

Portions 1, of 182 Hoogekraal: Terrestrial Biodiversity Compliance Statement



chepri (Pty) Ltd

November 8, 2021

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1 Summary

The construction of a dam (Figure 1) on portion 1 of Farm 182, Hoogekraal, Western Cape has been proposed (henceforth the proposed site). The Screening Report of the site and its surroundings delineate the proposed development area as very high sensitive terrestrial biodiversity due to the area's location on a critically endangered and a vulnerable ecosystem and lies within a strategic water source area. This document serves as a Terrestrial Biodiversity Compliance Statement. Evidence is presented here of the ground-truthed situation as assessed during a four hour visit of the site and surrounding landscapes on 17 June 2021 by an Ecologist, Dr. Marius van der Vyver (SACNASP: Ecological Science, 118303).

Most of the proposed site is located on a vulnerable ecosystem (Garden Route Shale Fynbos) while its south-eastern corner is located on a critically endangered ecosystem (Knysna Sand Fynbos) and it is in a strategic water source area, according to the Western Cape Biodiversity Spatial Plan (WCBSP, 2017) [1], The National Biodiversity Assessment (NBA) [2] and the associated National Vegetation Map [3].

The site does not fall on any of the WCBSP (2017) [1] delineated biodiversity planning units, i.e. CBAs (Critical Biodiversity Areas), PAs (Protected Areas), ESAs (Ecological Support Areas) or ONAs (Other Natural Areas). The site is, however, close (within 100-200m) to all of the sensitive units which the WCBSP (2017) [1] has delineated CBA 1 & 2 and ESA 1 & 2 areas with important biodiversity and ecological infrastructure features which include Bontebok Extended Distribution Range, Eastern Fynbos Renosterveld Sand Fynbos Floodplain Wetland, Freshwater Lakes, Knysna Sand Fynbos, Garden Route Granite Fynbos, Garden Route Shale Fynbos, Swartvlei (Core) Estuary, Water source protection – Swartvlei, Watercourse protection – South Eastern Coastal Belt, Indigenous Forest Type, South Eastern Coastal Belt Ephemeral Mountain River and Wolwedans Grassy Fynbos (Vlok variant).

The site is transformed mainly due to previous clearance for unknown agricultural activities. The surrounding landscape is in a highly fragmented and mostly degraded or transformed state due to agricultural practices, fencing and alien plant invasions.

Evidence of the following pressures in the local landscape in and around the proposed site is also presented here:

- i) the high fragmentation of remaining natural vegetation on a landscape scale (i.e., loss of ecosystem function and pattern),
- ii) high and increasing degradation through prolonged overgrazing and change of fire regimes through firebreaks in and around small properties,
- iii) increasing invasive alien plant (IAP) infestation immediately surrounding the proposed site and the use of alien invasive plants as windbreaks (eg. *Casuarina* and *Pinus* spp.),
- iv) current and historical crop and pasture agriculture,
- v) high levels of transformation in and around the borders of the proposed site.

Other influential factors for refuting the designation of very high biodiversity importance of the degraded Garden Route Shale Fynbos and Knysna Sand Fynbos transformed areas as designated in the screening report, but for which no evidence is presented here include:

- i) the high cost of restoration action needed, and
- ii) the highly improbable change to a specified landuse by current landowners/manager without adequate livelihood reparation, to restore the surrounding ecosystem on a landscape scale to resume the function of high biodiversity importance.

Based on the evidence outlined here, the designation of the proposed site in a strategic water source area of high biodiversity importance (as delineated by the screening tool) is confirmed, but the proposed activity is considered to have little or no effect on this in terms of a terrestrial biodiversity viewpoint. Although the proposed dam construction site's southern border lies only approximately 260 m from the Swartvlei estuary, and 300 m from one of the rivers, the Diep River, that feeds the estuary, the area between the site and these water bodies is highly transformed as it is completely cleared agricultural land. The area has therefore lost its original biodiversity but retains some capacity for biodiversity restoration. The WCSBP identifies the area as an Eastern Fynbos Renosterveld Sand Fynbos Floodplain Wetland area. It is thus possible for this proposed development of the dam to contribute to a partial restoration of the areas around the proposed dam to a similar wetland vegetation. With established farmland and its infrastructure such as roads and fences, the possibility of restoring the full extent of the larger area's lost biodiversity is highly unlikely, but the proposed activity may contribute to a better biodiversity outcome than its current business as usual scenario, if care is taken to foster natural vegetation regeneration along the dam edges.

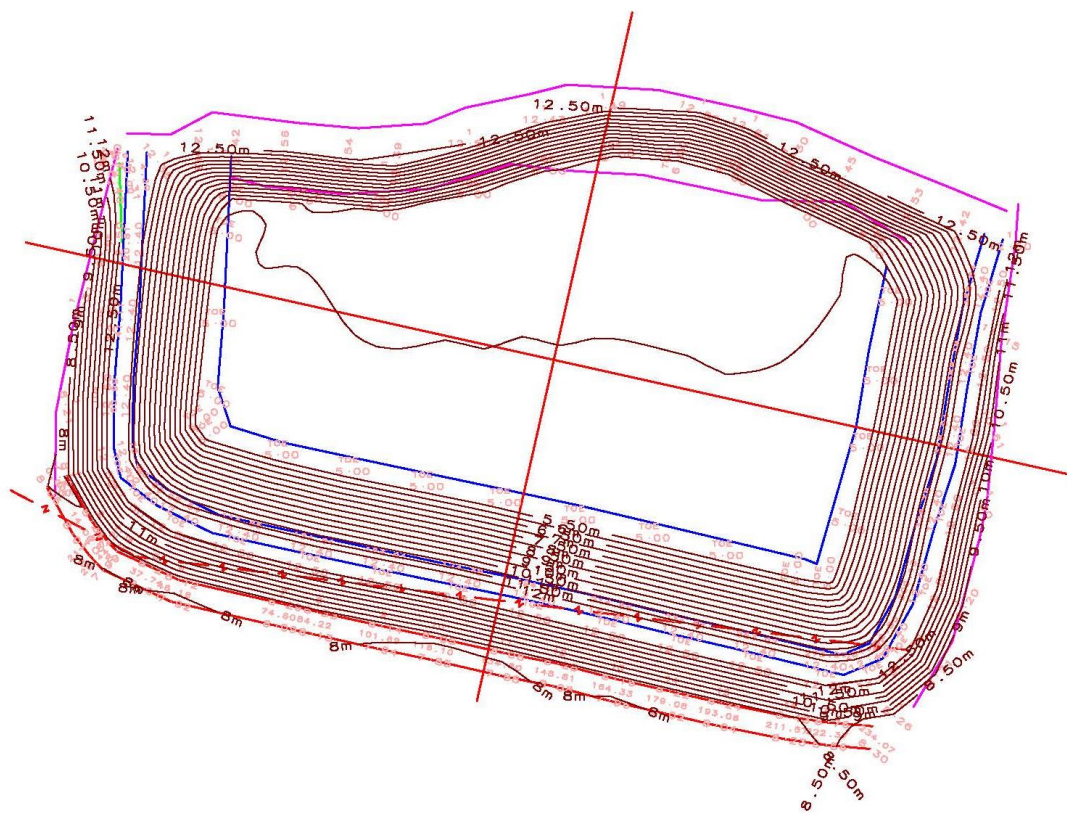


Figure 1: Lay-out plan for the proposed dam.

2 Introduction

Vegetation types usually stand as proxies of biodiversity patterns in a landscape, which entails both fauna and flora components and often changes with topographical features within an area. Based on a field investigation of the proposed site and its surrounding landscapes and the aid of satellite imagery (Google Earth, 2021) different areas of land cover categories are delineated on the proposed site and its surroundings on a landscape scale. These categories reflect degradation or transformation in terms of patterns, processes and functioning of the background ecosystem(s). In this way a general view of the current state of ecosystem functioning together with remaining biodiversity was considered in lieu of the potential development of the proposed site.

National Biodiversity Assessment tools such as the National Biodiversity Assessment (2018) [2] and the Western Cape Biodiversity Spatial Plan (WCBSP, 2017) [1] provide guidance on ecosystem types, extent, and conservation status on which important decisions regarding development planning is to be based.

2.1 Study area

The Hoogekraal area, which lies close to the Swartvlei Estuary (Figure 2), has been under pressure from high intensity landuse including multiple landowners on subdivided plots with fences, intensive grazing practices, widespread clearing of natural vegetation for agricultural purposes and high levels of alien infestation which has rendered most of the area highly fragmented and transformed.

2.1.1 Western Cape Spatial Biodiversity Plan (WCBSP, 2017)

The WCBSP (2017) [1] and National Vegetation Map (2019) [3] identifies the following ecosystem types on the Hoogekraal site:

1. Garden Route Shale Fynbos (VU) (WCBSP, 2017)

The Vulnerable Garden Route Shale Fynbos (GRAF) as delineated by the Western Cape Biodiversity Spatial Plan [1] (Figure 3 & 4) is approximately 500 km² in extent. In terms of the 2011 national listing, or as per CapeNature's 2016 assessment of threat status, this ecosystems' habitat loss is currently irreversible (WCBSP, 2017) [1]. From examining Google Earth (2021) imagery within its extent, it is likely that currently more than 80% of this vegetation type is already transformed through crop agriculture, alien plant invasions and coastal developments.

2. Knysna Sand Fynbos (CR) (WCBSP, 2017)

The Critically Endangered Knysna Sand Fynbos (FFd 10) as delineated by the Western Cape Biodiversity Spatial Plan [1] (Figure 3 & 4) is approximately 143 km² in extent. In terms of the 2011 national listing, or as per CapeNature's 2016 assessment of threat status, this ecosystems' habitat loss is currently irreversible (WCBSP, 2017) [1]. From examining Google Earth (2021) imagery within its extent, it is likely that currently more than 80% of this vegetation type is already transformed through crop agriculture, alien plant invasions and coastal developments.

For these endangered and critically endangered vegetation types, the major threats and causes of transformation are crop agriculture, intensive herbivory (horses, goats, sheep and donkeys) and residential developments associated with the rapid expansion of coastal towns in the Garden Route.

3. Strategic Water Source Area (WCBSP, 2017)

The WCBSP (2017) [1] designates the proposed development site as a Strategic Water Source Area and a FEPA River Corridor. The National Freshwater Priority Areas Project (NFEPA) and associated atlas (NFEPA, 2011) [4] delineates the site area as an Upstream Management Area. Upstream Management Areas are subquaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas. Upstream Management Areas do not include management areas for wetland FEPAs, which need to be determined at a finer scale (NFEPA, 2011).

4. Critical Biodiversity Areas and Ecological Support Areas (WCBSP, 2017)

The Critical Biodiversity Areas 1 and 2 (CBA1 & CBA2), Ecological Support Area 2 (ESA2) and Protected Area (PA) delineated by the WCBSP (2017) [1] and associated map [2] lie close to the proposed development site but does not fall within the site. These areas do, however surround the proposed development site and lies between 80m and 300m from the site, depending on the area type) Figure 5)

CBA areas that are those required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure which include all areas required to meet biodiversity pattern (e.g., species, ecosystems) targets, Critically Endangered (CR) ecosystems (terrestrial, wetland and river types), all areas required to meet ecological infrastructure targets, which are aimed at ensuring the continued existence and functioning of ecosystems and delivery of essential ecosystem services and Critical corridors to maintain landscape connectivity.

CBAs are areas of high biodiversity and ecological value and need to be kept in a natural or near-natural state, with no further loss of habitat or species. Degraded areas should be rehabilitated to natural or near-natural condition. Only low-impact, biodiversity-sensitive land uses are appropriate. A distinction is made between CBAs that are likely to be in a natural condition (CBA 1) those that are potentially degraded or represent secondary vegetation (CBA 2).

The ESA areas are described as not essential for meeting biodiversity targets but play an important role in supporting the functioning of PAs or CBAs and are often vital for delivering ecosystem services. The management objectives of ESA2 areas are to restore or manage to minimize the impact on ecological infrastructure functioning; especially soil and water-related services.

Therefore, for an ESA2, some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised [1]. The accompanying landuse guidelines for these areas require that these areas should ideally be avoided for any activity resulting in habitat loss. If it cannot be avoided, it must be shown that the mitigation hierarchy set out in the WCBSP (2017) has been applied [1].

Although the site is not situated on any sensitive areas, the WCBSP (2017) [1], delineated CBA1 & 2 and ESA2 areas on the two planning units on which the site falls, with important biodiversity and ecological infrastructure features which include Bontebok Extended Distribution Range, Eastern Fynbos Renosterveld Sand Fynbos Floodplain Wetland, Freshwater Lakes, Knysna Sand Fynbos, Garden Route Granite Fynbos, Garden Route Shale Fynbos, Swartvlei (Core) Estuary, Water source protection – Swartvlei, Watercourse protection – South Eastern Coastal Belt, Indigenous Forest Type, South Eastern Coastal Belt Ephemeral Mountain River and Wolwedans Grassy Fynbos (Vlok variant) (Figure 6).

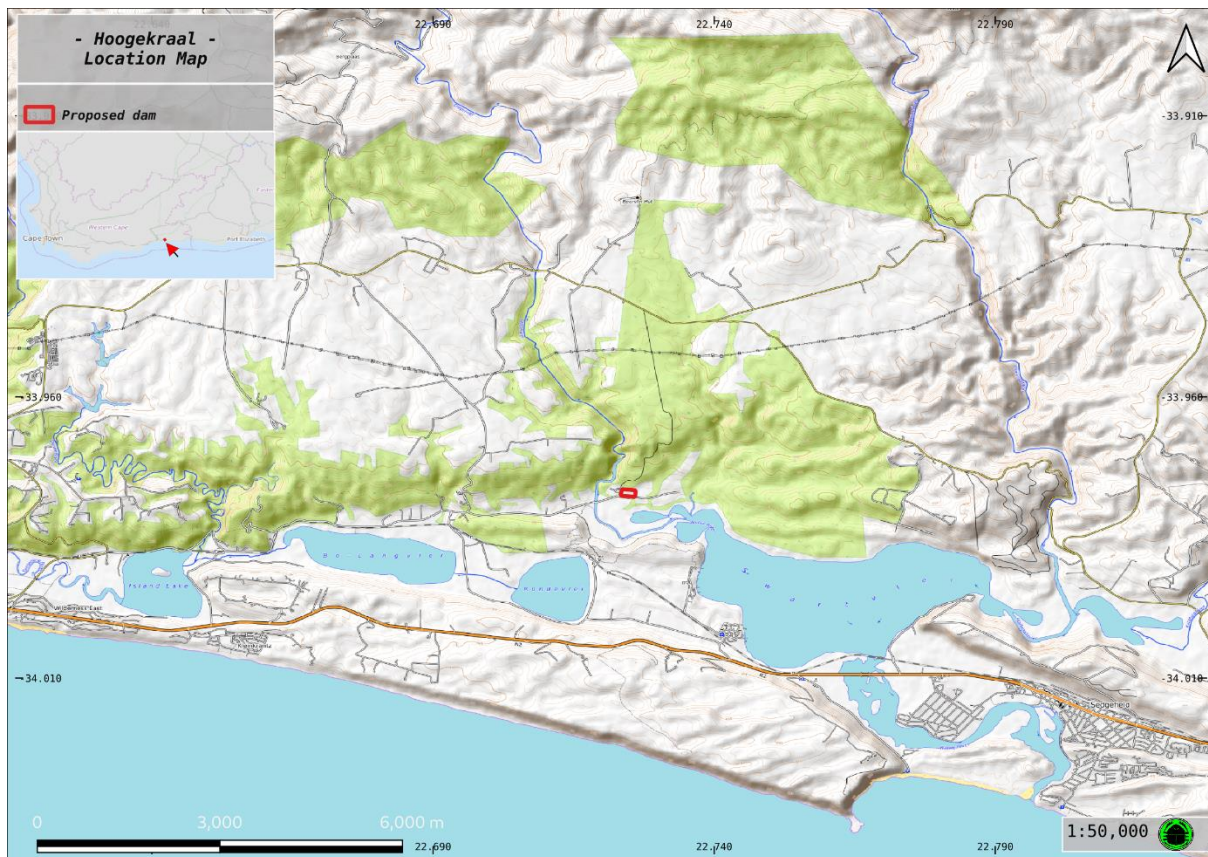


Figure 2: Location of Portion 1 of 182, Hoogekraal and surroundings.

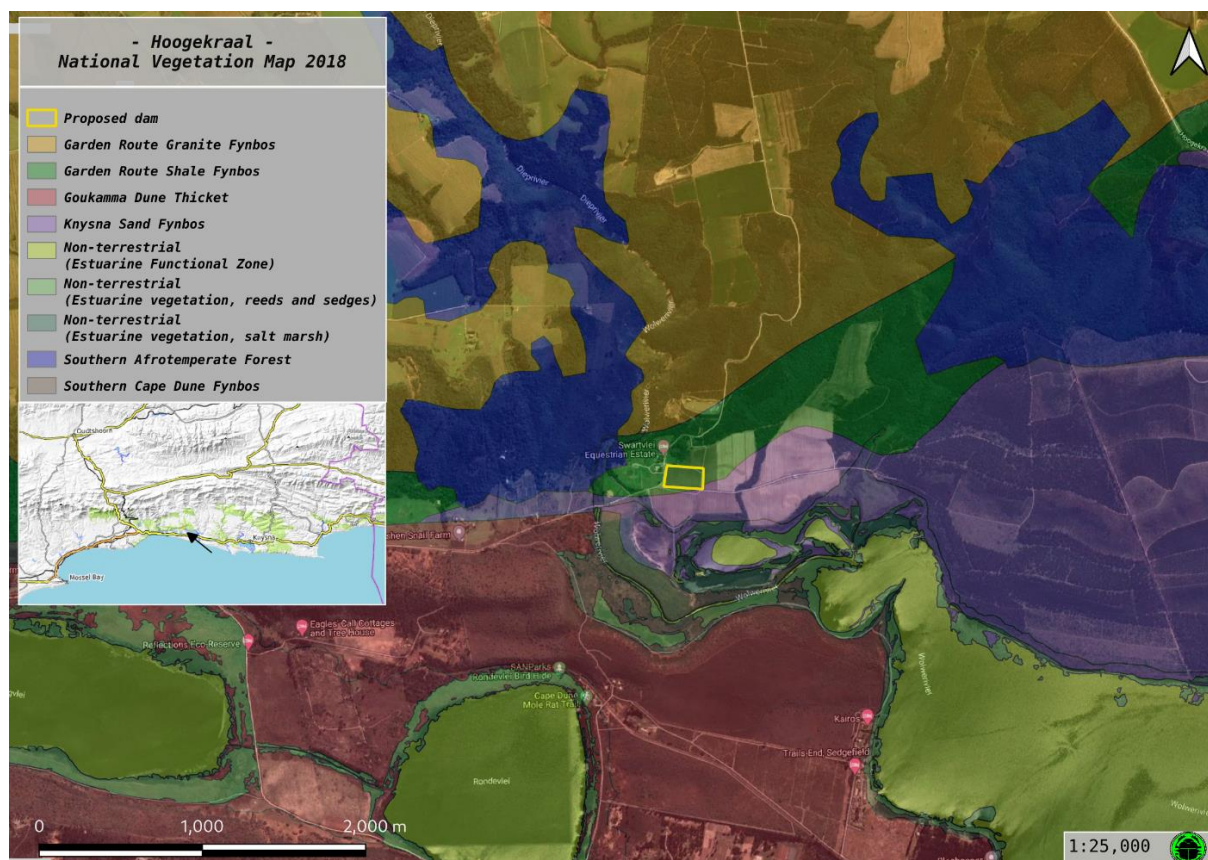


Figure 3: National Vegetation Map [3] delineation of Portion 1 of 182, Hoogekraal and surroundings.

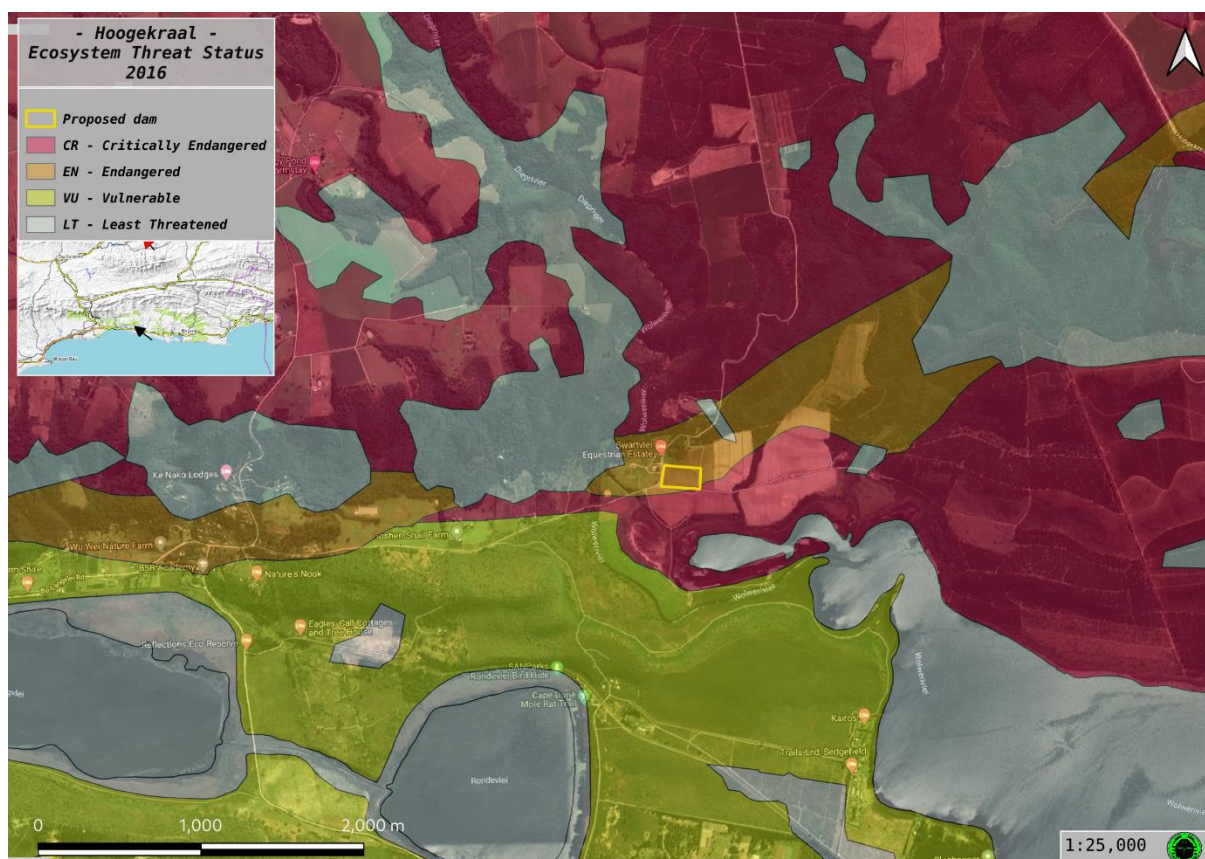


Figure 4: The George Biodiversity Sector Plan/WCBSP (2017) [1] delineation of Portion 1 of 182, Hoogekraal and immediate surroundings.

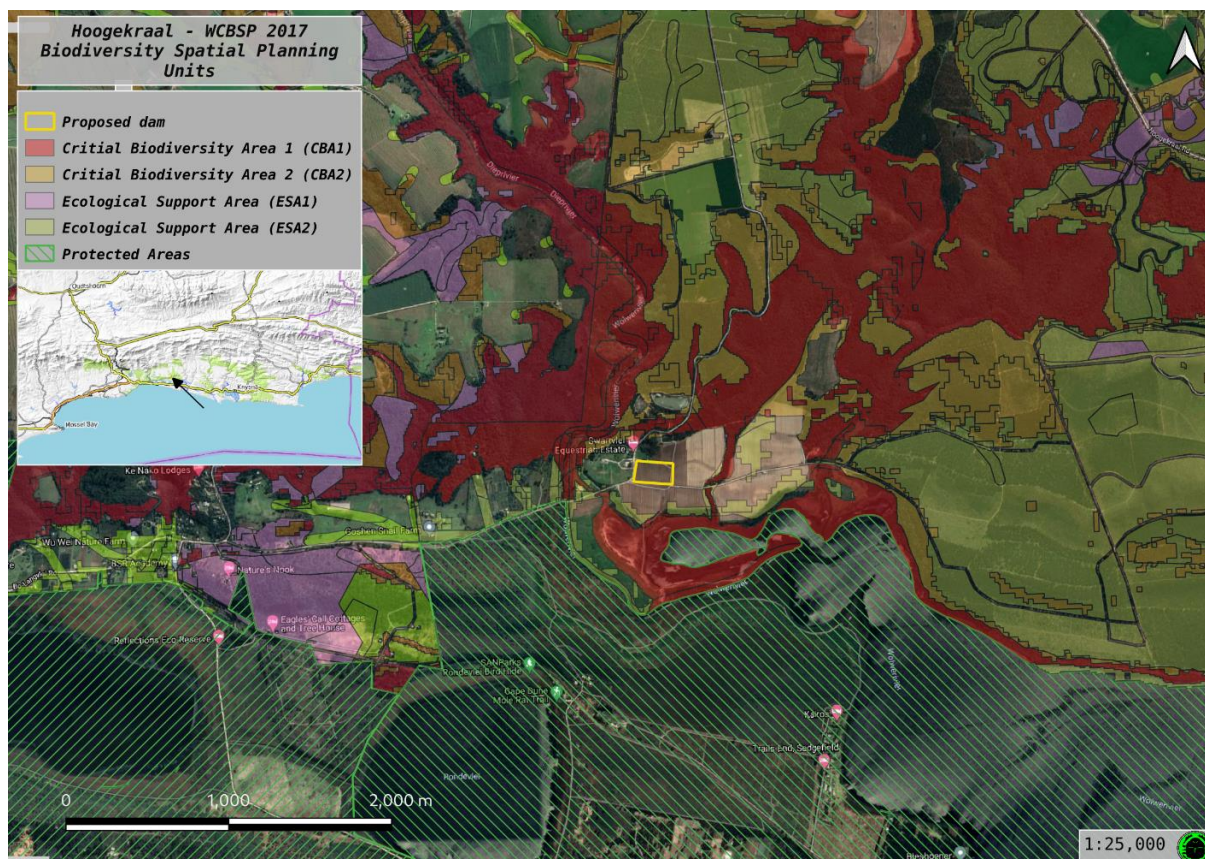


Figure 5: The George Biodiversity Sector Plan/WCBSP (2017) [1] delineation of the larger landscape around Portion 1 of 182, Hoogekraal.

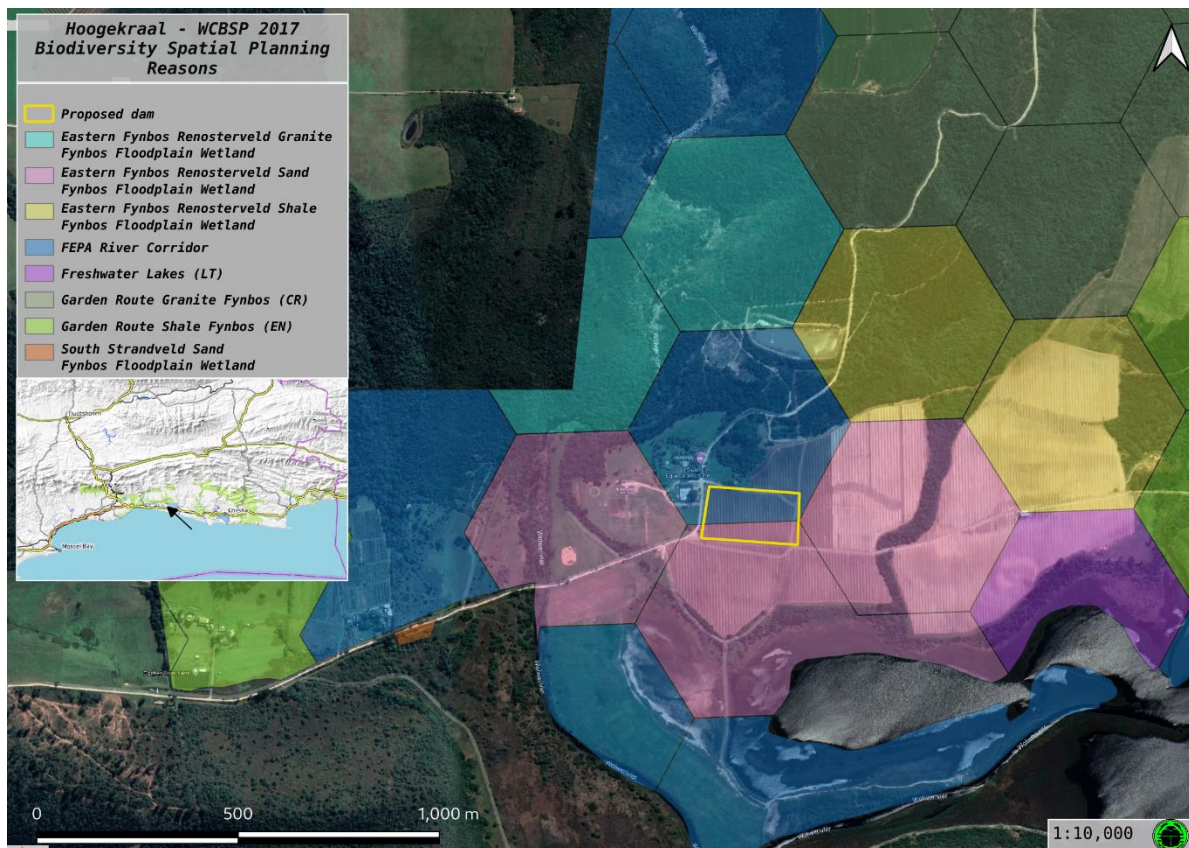


Figure 6: The George Biodiversity Sector Plan/WCBSP (2017) [1] delineated CBA1 & 2 and ESA2 areas on the two planning units on which the site falls, with important biodiversity and ecological infrastructure features.

3 Methods

The result of this report is derived from the findings of a desktop study and a four hour visit of the proposed site by a Botanical and Terrestrial Biodiversity Specialist, Dr. Marius van der Vyver (SACNASP: Ecological Science, 118303). The site inspection was conducted in mid-June 2021 and for the purposes of a terrestrial biodiversity assessment in this specific area, the effect of seasonal variation on the results reported here is minimal.

Recent Google EarthTM imagery were used to delineate the communities found on site and identify species of conservation concern (SOCC). The Western Cape Biodiversity Spatial Plan (WCBSP, 2017) [1] as well as the National Vegetation Map [3] were extensively consulted, along with relevant field guides. Natural areas were identified from the Google Earth images and possible ecological corridors identified. All identified features were then ground-truthed during the site inspection. The proposed site area was investigated by walking in multiple transects and identifying all plant (and fauna) species and noting all observed disturbances that impact on the site. The surrounding landscape within a radius of 500m - 1km were delineated in terms of different landuse patterns from a recent Google Earth image and investigated where possible. Photographs were taken where relevant, and a GPS device were used to mark SOCCs.

The identification of sensitive areas was primarily based on consideration of the current state of the proposed site. This state includes the extent to which the area can currently be considered to function as it is designated in terms of reigning conservation plans (WCBSP, 2017 in this case). Highly fragmented, degraded and transformed areas are considered in terms of the capacity, cost and urgency for active restoration action to be applied to regain that biodiversity function. This methodology considers the mitigation hierarchy [1] as guideline (see Figure 7).

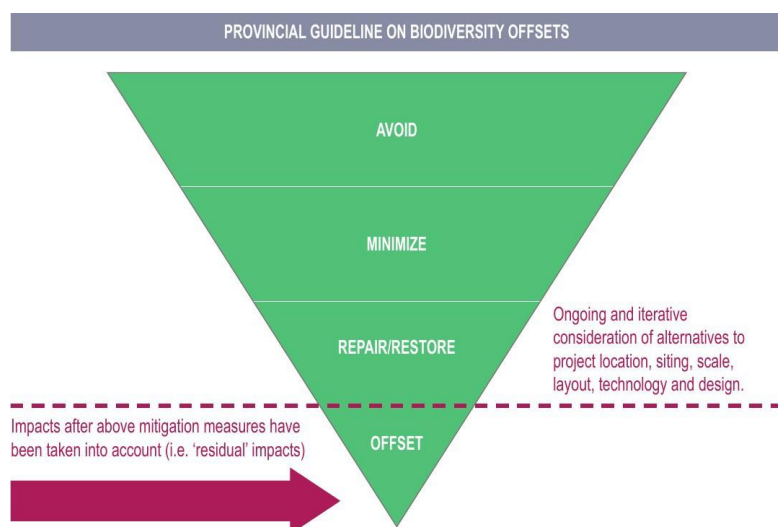


Figure 7: The Mitigation Hierarchy from WCBSP, 2017.

4 Results

4.1 Landscape description

The landscape within which the proposed development sites lies has high levels of transformation, fragmentation and degradation of the natural Garden Route Shale Fynbos and Knysna Sand Fynbos vegetation. The riverine area close to and on the western side of the site is infested with invasive alien plants, e.g., *Acacia mearnsii* (black wattle) and the landscape further north of the site is infested with pine (*Pinus radiata*) and blue gum trees (*Eucalyptus globules*).

Current landuse of the Garden Route Shale Fynbos and Knysna Sand Fynbos areas in and around the proposed site has already transformed the natural vegetation once present on site. The proposed site is overgrown with pioneer grass species, and cleared for crop agriculture in the past. The high density of fences and access roads, the high intensity historical landuse and the current wide variety of landuses around remaining natural vegetation fragments in the landscape has severely limited natural ecological function and processes present before anthropogenic transformation.

4.2 Site descriptions and sensitivity

The proposed site is flat with its western boundary bordering a gravel road and farm infrastructure. Its northern, eastern and southern boundaries border cleared land for pasture or crop agriculture. The entire site is fenced (Figure 8). It consists of parallel rows of raised beds for agriculture.

The entire site is completely transformed mainly from previous clearance for agriculture and there is no evidence of Garden Route Shale Fynbos or Knysna Sand Fynbos habitats remaining (Figures 7). The dominant vegetation on the site can be described as pioneer and pasture grassland (*Pennisetum clandestinum*, *Cynodon dactylon*, *Lolium perenne*) which covers the entire site as well as the areas around it.



Figure 8: Photos taken of the site from different angles, showing the high level of degradation of the site due to previous clearance. Pioneer and pasture grasses (*Pennisetum clandestinum*, *Cynodon dactylon*, *Lolium perenne*) are most abundant and pine (*Pinus sp.*) and blue gum (*Eucalyptus sp.*) invasives are visible close to the edges of the site and it borders farm infrastructure.

4.3 Ecosystem status quo

The proposed development site and surrounding landscape is in a highly fragmented and mostly degraded or transformed state, and does not cover the CBA1 and 2, ESA2 and PA areas within 100 – 200 m away.

The potential for larger-scale ecosystem restoration exists, but its likely high cost and landuse change implications for individual landowners are bound to be unrealistic within the current status quo. Such landscape-scale restoration would require the establishment of biodiversity corridors and current landuse would need to be mostly terminated. To consider such restorative action on the proposed site would imply a drastic change in landuse of the current landowners within the larger area to facilitate an ecological corridor and significant restoration on both the proposed site and surrounding properties.

There is however the potential of the proposed development to contribute to terrestrial biodiversity restoration, as opposed to crop agriculture. Since the area has been defined by the WCSBP as a wetland area, the edges around the proposed dam can be restored on a small scale and thus provide some return of biodiversity to the proposed site by allowing the regeneration of natural vegetation.

The site is transformed mainly due to previous clearance for unknown agricultural activities. The surrounding landscape is in a highly fragmented and mostly degraded or transformed state due to agricultural practices, fencing and alien plant invasions.

Evidence of the following pressures in the local landscape in and around the proposed site is also presented here:

- vi) the high fragmentation of remaining natural vegetation on a landscape scale (i.e., loss of ecosystem function and pattern),
- vii) high and increasing degradation through prolonged overgrazing and change of fire regimes through firebreaks in and around small properties,
- viii) increasing invasive alien plant (IAP) infestation immediately surrounding the proposed site and the use of alien invasive plants as windbreaks (e.g., *Casuarina* and *Pinus* spp.),
- ix) current and historical crop and pasture agriculture,
- x) high levels of transformation in and around the borders of the proposed site.

Other influential factors for refuting the designation of very high biodiversity importance of the degraded Garden Route Shale Fynbos and Knysna Sand Fynbos transformed areas as designated in the screening report, but for which no evidence is presented here include:

- iii) the high cost of restoration action needed, and
- iv) the highly improbable change to a specified landuse by current landowners/manager without adequate livelihood reparation, to restore the surrounding ecosystem on a landscape scale to resume the function of high biodiversity importance.

4.4 Recommendations

From a terrestrial biodiversity perspective, there are no identified constraints for the proposed development of the dam as shown in the layout provided (Figure 1), assuming that all standard construction and subsequent operational environmental health and safety guidelines be strictly followed. Because the site lies within a FEPA River Corridor (WCBSP, 2017) and is a sub-catchment or upstream management area (NFEP, 2011) [4], important for the downstream FEPA (Swatrvlei Estuary), it is important that the proposed dam be built accordingly as to maintain the ecosystem integrity of the FEPA. The site in and around the proposed dam construction area is completely transformed and if the dam is constructed according to criteria that will ensure that it does not negatively impact downstream ecological processes then the dam will not put any further pressure on ecosystem than already exist. The location of the proposed site and its surrounding landuse lends itself to this type of development.

The proposed activity has the potential to contribute to biodiversity restoration on a small scale around the edges of the dam and it is highly recommended that the natural vegetation be allowed to regenerate or assisted with regeneration through revegetation or seeding after the completion of the dam. The highly sensitive areas around the dam should not be impacted by the dam construction activities.

5 References

- [1] R Pool-Stanvliet, A Duffell-Canham, G Pence, and R Smart. The western cape biodiversity spatial plan handbook. *Stellenbosch: CapeNature*, 2017.
- [2] AL Skowno, CJ Poole, DC Raimondo, KJ Sink, H Van Deventer, L Van Niekerk, LR Harris, LB Smith-Adao, KA Tolley, TA Zengeya, et al. National biodiversity assessment 2018: the status of south africa's ecosystems and biodiversity. *Synthesis Report. South African National Biodiversity Institute, Pretoria*, 201.
- [3] A Dayaram, LR Harris, BA Grobler, S Van der Merwe, AG Rebelo, LW Powrie, JHJ Vlok, PG Desmet, M Qabaqaba, KM Hlahane, et al. vegetation map of south africa, lesotho and swaziland 2018: a description of changes since 2006. *bothalia*, 49 (1), a2452, 1–11, 2019.
- [4] Nel JL, Driver A, Strydom W, Maherry A, Petersen C, Hill L, et al. Atlas of freshwater ecosystem priority areas in South Africa: Maps to support sustainable development of water resources. Pretoria: Water Research Commission; 2011.

6 Declaration of Independence

I, Dr. Marius L van der Vyver, hereby declare that I

- Act as the independent specialist in this application;
- 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 and that there are no circumstances that may compromise my objectivity in performing such work;

- 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;

- Will comply with the Act, regulations and all other applicable legislation;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- 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 any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.

I further declare that all the particulars furnished by me in this form are true and correct; and acknowledge that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

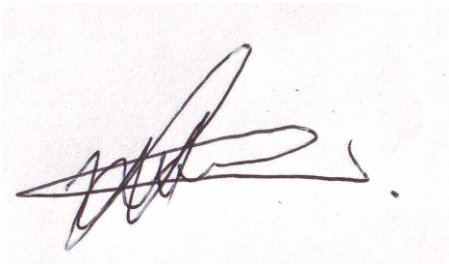
Name of Company

chepri (Pty) Ltd scientific services

Name of Specialist Consultant

Dr. ML van der Vyver

Signature of Specialist Consultant

A handwritten signature in dark ink, appearing to be 'ML van der Vyver', written on a light-colored background.

Date

October 7, 2021

7 Specialist details

Dr. Marius L. van der Vyver holds a PhD in Botany from Nelson Mandela University and has more than 15 years' experience as an ecologist and botanist. He is registered with the South African Council of Natural Scientific Professions (SACNASP) as an ecological scientist (reg.no. 118303) and a member of the South African Association of Botanists (SAAB).

Table 2: Project experience table: Dr. M.L. van der Vyver

Client	Name	Location	Description	Role	Year
Nelson Mandela University	Associate Researcher – NRM Restoration Research Group	Eastern and Western Cape	Research manager of a restoration team to investigate and promote spekboom restoration with funding from the Department of Environmental Affairs, Forestry and Fisheries' Natural Resource Management (NRM) division.	Project Scientist	2019
BMK consulting engineers	Rehabilitation Management Guidelines: Diepsloot Footbridge construction	Diepsloot, Johannesburg	Guidelines for rehabilitation after construction of a pedestrian footbridge over a wetland, Diepsloot, Gauteng	Restoration Ecologist	2019
Envirobalance (Pty) Ltd	Biodiversity Impact Assessment with specialist Vegetation and Mammal Studies for Calmera Estate, Cradle of Mankind	Cradle of Mankind, Muldersdrift, Gauteng	Biodiversity Impact Study including a specialist Vegetation (botanical) and Mammal study for assessing the impacts of a low-impact residential development	Biodiversity Scientist	Ongoing
Wild Summit Group, Kamala Game Reserve	Ecological Risk Assessment for the introduction of Red Deer (<i>Cervus elaphus</i>) on Kamala Game Reserve.	Eastern Cape, South Africa	Determine the ecological risk involved with the introduction of a population of Red Deer on Kamala Game Reserve.	Ecological Scientist	2019
Integrated Data Management (IDM) (Pty.) Ltd.	Determining trends in Electricity usage from data provided by Maputo Hospital	Maputo, Mozambique	Statistical analyses of energy usage of electricity monitoring data	Statistical analyst	2018
IDM, Arcelor Mittal	Energy usage analysis from a steel factory, Arcelor Mittal	Port Elizabeth, South Africa	Statistical analyses of energy usage of electricity monitoring data	Statistical analyst	2018
Wild Summit Group, Kamala Game Reserve	Ecological Risk Assessment for the maintenance of an existing population of Barbary Sheep on Kamala Game Reserve.	Eastern Cape, South Africa	Determine the ecological risk involved with the maintenance of an existing population of Barbary sheep on Kamala Game Reserve	Ecological Scientist	2018



Table 2: Project experience table: Dr. M.L. van der Vyver (*continued*)

Client	Name	Location	Description	Role	Year
Resilience Environmental Advice, Enviro-mining, Suralco LCC	Monitoring system for the Revegetation Index – Suralco LCC Mine Closure Project.	Surinam, South America	Develop a monitoring system for the rehabilitation and revegetation of ferro-bauxite mines, based on the inputs of various Biodiversity specialists.	Restoration ecologist, Statistical analyst	2018
CSIR	Biomass estimation of subtropical thicket vegetation in Addo Elephant National Park for calibration with LiDAR and radiometric sensor data	Addo Elephant National Park, Eastern Cape.	Biomass estimation of aboveground vegetation across Addo Elephant National Park for calibration with LiDAR and radiometric sensor data	Botanical specialist, Statistical analyst	2018
African Centre of Coastal Paleosciences, NMU	Vegetation community identification and plant species list for phytolith research on specific extant vegetation types in the Garden Route and Klein Karoo area	Southern Cape including Garden Route and Little Karoo	Botanical input to a post-doc researching phytolith composition in relation to extant vegetation types.	Botanical specialist	2018
Bothalia (academic journal)	Peer-review of a research paper on restoration ecology for publication in the academic journal Bothalia	NA	Peer-review of a research paper on restoration ecology for publication in the academic journal Bothalia	Restoration ecologist	2018
Rhodes University	Develop allometric models for estimating Biomass of Honeybush tea plants	NA	Specialist assistance to develop allometric models from commercially planted and wild honeybush plants sampled	Statistical analyst	2017
C4ES (Pty) Ltd	Statistical analysis and R code development for applying boundary line analysis to various soil datasets	NA	Develop new and debug existing R code to implement the boundary line analysis method and quantile regression to various soil datasets	Statistical analyst	2017
KDS Consortium (Pty) Ltd	Biodiversity Screening Report for a proposed township development, Tshivhazwaulu Extension 1	Makhado area, Limpopo	Biodiversity impact screening report for township development	Biodiversity scientist	2017



Table 2: Project experience table: Dr. M.L. van der Vyver (*continued*)

Client	Name	Location	Description	Role	Year
Envirobalance (Pty) Ltd	Wetland delineation for Calmera Estate, Cradle of Mankind.	Cradle of Mankind, Muldersdrift, Gauteng	Wetland delineation for a proposed Basic Assessment for a housing development	Wetland specialist	2017
Journal of Applied Ecology (academic journal)	Peer-review of a research paper on restoration ecology for publication in the academic Journal of Applied Ecology	NA	Peer-review of a research paper on restoration ecology for publication in the academic Journal of Applied Ecology	Restoration ecologist	2017
Arid Land Research and Management (academic journal)	Peer-review of a research paper on restoration ecology for publication in the academic Journal of Arid Land Research and Management	NA	Peer-review of a research paper on restoration ecology for publication in the academic Journal of Arid Land Research and Management	Restoration ecologist	2016
Sigwela and Associates (Pty) Ltd / DEA (National Resource Management Programmes)	Restoration of Forest Vegetation in Matiwane, near Port St. Johns, Eastern Cape	Port St. Johns area, Eastern Cape.	Monitoring of ongoing forest restoration project and establish research sites to ascertain the feasibility of different clearing protocols and treatments for the restoration of grassland habitat after alien plant clearing by WfW teams.	Restoration ecologist	2016
PeerJ (academic journal)	Peer-review of a research paper on restoration ecology for publication in the academic journal PeerJ	NA	Peer-review of a research paper on restoration ecology for publication in the academic journal PeerJ	Restoration ecologist	2015
Forests, Trees and Livelihoods (academic Journal)	Peer-review of a research paper on restoration ecology for publication in the academic journal Forests, Trees and Livelihoods	NA	Peer-review of a research paper on restoration ecology for publication in the academic journal Forests, Trees and Livelihoods	Botanical specialist	2014
Gamtoos Irrigation Board	Develop allometric models for biomass estimation of 5 major alien invasive plants in the Nelson Mandela Metropolitan area.	Port Elizabeth	Develop allometric models by destructively harvesting a number of prominent Invasive Alien Plant Species	Botanical specialist, Statistical analyst	2013-2014



Table 2: Project experience table: Dr. M.L. van der Vyver (*continued*)

Client	Name	Location	Description	Role	Year
USK Consulting (Pty)Ltd	Ecological Impact Assessment for the proposed Swartwater Solar Energy Facility, Northern Cape	Swartwater, Northern Cape	Botanical and Fauna specialist study	Biodiversity scientist	2013
USK Consulting (Pty) Ltd	Ecological Impact Assessment for the proposed Wesley Wind Energy Facility, Eastern Cape	Wesley, Eastern Cape	Biodiversity (Flora and Fauna) impact specialist study of a proposed Wind Energy Project	Biodiversity scientist	2012
Envirobalance (Pty) Ltd	Ecological Impact Assessment for the proposed Albert Luthuli (Badplaas) Landfill Site	Badplaas, Mpumulanga	Biodiversity (Flora and Fauna) impact specialist study for a proposed landfill site	Biodiversity scientist	2012
Envirobalance (Pty) Ltd	Ecological Screening Report – Kuruman Housing Development and Wastewater Treatment Works	Kuruman, Northern Cape	Biodiversity (Flora and Fauna) screening study for a proposed landfill site	Biodiversity scientist	2012
USK Consulting (Pty) Ltd	Air Quality monitoring at East London Port Harbour	East London, Eastern Cape	Procure, install maintain and manage air quality monitoring instruments and weather stations and analyse data	Environmental scientist	2010-2011
NMU Restoration Research Group	Active restoration of woody canopy dominants in degraded south african semi-arid thicket is neither ecologically nor economically feasible	Krompoort, Rhinosterhoek Eastern Cape	Experiment with planting nursery-grown propagules in spekboom restoration stands of different ages. Analysis and reporting on the ecological and economic implications of results. Publish results in Journal of Applied Vegetation Science.	Restoration ecologist	2011-2012
NMU Restoration Research Group, DEA	Spontaneous return of biodiversity in restored subtropical thicket: Portulacaria afra as an ecosystem engineer.	Krompoort, Rhinosterhoek Eastern Cape	Survey plant biodiversity and above and belowground carbon pools in different stands ranging from 0-50 years under spekboom restoration treatment and intact stands, and compare results to gauge restoration success in terms of biodiversity.	Restoration ecologist	2011-2012



Table 2: Project experience table: Dr. M.L. van der Vyver (*continued*)

Client	Name	Location	Description	Role	Year
USK Consulting (Pty) Ltd /BCM	Water quality monitoring at Roundhill municipal landfill site in Buffalo City Municipality	East London, Eastern Cape	Publish results in the journal Restoration Ecology. Water sampling from various locations around and inside the municipal landfill site and lab analysis interpretation and reporting against norms and allowable limits.	Environmental scientist	2010-2011
DEA (National Resource Management Programmes), NMU	Habitat and herbivory impact efficient ecological restoration of spekboom (Portulacaria afra)-rich subtropical thicket.	Various locations within the Southern and Eastern Cape	Assessment of local environmental and management factors affecting spekboom restoration efficacy on 275 experimental restoration plots on a biome-wide scale (Thicket-wide Plot Experiment)	Restoration ecologist, Statistical analyst	2011-2017
DEA (National Resource Management Programmes), NMU	Plant larger truncheons deeper: more effective spekboom (Portulacaria afra) thicket restoration protocol.	Various locations within the Southern and Eastern Cape	Assessment of various propagule treatments and planting protocols affecting spekboom restoration efficacy on 275 experimental restoration plots on a biome-wide scale (Thicket-wide Plot Experiment)	Restoration ecologist, Statistical analyst	2011-2017
DEA (National Resource Management Programmes), NMU	Contrasted aboveground carbon pool estimations of intact and degraded (Portulacaria afra)-rich subtropical thicket show terrestrial carbon offset potential.	Various locations within the Southern and Eastern Cape	I developed 40 different species-specific allometric models for estimating aboveground biomass of subtropical thicket vegetation	Botanical specialist, Statistical analyst	2011-2017
C4ES (academic journal) / PrimaKlima (academic journal)	Monitoring of aboveground carbon pools on rehabilitated spekboomveld for three sites in the Eastern Cape.	Kaboega, Klipplaat, Jansenville and Uitenhage areas, Eastern Cape	Monitor and quantify aboveground carbon of spekboom restoration plots as terrestrial carbon offsets	Restoration ecologist	2011-2014
USK Consulting (Pty) Ltd	Strategic Environmental Assessment (SEA) for Mnquma Municipality, Eastern Cape.	Mnquma Municipality, Transkei, Eastern Cape	I was responsible for the biodiversity (Fauna and Flora) component including extensive mapping and verification/ground-truthing of areas delineated by the Eastern Cape Biodiversity Plan. I managed the GIS component of the project.	Biodiversity scientist and GIS analyst	2011
Envirobalance (Pty) Ltd	Weltevreden Park Wetland Delineation Study, Centurion.	Weltevreden Park, Gauteng	Wetland delineation and map for a BA for proposed housing development	Wetland specialist	2011



Table 2: Project experience table: Dr. M.L. van der Vyver (*continued*)

Client	Name	Location	Description	Role	Year
USK Consulting (Pty)Ltd / Afrisam	Biodiversity Management Plan for Afrisam Dudfield Mine, Lichtenburg	Lichtenburg, North Wes	A biodiversity management plan including a vegetation map an alien plant control plan and an ecological management plan of a small protected area adjacent to the mining area with plant checklist, botanical baseline, veld condition assessment, game and stocking rate recommendation	Biodiversity scientist	2010
Envirobalance (Pty) Ltd	Vegetation Screening Report: Kuruman Housing development and Wastewater treatment works	Kuruman, Northern Cape	Botanical screening study for a proposed landfill site	Botanical specialist	2010
Envirobalance (Pty) Ltd	Ecological Impact Assessment: Ga-Oria to Tsate road – Sekhukhuneland, Limpopo	Steelpoort area, Mpumulanga	Biodiversity (Flora and Fauna) impact study for a proposed road.	Biodiversity scientist	2010
Envirobalance (Pty) Ltd	Karino Wetland Rehabilitation and Management Plan	Nelspruit, Mpumulanga	Wetland delineation and rehabilitation plan	Wetland specialist	2010
USK Consulting (Pty)Ltd	Ecological Screening for Tsolo Junction Development, Eastern Cape	Tsolo, Transkei, Eastern Cape	Biodiversity (Flora and Fauna) screening study for a proposed road	Biodiversity specialist	2010
USK Consulting (Pty)Ltd	A number of Basic Assessments Reports	East London Area, Eastern Cape	Standard Basic Assessments and various inputs to EIA reports.	Environmental consultant	2009-2011
USK Consulting (Pty)Ltd	Ecological screening report - Riverland Orchard Farm 799/37 Gonubie	Gonubie, Eastern Cape	Biodiversity (Flora and Fauna) screening study for a proposed agricultural clearing	Botanical specialist	2008



Table 2: Project experience table: Dr. M.L. van der Vyver (*continued*)

Client	Name	Location	Description	Role	Year
Savannah Environmental (Pty) Ltd / Eskom	Scoping report: Ankerlig Power Station Conversion and transmission integration project, Western Cape.	Mossel Bay LM	I co-authored the scoping report and made two site visits and attended public meetings.	Environmental consultant	2008
Savannah Environmental (Pty) Ltd / Eskom	Scoping report: Ankerlig Power Station Conversion and transmission integration project, Western Cape.	Ingula, Ladysmith area, KwaZulu Natal	I developed an environmental management plan for the construction of a large transmission line across sensitive ecological communities in the KwaZulu Natal midlands.	Environmental scientist	2008
Savannah Environmental (Pty) Ltd / Eskom	Environmental Impact Assessment for building water infrastructure at Medupi Power Plant	Medupi, Limpopo Province	EIA and scoping for a proposed water infrastructure including extensive pipelines and reservoirs	Environmental consultant	2008
Savannah Environmental (Pty) Ltd / Eskom	Environmental Compliance Officer (ECO) for construction of pipeline for disposal of waste water and ash at Duvha Power Station, Witbank	Witbank, Mpumulanga	Environmental compliance project auditing the construction activities of a pipeline for the disposal of waste water and ash at Duvha Power Station, Witbank.	Environmental Compliance Officer	2008
Savannah Environmental (Pty) Ltd / DWAF	On-site ECO for construction of the De Hoop Dam and realignment of the provincial road	Steelpoort area, Mpumulanga	Independent Environmental Compliance Monitoring of a large dam construction project (DWAF) and an associated project involving the consequent realignment of the provincial road	Environmental Compliance Officer	2007-2008
Pidwa Conservation Projects (Pty) Ltd	Research and Monitoring support to Pidwa Reserve Management, part of the Greater Makalali Conservation Area, with paying volunteers.	Greater Makalali Conservation Area near Gravelotte, Limpopo	Research and monitoring within a large big-5 game reserve, specifically in terms of Elephant impacts on vegetation, leopard population and home range study, game monitoring and census, alien plant control, predation preferences of lions and management of international paying volunteers and post graduate students	Project and research manager	2006-2007



Table 2: Project experience table: Dr. M.L. van der Vyver (*continued*)

Client	Name	Location	Description	Role	Year
Siyafunda Conservation Projects (Pty) Ltd	Research and Monitoring support to Makalali Reserve Management, part of the Greater Makalali Conservation Area, with paying volunteers.	Greater Makalali Conservation Area near Hoedspruit, Limpopo	Research and monitoring within a large big-5 game reserve, specifically elephant group behaviour with regards to the reserve immuno-contraception program, predation preferences of predators on reserve, hyaena monitoring and home range calculations, elephant impacts on vegetation, leopard population and home range study, game monitoring and census, alien plant control and management of international paying volunteers and post graduate students	Volunteer facilitator, Monitoring officer	2004-2006
Tshwane University of Technology	Botanical surveys, vegetation condition assessments and game stocking recommendation on tribal lands in view of the potential establishment of a reserve.	Greater Giyani region, Limpopo	Botanical surveys, vegetation condition assessments and game stocking recommendation on tribal lands in view of the potential establishment of a reserve (3-month contract).	Botanical specialist	2004
Cambridge University, Kalahari Meerkat Project	International research station on small reserve focussed mostly on the behavioural ecology of Meerkats.	Kuruman River Reserve, Van Zylsrus, Northern Cape	Reserve management and research technician	Research technician, Reserve infrastructure manager.	2003-2004
SANParks	Field ranger	Kgalagadi Transfrontier Park	Reserve management duty, 4x4 trail guide, field guide	Field ranger, Field guide, 4x4 trail guide	2003

