road it may form a near-impenetrable barrier for small species who are unable to cross safely. There will be a risk of vehicle collisions to species (especially smaller species drivers do not see). Additionally, species may also put themselves at risk by traversing onto the road.



(outside of their natural habitat) to cross between fragmented patches of forest. Risks include vehicle collisions, predation where there is little or no cover and desiccation in the event species are forced into direct sunlight for long periods. Much of this maintenance and alterations that need to be conducted on the existing road will be incorporating drainage into the road to divert water into areas that is safe to do so. This will limit the formation of dongas and gullies in the road surface considerably, while limiting the disturbance to animals in the area. Roadside drainage needs to consider where the water is being released from the road as to prevent further damage in natural areas. Advice would be to make small bolster humps and associated drains on the downward slope of the road verge wherever deemed necessary. Furthermore, it is important to make sure these drains flow into well vegetated and stable areas where water will easily be able to infiltrate the ground and there is little risk of further runoff.

- Removable walkways – Removable sections in the raised deck walkways. The raised boardwalks are preferable as they will impact fewer species at the proposed study site. Small animals and invertebrates will be able to pass underneath uninhibited. However, when the site is decommissioned outside of season these walkways will still form a barrier to the movement of larger species in the area, some of which are listed as sensitive. It is thus suggested that the boardwalks be constructed with sections that are easy to remove (possibly a two-meter section every 10 meters of boardwalk). This will limit the negative impacts of linear infrastructure on species and lessen the environmental footprint of the proposed site outside of the tourist season and ensures the boardwalks will not inhibit the movement of large species when the camp is decommissioned.
- Animal proof refuse facilities – both baboons and vervet monkeys are known to be in the area and can easily become a pest if they identify the camp as an easy food source. Care needs to be taken to ensure that all refuse facilities are animal proof and rubbish bins have lockable lids. Caution also needs to be taken around the kitchen and dining areas to ensure that no food or food waste is left lying around as this can become an easy meal for animals (especially primates). Unfortunately, once behaviours are learnt (i.e. raiding and stealing food) it becomes very difficult to stop these behaviours and it is often to the detriment of the animal species.
- Clearing of old vegetation – The dense natural vegetation in the clearing will provide habitat for *Bradypterus sylvaticus* and the tangled vegetation will provide important habitat for them to feed close to the ground. As a result, the disturbance to this vegetation needs to be minimized. Some clearing may be possible and necessary, especially around the kitchen and dining areas, however clearing should only be carried out with the approval of the ECO in demarcated areas. It is recommended that small sections of dense *Helichrysum* be cleared at any one time to prevent drastic loss of species and change of ecosystem functioning in the clearing. Areas that should be prioritised are those where dense stands of AIP are present as clearing vegetation will almost certainly be necessary to access some AIP stands. Clearing areas directly



surrounding the kitchen, dining and parking areas may also be prioritised as this will improve aesthetics and assist in preventing insects in these communal areas. Other areas can then be cleared over time to improve aesthetics, however I do not recommend that any more than 25 % of the clearing is cleared in any one season. To improve biodiversity in the area I suggest introducing indigenous species (possible wetland adapted species) into recently cleared area. By rehabilitating areas with indigenous species one can improve biodiversity, aesthetics and ecosystem functioning in a small area surrounding the camp. Furthermore, protected plants and wetland adapted plants that require removal (i.e. from tent sites and road verges) make ideal candidates for this initial reintroduction of indigenous species.

- Alien Invasive Plants – AIP's should be removed as soon as possible to prevent infestations becoming worse. The area is relatively pristine and there are no high densities of AIP's and as such this should not be a difficult task. As you are not dealing with dense infestations, I would not recommend the use of herbicides. Herbicides may affect other non-target species. The most prominent AIP in the clearing are brambles *Robus sp.* These should be removed by exposing the roots and manually removing as much of the plant (including root system) as possible. This is essential as brambles are capable of regrowing from the roots. Furthermore, it is imperative that follow-up clearing be done on a yearly basis to prevent reinfestation of AIP in the area.
- Drainage along road – roadside drainage along the side of the clearing poses a potential problem, especially during times of heavy rainfall. For the immediate construction of the proposed development I suggest a precautionary approach is taken and no major alterations are made to the access road. However, severe damage and degradation of the road may negatively affect diversity features and species in the area. Should this be the case and the road becomes impassable either a gravel surface can be used to enable drainage and prevent mud. Alternatively, a small culvert can be placed along the up side of the road. This can be used to divert water to an area where suitable under-road drainage can be constructed.
- The wetland should remain a restricted feature of the site both during construction and operation of the camp. Although, it is not natural in nature it has become a naturalised feature over time. Disturbance to the wetland can result in disturbance to several species that use the area as either an important resource or habitat. This being said. Situating a small bench close to the wetland can add a beneficial feature, whereby guests can sit quietly and observe the species using the habitat.
- Removal of trees – where possible the position of tents should be built around trees rather than removing them. Where trees need to be removed for the construction of platforms for tents and other infrastructure the following guidelines should be adhered to:
 - The National Forests Act of 1998 (as amended) provides the strongest and most comprehensive legislation and mandate for the protection of all natural



forests in South Africa. The principles of the Act in Section 3 state clearly that “...natural forests may not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits”. Bearing this legislation and knowledge of the benefits of the proposed development only areas that are demarcated for development should be developed. All other areas of forest should be protected around the proposed area.

- Protected trees *Afrocarpus falcatus*, *Curtisia dentata*, *Ocotea bullata* and *Podocarpus latifolius* that were identified at possible tent locations and need to be removed should be transplanted elsewhere. Either these trees can be planted elsewhere in the clearing for aesthetical value, in areas nearby where rehabilitation is taking place or they can be moved to a nursery where they can generate extra income for the GRNP. Importantly, it is essential that if these species are removed they are not discarded.

8.1. Site decommission

As with the construction of the site and seasonal setup at the site, decommission is also crucial to minimize any negative impacts of the environment and species therein. I therefore advise the following guidelines for the decommission of the site to minimize effects of species and the environments. After the initial construction there should be no need for an ECO to be onsite during the decommission. However, it is advised that SANParks provide a final sign off and site inspection at the end of each decommission to ensure the site is left in as natural state as possible.

- All tents and equipment be removed from the site. Importantly, during deconstruction care should be taken to use the walkways and not extend the footprint of the proposed camp outside what has been authorised by the ECO.
- Final sweeps should be carried out to ensure that there is no litter remaining on the site. This includes anything that may have fallen through cracks in the decks or walkways. Litter and plastic debris can be fatal to wildlife.
- All materials that can harm wildlife should be removed from the site. This includes liquids such as fuels and oils, wires and lighting.
- If water tanks are left on the site it is imperative that they are sealed or closed properly. We do not want wildlife to be able to get trapped and die in open tanks. Furthermore, if animals and vegetation gets trapped in water tanks, they would need to be cleaned and sanitized prior to opening the camp again.
- Any damage caused to the environment that could affect animal species should be rehabilitated before the camp is closed. This includes repairs to road verges and parking areas where there is heavy vehicle traffic as well as any necessary repairs to the access roads to ensure there is no further degradation when the camp is closed.



- All pools and hot tubs need to be removed out of season as suggested by the developer. Care needs to be taken that any water drained from the pool and hot tubs is not drained into an area where it can filter or run into the wetland. Care needs to be taken that the slip paths suggested for water disposal slope away from the wetland.

Overall, it is my expert opinion that the site is suitable for the proposed development and the development will cause minimal disturbance to the animal species within the area. It is unlikely that the risks associated with this development will cause the loss of any irreplaceable resources. To make this feasible the development should be undertaken responsibly and incorporate the findings of this study there will be very few long-term negative impacts. However, even with a low impact I highly recommend (although it is not a pre-requisite) that a monitoring plan is implemented. Ideally, a baseline monitoring assessment should be implemented prior to the project beginning as to understand how species occurrence changes during and post development. Although, this may not be of direct significance to the proposed project it will hugely assist other projects of a similar nature going forward. The plan should include the implementation of camera traps and possible recording devices for species detection. Invertebrate mortalities should also be recorded periodically around the camp as a direct result of lighting in the evenings and at night. Collaborations between SANParks and local research institutions may be one way to approach this. Furthermore, it would be beneficial to keep a record of interesting and unexpected animal species that are seen in and around the camp. One possible record keeping that is recommended is that of iNaturalist (<https://www.inaturalist.org/>) as this makes records available and contributes to our knowledge of species through citizen science.

9. Conclusion and recommendations

The proposed Diepwalle tented camp is situated within the Diepwalle Section of the GRNP within the Knysna municipality. The selected site is a small area of approximately 0.59 ha and is made up of a densely vegetated clearing, wooded pond and surrounding mature Southern Afrotemperate Forest. As part of the EIA compliance process a terrestrial biodiversity specialist assessment was undertaken in February 2023 to identify key habitats and sensitive features that may be negatively affected by the proposed development. Together with a field survey, inventory of terrestrial fauna and important habitats, data were drawn from literature and up to date online resources. Each environmental feature identified by the screening tool was evaluated in terms of intactness, invasion by AIP's, conservation importance and functional integrity and finally rated according to SEI. All habitats and sensitive features were intact and functioning in a natural state at the proposed site, however due to the nature of the proposed development none of these features are at severe risk of environmental degradation.



Based on these findings it is my expert opinion that the construction of the proposed tented camp will not negatively affect the biodiversity of the area or the habitats identified by the screening tool. I can therefore suggest that the project can go ahead with minimal effect to the animals, biodiversity and important features in the study area and surrounding lands. The only area deemed not suitable for development is within the permanent wetland within the densely vegetated clearing as discussed in the aquatic report. I suggest numerous environmental measures that can be put in place to limit the negative effects on species and the environment and these should be incorporated into any further design and construction at the site. Understanding these mitigatory measures is crucial and if there are questions regarding the recommendations the specialists should be contacted for clarification.

During the surveys we did not determine any other possible sites for development, however the proposed site is suitable and there is no need to alternate site selection. Furthermore, previous degradation and use of the area resulted in the site not being in a completely natural state.



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Appendix 1: Sensitive animal species identified by the screening tool

Sensitivity	Species	Common name
High	<i>Bradypterus sylvaticus</i>	Knysna warbler
Medium	<i>Afrixalus knysnae</i>	Knysna leaf-folding frog
Medium	<i>Circus maurus</i>	Black harrier
Medium	<i>Stephanoaetus coronatus</i>	Crowned eagle
Medium	<i>Chlorotalpa duthieae</i>	Duthie's golden mole
Medium	Sensitive species 8	
Medium	Forest invertebrate	
Medium	<i>Aneuryphymus montanus</i>	Yellow-winged agile grasshopper



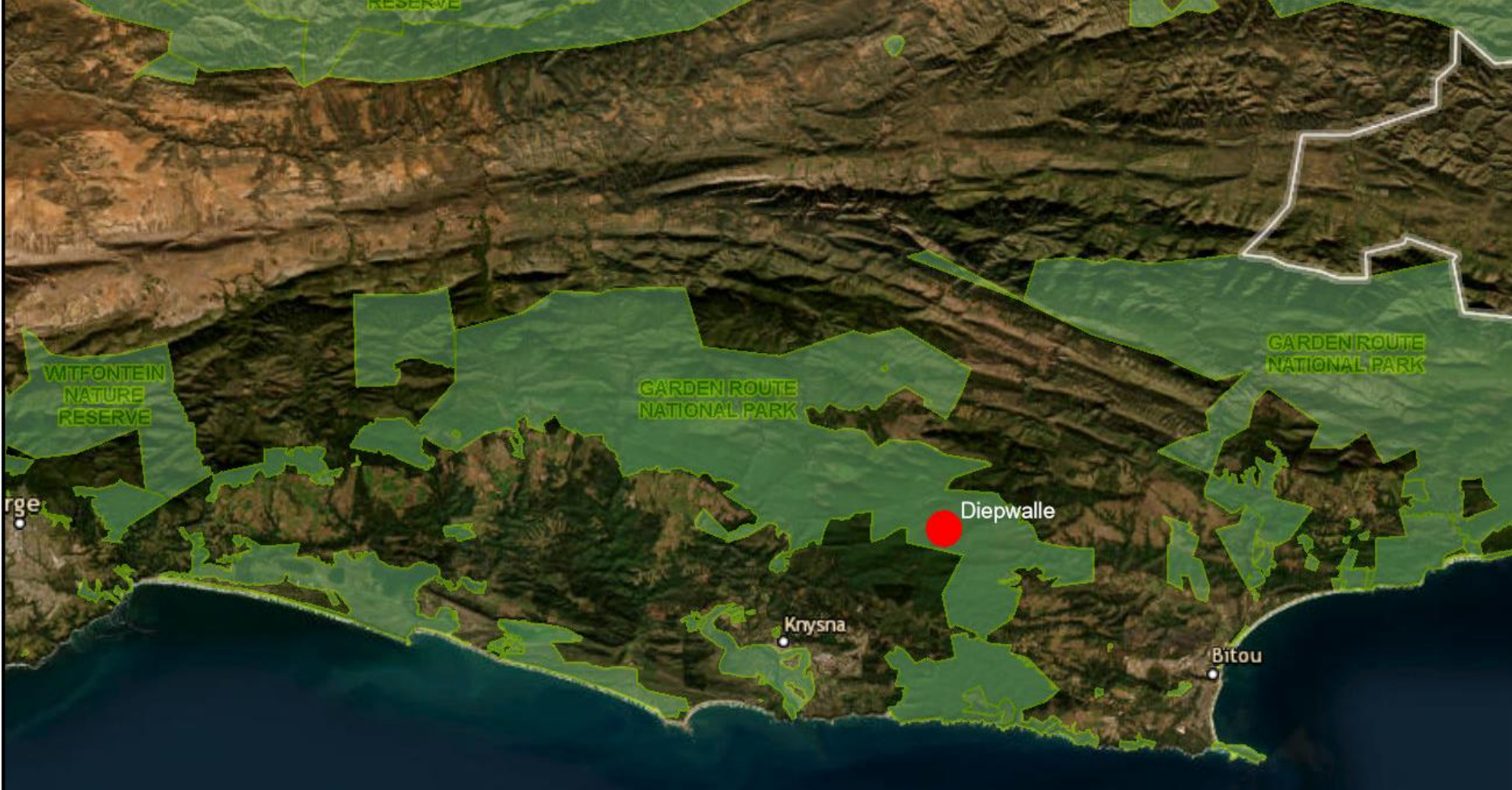
Appendix 2: Sensitive plant species identified by the screening tool

Sensitivity	Species	Common name
Medium	<i>Faurea macnaughtonii</i>	Terblans beechwood
Medium	<i>Ocotea bullata*</i>	Black stinkwood
Medium	<i>Amauropelta knysnaensis</i>	Knysna wood fern
Medium	<i>Psyrax capensis</i>	Cape forest quar
Medium	Sensitive species 763	

*Sensitive species noted as occurring at the site of one or more of the preliminary tent placements.



Appendix 3: Garden Route National Park Map (Cape Farm Mapper, 2016)



Appendix 4: National Red List Categories

Definitions of the national Red List categories

Categories marked with ^N are non-IUCN, national Red List categories for species not in danger of extinction, but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).

Extinct (EX) A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.

Extinct in the Wild (EW) A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.

Regionally Extinct (RE) A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.

Critically Endangered, Possibly Extinct (CR PE) Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.

Critically Endangered (CR) A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.

Endangered (EN) A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.

Vulnerable (VU) A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.



Near Threatened (NT) A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable, and is therefore likely to become at risk of extinction in the near future.

Critically Rare (plants) - Extremely Rare (butterflies) A species is Critically / Extremely Rare when it is known to occur at a single site, but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.

Rare A species is Rare when it meets at least one of four South African criteria for rarity, but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:

- Restricted range: Extent of Occurrence (EOO) <500 km², OR
- Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km², OR
- Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
- Small global population: Less than 10 000 mature individuals.

Least Concern A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.

Data Deficient - Insufficient Information (DDD) A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required and that future research could show that a threatened classification is appropriate.

Data Deficient - Taxonomically Problematic (DDT) A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.

Not Evaluated (NE) A species is Not Evaluated when it has not been evaluated against the criteria. Certain species do not qualify for national listing because they are naturalized



exotics, hybrids (natural or cultivated), or synonyms. In certain cases species have not been assessed nationally as taxon specialists prefer to use only the Global Red List status.

