

An aerial photograph of a dense, green forest covering a hillside. The trees are mostly deciduous with varying shades of green. In the upper right corner, a small portion of a building with a white wall and a brown roof is visible. The overall scene is a lush, natural landscape.

Terrestrial Biodiversity Assessment

Portion of Keurboomstrand Erf 155

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Author: J. Pote

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Portion of Keurboomstrand Erf 155

Compiled by: **Jamie Pote** (Pr. Sci. Nat.)

Postnet Suite 57, Private Bag X13130, Humewood, Port Elizabeth, 6013, South Africa
jamiepote@live.co.za +27 (0)76 888 9890

Compiled for: **Bluepebble Consulting**

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First Draft

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Abbreviations

CARA	Conservation of Agricultural Resources Act, Act 43 of 1983
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs (<i>now DEFF, see below</i>)
DEA&DP	Department of Environmental Affairs and planning (W Cape)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism (E Cape)
DEFF	The <u>Department of Environment, Forestry and Fisheries</u> (DEFF), renamed from the Department of Environmental Affairs in June 2019, incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries.
DEMC	Desired Ecological Management Class
DWS	Department of Water Affairs and Sanitation
DWAF	Department of Water Affairs and Forestry (former department name)
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMC	Ecological Management Class
EMP	Environmental Management Plan
EMPr	Environmental Management Programme report
ER	Environmental Representative
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
LM	Local Municipality
masl	meters above sea level
MPAH	Maputaland-Pondoland-Albany Hotspot
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, Act 107 of 1998
NFA	National Forests Act
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NFA	National Forest Act, Act 84 of 1998
PEMC	Present Ecological Management Class
PES	Present Ecological State
PNCO	Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).
RDL	Red Data List
RHS	Right Hand Side
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SoER	State of the Environment Report
SSC	Species of Special Concern
ToPS	Threatened of Protected Species
ToR	Terms of Reference
+ve	Positive
-ve	Negative

Glossary

Alien Invasive Species (AIS)	An alien species whose introduction and/or spread threaten biological diversity (Convention on Biological Diversity). Note: “ <i>Alien invasive species</i> ” is considered to be equivalent to “ <i>invasive alien species</i> ”. An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity (IUCN).
Best Environmental Practice	The application of the most appropriate combination of environmental control measures and strategies (Stockholm Convention).
Best Management Practice	Established techniques or methodologies that, through experience and research, have proven to lead to a desired result (BBOP).
Biodiversity	Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.
Biodiversity Offset	Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people’s use and cultural values associated with biodiversity (BBOP).
Biodiversity Threshold	The target areas (hectares) of biodiversity which must be safeguarded for the component plants and animals to exist and for ecosystems to continue functioning (e.g. pollination, migration of animals) i.e. the target areas comprise the CBA.
Bioremediation	The use of organisms such as plants or microorganisms to aid in removing hazardous substances from an area. Any process that uses microorganisms, fungi, green plants, or their enzymes to return the natural environment altered by contaminants to its original condition.
Boundary	Landscape patches have a boundary between them which can be defined or fuzzy (Sanderson and Harris, 2000). The zone composed of the edges of adjacent ecosystems is the boundary.
Catchment	In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.
Connectivity	The measure of how connected or spatially continuous a corridor, network, or matrix is. For example, a forested landscape (the matrix) with fewer gaps in forest cover (open patches) will have higher connectivity.
Corridors	Have important functions as strips of a landscape differing from adjacent land on both sides. Habitat, ecosystems, or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as “steppingstones” that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.
Critically Endangered (CR)	A category on the IUCN Red List of Threatened Species which indicates a taxon is considered to be facing an extremely high risk of extinction in the wild (IUCN).
Cultural Ecosystem Services	The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic

	experience, including, e.g. knowledge systems, social relations, and aesthetic values (Millennium Ecosystem Assessment).
Cumulative Impacts	The total impact arising from the project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures and trends which may be unregulated. The project's impact is therefore one part of the total cumulative impact on the environment. The analysis of a project's incremental impacts combined with the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation (BBOP).
Data Deficient (DD)	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat (IUCN).
Degraded Habitat/Land	Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.
Disturbance	An event that significantly alters the pattern of variation in the structure or function of a system, while fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. Disturbance is generally considered a natural process.
Ecological Function	How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly.
Ecological Pattern	The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them.
Ecological Process	Includes <i>Physical processes</i> [Climate (precipitation, insolation), hydrology, geomorphology]; <i>Biological processes</i> [Photosynthesis, respiration, reproduction]; <i>Ecological processes</i> [Competition, predator-prey interactions, environmental gradients, life histories]
Ecological Processes	Ecological processes typically only function well where natural vegetation remains, and where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened.
Ecological Structure	The composition, or configuration, and the proportion of different patches across the landscape. Relates to species diversity, the greater the diversity, the more

	complex the structure. A description of the organisms and physical features of environment including nutrients and climatic conditions.
Ecosystem	All the organisms of a habitat, such as a lake or forest, together with the physical environment in which they live. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Ecosystem Services	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Supporting Ecosystem services are those that are necessary for the maintenance of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.
Ecosystem Status	Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem (Millennium Ecosystem Assessment).
Ecotone	The transitional zone between two communities. Ecotones can arise naturally, such as a lakeshore, or can be human created, such as a cleared agricultural field from a forest. The ecotonal community retains characteristics of each bordering community and often contains species not found in the adjacent communities. Classic examples of ecotones include fencerows; forest to marshlands transitions; forest to grassland transitions; or land-water interfaces such as riparian zones in forests. Characteristics of ecotones include vegetational sharpness, physiognomic change, and occurrence of a spatial community mosaic, many exotic species, ecotonal species, spatial mass effect, and species richness higher or lower than either side of the ecotone.
Edge	The portion of an ecosystem near its perimeter, where influences of the adjacent patches can cause an environmental difference between the interior of the patch and its edge. This edge effect includes a distinctive species composition or abundance in the outer part of the landscape patch. For example, when a landscape is a mosaic of perceptibly different types, such as a forest adjacent to a grassland, the edge is the location where the two types adjoin. In a continuous landscape, such as a forest giving way to open woodland, the exact edge location is fuzzy and is sometimes determined by a local gradient exceeding a threshold, as an example, the point where the tree cover falls below thirty-five percent.
Emergent Tree	Trees that grow above the top of the canopy
Endangered (En)	<u>Endangered terrestrial ecosystems</u> have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised. A <u>taxon (species)</u> is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a <u>very high risk</u> of extinction in the wild (IUCN).
Endemic	A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region, which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threatened Species.

Environment	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical, and cultural aspects.
Estuary	a partially or fully enclosed body of water - (a) which is open to the sea permanently or periodically; and (b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land.
Evolutionary Processes	Series of actions which enable new species to evolve in response to changing Biodiversity is maintained by ecological processes at the micro-scale (such as in pollination and nutrient cycling via microbial action) through to the mega-scale (natural events e.g. fire, flood; migration of species along river valleys or coastal areas, quality and quantity of water feeding rivers and estuaries; marine sand movement and the seasonal mountain-to-coast migration of birds that pollinate plants).
Exotic	Non-indigenous; introduced from elsewhere, may also be a <i>weed</i> or alien <i>invasive</i> species. Exotic species may be invasive or non-invasive.
Fragmentation (Habitat Fragmentation)	The ‘breaking apart’ of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development occur.
Habitat	The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival.
Habitat Banking	A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time (IEEP).
IFC PS6	International Finance Corporation Performance Standard 6 – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)
Indicator	Information based on measured data used to represent an attribute, characteristic, or property of a system.
Indicator species	A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.
Indigenous	Native; occurring naturally in a defined area.
Indigenous Species (Native species)	A species that has been observed in the form of a naturally occurring and self-sustaining population in historical times (<i>Bern Convention 1979</i>). A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy <u>using its natural dispersal systems</u> (<i>modified after the Convention on Biological Diversity</i>)
Indirect Impact	Impacts triggered in response to the presence of a project, rather than being directly caused by the project’s own operations (BBOP)
Instream habitat	Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse;
Intact Habitat / Vegetation	Land that has not been significantly impacted upon by man’s activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Intrinsic Value	The inherent worth of something, independent of its value to anyone or anything else.
Keystone Species	Species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance. Although all species interact, the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct

	and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web.
Landscape	An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems (Millennium Ecosystem Assessment).
Landscape Approach	Dealing with large-scale processes in an integrated and multidisciplinary manner, combining natural resources management with environmental and livelihood considerations (FAO).
Landscape connectivity	The degree to which the landscape facilitates or impedes movement among resource patches.
Least threatened / Least Concern (LC)	<p>These <u>ecosystems</u> have lost only a small proportion (more than 80 % remains) of their original natural habitat, and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).</p> <p>A <u>taxon (species)</u> is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category (IUCN).</p>
Matrix	The “ <i>background ecological system</i> ” of a landscape with a high degree of connectivity.
Natural Forest (Indigenous Forest)	<p>The definition of “<i>natural forest</i>” in the National Forests Act of 1998 (NFA) Section 2(1)(xx) is as follows: ‘A natural forest means a group of indigenous trees</p> <ul style="list-style-type: none"> • whose crowns are largely contiguous • or which have been declared by the Minister to be a natural forest under section 7(2) <p>This definition should be read in conjunction with Section 2(1)(x) which states that ‘Forest’ includes:</p> <ul style="list-style-type: none"> • A natural forest, a woodland, and a plantation • The forest produce in it; and • The ecosystems which it makes up. <p>The legal definition must be supported by a technical definition, as demonstrated by a court case in the Umzimkulu magisterial district, relating to the illegal felling of Yellowwood (<i>Podocarpus latifolius</i>) and other species in the Gonqogonqo forest. From scientific definitions we can define natural forest as:</p> <ul style="list-style-type: none"> • A generally multi-layered vegetation unit • Dominated by trees that are largely evergreen or semi-deciduous • The combined tree strata have overlapping crowns, and crown cover is >75% • Grasses in the herbaceous stratum (if present) are generally rare • Fire does not normally play a major role in forest function and dynamics except at the fringes • The species of all plant growth forms must be typical of natural forest (check for indicator species) • The forest must be one of the national forest types
Near Threatened (NT)	A <u>taxon (species)</u> is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN).
Patch	A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements.

Protected Area	A clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Range restricted species	Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited <u>extent of occurrence</u> (EEO): <ul style="list-style-type: none"> For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EEO less than 50,000 square kilometres (km²).
Refugia	A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting.
Rehabilitation	Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/ or minimised. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure (<u>BBOP</u>).
Resilience	The capacity of a natural system to recover from disturbance (<u>OECD</u>).
Restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions (<u>IFC</u>).
Riparian	Pertaining to, situated on, or associated with the banks of a watercourse, usually a river or stream.
Riparian Habitat	Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.
River Corridors	River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (<u>WCED</u>).
Terrestrial	Occurring on, or inhabiting, land.
Threatened Species	Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species (<u>IUCN</u>). Any species that is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate (<u>EU</u>).
Traditional Ecological Knowledge	Knowledge, innovations, and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values,

	beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry (CBD).
Transformation	In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.
Transformed Habitat/Land	Land that has been significantly impacted upon as a result of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.
Tributary	A small stream or river flowing into a larger one.
Untransformed Habitat/Land	Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Vulnerable (Vu)	<u>Vulnerable terrestrial ecosystems</u> have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat. A <u>taxon (species)</u> is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild (IUCN)..
Watercourse	Natural or man-made channel through or along which water may flow. A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake, or dam into which, or from which, water flows. and a reference to a watercourse includes, where relevant, its bed and banks;
Weed	An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens. Weeds are generally known to proliferate through the production of large quantities of seed.
Wetlands	A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.

Executive Summary

The Executive summary provides a synopsis of the key principles that are applicable and a summary of the main findings of the Biodiversity Assessment Report. Refer to the corresponding sections of the report, including images, tables, and appendices, for further clarification and relevant background supporting the assessment. A glossary of terms as well as abbreviations is provided in the preface and comprehensive references in the appendices, that have bearing on or have been sources for compilation of the report.

Purpose of Report

Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes

This report has been compiled to fulfil the requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020**. This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity. [Refer to Section 9.8 \(Appendix H: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity\)](#) for protocol and cross references to specific sections within this report.

In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal themes**, the proclamation notes that ‘*the requirements of these protocols will apply from the date of publication, except where the applicant provides proof to the competent authority that the specialist assessment affected by these protocols had been commissioned by the date of the publication of these protocols in the Government gazette, in which case Appendix 6 of the Environmental Impact Assessment Regulations, 2014, as amended will apply to such applications*’. In this regard and with reference to the appointment letter provided in Section 9.7 (Appendix G), these protocols have not been adopted as the appointment was before commencement of the regulations. However, due diligence regarding their presence has still been undertaken.

The principles that guide this process include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources which are fundamental to sustainable development.

Project Description

Activity Location and Description

The landowner proposes to subdivide a portion of Erf 155 in order to accommodate additional dwelling units as follows:

- Alternative 1 (preferred): 3 units
- Alternative 2: 6 units
- Alternative 3: 12 units
- Alternative 4: no-go

Aspects of the project that could potentially have Biodiversity related Impacts

Methodology and Approach

This terrestrial biodiversity assessment and report has been undertaken as per the requirements of the *Procedures 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, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

Site visit

A mid-spring site visit was conducted on 13 & 14 October 2020. The site falls within a summer rainfall area and for the purposes of this report, this is deemed to be adequate, specifically due to the linear nature of the activity and also as large portions are constructed in already disturbed/transformed areas.

Legislation Framework: EIA Regulations

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following specific listing notices have bearing on this report:

Listing Notice 1 (GNR):

27. The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—

- (i) the undertaking of a linear activity; or
- (ii) maintenance purposes undertaken in accordance with a maintenance management plan.

Clearing of Indigenous Vegetation for the activity will be less than 1 hectare.

Listing Notice 2 (GNR):

None are applicable.

Listing Notice 3 (GNR):

12. The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

(i) Western Cape

ii. Within critical biodiversity areas identified in bioregional plans;

~~iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line or erven in urban areas;~~

iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or

Clearing of Indigenous Vegetation for the activity will be greater than 300 m² within a Critical Biodiversity Area, including 120 m² access road through an erf zoned as open space I on the north side of Erf 155. The southern boundary of the site footprint is situated approximately 100m inland from the high-water mark, hence vegetation clearing will be predominantly outside of 100m from the high watermark. A Basic Assessment is thus required.

Systematic Planning Frameworks

Summary of Regional Planning Biodiversity features:

FEATURE ¹	DESCRIPTION	IMPLICATIONS/COMMENT
National Vegetation Map (NVM, 2018)	Goukamma Dune Thicket South Outeniqua Sand Fynbos	Least Concern (Most of site) Least Concern (elements present)

¹ Refer to Map 2 to Map 8.

FEATURE ¹	DESCRIPTION	IMPLICATIONS/COMMENT
	Southern Afrotropical Forest Garden Route Shale Fynbos Cape Seashore Vegetation	Least Concern (surrounding area with elements present) Vulnerable (elements present) Least Concern (adjacent area)
Regional Planning: Sub-Tropical Ecosystem Planning (STEP)	Gouritz Dune Thicket Tsitsikamma Plateau Fynbos Knysna Afromontane Forest	Vulnerable (Most of site) Vulnerable (elements present) Critically Endangered (surrounding area with elements present)
Regional Planning: Garden Route BSP (GRBSP)	Keurbooms Thicket-Forest Wilderness Forest-Thicket Fynbos?	No classification provided (Most of site)
Critically Endangered and Endangered Ecosystems (NBA 2018)	None	None
Vulnerable Ecosystems (NBA)	Garden Route Shale Fynbos?	Remnant elements of the unit present
Critical Biodiversity Areas (WC BSP)	CBA1 (Terrestrial)	Priority terrestrial CBA area – edge
Critical Biodiversity Areas (GR BSP)	CBA1 (Terrestrial)	Priority terrestrial CBA area -edge
Protected Areas (SAPAD)	None	No Protected areas are directly affected
Marine/Coastal areas or Estuaries	Site is situated within 100 m of high-water mark	Site is within 100m of high-water mark but will have no direct or indirect affect, other than residual risk should significant sewer or other waste spills occur.
Ecological Support Areas	None	N/A
Within 32 m of Watercourse	Site is not within 32 m of any watercourse	N/A
Within 100 m of River	Site is not within 100 m of any watercourse	N/A
Within 500 m of Wetland	No natural wetlands present	N/A
Surrounding Land Uses	Urban (coastal village), forest, coastline and beaches (recreational use)	
Critical Habitat for listed endemic/ protected species	The endemic and other protected species that are present are generally having widespread distributions and the activity is unlikely to pose any significant threat to any species or population. No specific populations of threatened species were identified within the footprint and the affected footprint is largely disturbed or comprised of secondary vegetation. There are a number of red listed species in the surrounding vegetation units and area that are known to have limited distributions, however none were recorded on the footprint (refer to Sections 3.1.8 & 3.2.1). These are assessed in terms of	

DEA Screening Tool

The DEA screening tool identifies Very High Terrestrial Biodiversity (Critical Biodiversity Area & Vulnerable Ecosystem), High & Medium Animal Species and High & Medium Plant Species Sensitivities. Figure 6 to Figure 8 below are extracted directly from the Screening Tool report. The content of the report will address the findings of the screening tool as well as any site-specific sensitivities that may not have been identified the screening tool. With reference to Figure 6, Terrestrial CBA features are assessed in Section 3.2, Figure 7, Flora species and Figure 8, Fauna species are addressed in Section 3.1.8. The site assessment has physically screen for physical presence of these and other possible species not identified in the screening tool.

Terrestrial Biodiversity Theme (Very High Sensitivity)

Sensitivity	Feature(s)
Very High	Vulnerable ecosystem, Critical Biodiversity Area 1

Plant Species Theme (High & Medium Sensitivity)

Sensitivity	Feature(s)
High	<i>Ruschia duthiae</i>
Medium	<i>Ruschia duthiae</i> , <i>Erica glandulosa</i> subsp. <i>Fourcadei</i> , <i>Erica glumiflora</i> , <i>Pterygodium cleistogamum</i> , <i>Acmadenia alternifolia</i> , <i>Muraltia knysnaensis</i> , <i>Leucospermum glabrum</i> , <i>Lampranthus pauciflorus</i> , Sensitive species 287, Sensitive species 273,

Animal Species Theme (High Sensitivity)

Sensitivity	Feature(s)
High	<i>Circus maurus</i> (bird)
Medium	<i>Tetradactylus fitzsimonsi</i> (reptile), <i>Afrixalus knysnae</i> (amphibian), <i>-Aloeides thyra orientis</i> & <i>Aloeides pallida juno</i> (insects), Sensitive species 1, Sensitive species 6

Vegetation of Southern Africa

The vegetation on site is classified (Table 1, Map 2) as Goukamma Dune Thicket (Mucina & Rutherford, 2006, as amended) with found in the surrounding area (Least Threatened, NBA, 2019). A general description of the vegetation units is provided in the section below (as per Mucina & Rutherford, 2006, as amended) as a reference point for the baseline vegetation composition.

The vegetation is generally a thicket vegetation with forest pockets and a precursor woody fynbos. Within the site, the predominant vegetation is the Dune Thicket, becoming forest and with a patch of moribund fynbos along the southern edge and at the base of the slope (historical dune slack, which has been cut off from the coast by a road). Dominant species (typical of the dune thicket) include *Pterocelastrus tricuspidatus*, *Schotia afra*, *Sideroxylon inerme*, *Tarchonanthus littoralis*, *Azima tetraacantha*, *Carissa bispinosa*, *Mystroxydon aethiopicum*, *Cassine peragua*, *Euclea racemosa*, *Grewia occidentalis*, *Gymnosporia capitata*, *Maytenus procumbens*, *Mystroxydon aethiopicum*, *Olea exasperata*, *Passerina rigida*, *Putterlickia pyracantha*, *Scutia myrtina* and various *Searsia* (*Rhus*) spp.

The outcome of the most recent National Biodiversity Assessment (2018) indicate that none of the affected vegetation types are currently under threat (Map 2). The affected vegetation unit has a Least Threatened Conservation Status (Table 1).

- Vegetation assessed on site is generally characteristic of the vegetation units.
- The vegetation unit is not currently under imminent threat, not having an elevated conservation status.
- Several South Africa and Eastern Cape endemic species are recorded from the vegetation units, some have localised distributions and others are widespread. Refer to Sections 3.1.8 and 9.3 for further assessment of species, although no major conflicts were noted with the intended land use change.
- Vegetation units are generally well represented regionally, and none are under any imminent threats that could pose a risk to the proposed development.
- No vegetation units present have an elevated conservation status.

Sub-Tropical Ecosystem Planning (STEP)

STEP (Map 3) identifies Gouritz Dune Thicket as being the dominant local vegetation units. At the time of the STEP classification (2002), it was deemed to be Vulnerable. The STEP classification aligns closely with the National Vegetation Map classification (as above), as these specific units were derived from STEP. In addition, surrounding vegetation includes Tsitsikamma Plateau Fynbos and Knysna Afromontane Forest. Elements of these units may also be present, being in proximity and vegetation tends to have transitional elements.

Western Cape Biodiversity Spatial Plan

The Western Cape is endowed with world-renowned biodiversity and natural resources. Together with this unparalleled endowment comes international responsibilities as well as significant opportunities for our people and the biodiversity economy. The Western Cape Biodiversity Spatial Plan (WC BSP, 2017) represents the “state of the art” provincial systematic biodiversity planning product. It represents the priority biodiversity areas and ecological infrastructure that need to be secured in the long-term in order that we, together with CapeNature, fulfil our core provincial mandate for biodiversity management.

The CBA map (Map 6) indicates areas of land as well as aquatic features which must to be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. Land in this category is referred to as a Critical Biodiversity Area. Land use guidelines, as per WC BSP, recommend the following:

- Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.
- Maintain in a natural or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.

Implications:

- The site falls within a designated WC BSP designated Critical Biodiversity Area, on the eastern extremity of a band that corresponds to an extensive band of forest-thicket to the west of the site situated on steep, but undevelopable slopes.
- *Refer to implications outlined in Table 4.*
- Fragmentation of CBA, as a result of the development will be limited to the footprint, and generally within areas that already have disturbance, relating to the proposed dwellings and infrastructure requirements. **Refer to Map 10 and Section 3.2.**
- The activities fall outside of the recommended land use parameters for the category. Dwellings are generally not acceptable within CBA 1 areas within the recommended land-use guidelines.
- Impacts to intact CBA will however be minimal with majority of impact occurring within previously disturbed areas of the site.
- A large portion of the Erf to the west, outside of the potential development footprints are likely to never be developed due to slope constraints and vegetation in these areas is intact and natural.

Garden Route BSP

The Garden Route BSP (GRBSP, 2010) identified the vegetation as being Keurbooms Thicket-Forest with Wilderness Forest-Thicket. The Garden Route BSP further indicates the site as being on the edge of designated Critical Biodiversity Area.

Implications:

- The vegetation on site falls within the broad description of the above, dominant and common tree species including *Tarchonanthus camphoratus*, *Azima tetracantha*, *Gymnosporia buxifolia*, *Scutia myrtina* and *Sideroxylon inerme*, with occasional, generally small *Celtis africana*, *Ekebergia*

capensis and *Olea europaea* spp. *africana* trees also noted. The climber *Rhoicissus tomentosa* as well as the succulents *Aloe arborescens* and *Aloe pluridens* were also noted in more open areas.

- It is noted and confirmed that this habitat is intermediate in structure and the species present are from both the typical Coastal Forest and the Dune Thicket vegetation. The species however mix to such an extent that it is impossible to separate them into two distinct units.
- Larger trees, typical of the surrounding forest, such as *Afrocarpus falcatus* and *Calodendrum africana* were noted to be absent, suggesting that it is structurally and floristically more inclined towards dune thicket than Coastal Forest. The surrounding steeper slopes appear to have more typical coastal forest, which is generally intact, being on slopes too steep to be suitable for development.
- The Knysna Woodpecker (*Campethera notata*), although not confirmed may be a transient visitor.
- Evidence of slip faces as described above were noted in the wider area and suggest that the slopes within the site should be avoided or not blanket cleared of vegetation.
- The site is deemed to be situated on the edge of designated Critical Biodiversity Area by the GRBSP.

Protected Areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa (Map 4 and Map 6). A large number (42) of land-based protected areas (including private nature reserves), as well as a marine based protected environment are situated within 50 km of the site, but all are outside of the immediate study area. The protected areas in close proximity (under 5 km) are indicated in Table 3 and below.

NAME	NSBA CATEGORY	SIZE (HA)	DISTANCE
Annex Arch Rock Private Nature Reserve	Nature Reserve	53 Ha	0.8 km E
Garden Route National Park	National Park	126 106 Ha	1.4 km E
The Gums Private Nature Reserve	Nature Reserve	62 Ha	1.5 km NW
Brackenburn Private Nature Reserve	Nature Reserve	91 Ha	2.0 km NE
Kiaruna Private Nature Reserve	Nature Reserve	66 Ha	3.0 km N
Forest Hall Private Nature Reserve	Nature Reserve	49 Ha	3.2 km E

This project is not located within any legally protected conservation area. No RAMSAR nor Marine Protected Areas are directly affected, Tsitsikama National Park and Marine Protected Area is situated to the east. The activity will have no direct, indirect, or cumulative impact on any protected environment, however, the site may overlap with the foraging habitats of bird and mammal species from surrounding protected areas. The significant number of protected areas and a nature reserves in the vicinity suggest that the surrounding habitat is potentially well-protected.

Strategic Water Source Areas

This site is located outside of any Strategic Water Source area. There will be no downstream impacts to any critical water supply to downstream economies and urban centres.

Freshwater Ecosystem Priority Areas

This site is located outside of any Freshwater Ecosystem Priority Areas (being along the coast and not within the catchment of any rivers), hence there will be no downstream impacts to any Freshwater Ecosystem Priority Areas.

Regional Hotspots and Centres of Endemism

The site is situated within the Cape Floristic Region. The location of the proposed activity within the centre of Endemism would encourage the screening for possible endemic species, which has been undertaken and provided in Section 3.1.8.

Implications:

- Several endemic species could possibly occur within the general area, including the site, none of which have been found within the proposed site footprint. A residual risk will be present, although all reasonable attempts have been made to locate any such species.
- Due to the nature of the footprint being predominantly within already disturbed areas as well as the slightly disturbed nature of the affected area, the risk is deemed to be moderate and acceptable, since the site falls within a village area and is suited to development of dwellings.
- The site can be developed without having significant repercussions i.t.o ecological integrity and ecological processes within the wider area.
- Erven in surrounding areas have been developed, while still maintain strong elements of the natural habitat, which can be considered to be a feature of Keurboomstrand and other coastal villages in the vicinity having similar vegetation.

Key Biodiversity Areas

Important Bird Areas

The closest IBA's include Tsitsikamma National Park, located 11 km to the east. Species that are within the IBA may be transient to the site, as foraging and nesting habitat, however, they are unlikely to be affected other than minor displacement from a very small area and the surrounding habitat will remain intact. The activities are thus unlikely to have any impact on surrounding IBA's or ecological processes associated with them, other than potential minor displacement from the specific footprint.

Vegetation and Ecological Processes and Corridors

Critical Biodiversity Areas and Ecosystem Processes

The site falls within a designated Critical Biodiversity Area. Additional fragmentation of Dune Thicket minimal, and the key corridors to the west will not be significantly affected, as the site is situated directly adjacent to existing developed erven to the east and north.

Vegetation and Ecological Processes and Corridors

Site Locality

The site is situated in Keurboomstrand, a coastal village comprised of several clusters, generally interspaced with undeveloped areas. The site is situated on the western side of such a cluster and is bound on all sides by developed erven or infrastructure. Erven in the area generally have restricted footprints that are tucked away within a natural forest-thicket matrix that is retained.

Topography and Drainage

The site is situated on a south facing coastal palaeodune, running in an east-west direction. The site is located on a small bench approximately 100 m inland from the high-water mark.

Terrestrial Landscape Features (Habitat)

Overview

The project area is generally characterised by undulating to steep south facing palaeodunes, deeply incised by drainage lines and rivers where slopes are generally vegetated in solid dune thicket with dune forest in places and occasional patches having coastal fynbos.

Within the site, the predominant vegetation is the Dune Thicket, becoming forest and with a patch of moribund pre-cursor fynbos along the southern edge and at the base of the slope (historical dune slack, which has been cut off from the coast by a road). Dominant species (typical of the dune thicket) include *Pterocelastrus tricuspidatus*, *Schotia afra*, *Sideroxylon inerme*, *Tarchonanthus littoralis*, *Azima tetracantha*, *Carissa bispinosa*, *Myroxylon aethiopicum*, *Cassine peragua*, *Euclea racemosa*, *Grewia occidentalis*, *Gymnosporia capitata*, *Maytenus procumbens*, *Myroxylon aethiopicum*, *Olea exasperata*, *Passerina rigida*, *Putterlickia pyracantha*, *Scutia myrtina* and various *Searsia (Rhus) spp.*

It is clear from the Site Assessment, that a portion of the site does currently host the Dune Thicket, as well as fynbos and forest elements, which are deemed to be successional pre-cursors (fynbos) and successors (forest) to the Dune Thicket. Dune Thicket may not necessarily become forest and fynbos may not necessarily develop into Dune Thicket.

A summary of Terrestrial Landscape Features and indicators is provided in Table 5. The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the localised impact associated with any footprint would in general be of low to very low significance with implementation of a number of mitigation, as well as some possible minor alignment adjustments.

Site Vegetation

Based on literature and site observations, the vegetation is a mosaic of transitional vegetation, where a coastal fynbos develops and in the absence of fire or disturbance can develop into a dune thicket vegetation. Over long time periods and with the absence of disturbances and fire, as well as where microclimate and soil conditions allow, this can become forest.

The vegetation present on site can be categorised as follows (Figure 12 to Figure 11):

- Natural vegetation (Scrub Forest/Thicket) – The predominant vegetation with dominant species largely being trees (mostly 2 – 5 meters in height) with poorly developed ground cover except where opening in the canopy (disturbed patches) allow sunlight penetrating.
- Natural vegetation (Dune Forest) – Forest and forest like vegetation can occur where thicket reaches a climax stage. This climax state is only prevalent where specific conditions allow.
- Natural Vegetation (Fynbos) – a fynbos vegetation, usually a precursor to the dune-thicket.

Present Ecological State

Table 5 provides a comprehensive description and assessment of biodiversity and ecological indicators for the site. In summary, the following general observations can be noted regarding the site:

- Vegetation on site can be considered to range from semi intact (with pockets of still intact – dune-thicket) through varying degrees of degraded where there has been disturbance, most likely due to historical bush clearing to access the site. Evidence is present (certain area) of historical intent to prepare a portion of the site for construction of a small dwelling.
- Alien invasion is generally low.
- To the immediate west of the site is a large steep area having generally natural and undisturbed dune thicket with forest elements.
- To the east is predominantly urban development interspersed with remnant pockets and elements of natural vegetation that has been retained.

Summary of Key Biodiversity and Ecological Indicators:

ASPECT	DESCRIPTION
LANDSCAPE AND COMMUNITY DESCRIPTION	
Aspect, Slope, Topography	South facing coastal palaeodune, running in an east-west direction. The site is located on a small bench approximately 100 m plus inland from the high-water mark
Substrate	Consolidated and unconsolidated palaeodunes

ASPECT	DESCRIPTION
Vegetation units	Dune Thicket, as well as fynbos and forest elements, which are deemed to be successional pre-cursors (fynbos) and successors (forest) to the Dune Thicket. Dune Thicket may not necessarily become forest and fynbos may not necessarily develop into Dune Thicket.
Total Ground Cover (%)	60 – 80 %
Tree Height (m) – Median	2-8 m in dune thicket and forest 0.50 to 1.5 m in fynbos & disturbed areas
Tree Cover (%) Aerial	70 – 90 % in dune thicket < 10 % in disturbed and fynbos areas
Shrub Cover (%)	< 20 in dune thicket
Herbaceous Cover (%)	> 80 % in fynbos and disturbed areas
Grass Cover (%)	Grass cover is low in all areas, < than 5 %
Bare soil/rock (%)	Usually less than 5 %, except on rock face adjacent to road cutting to the south of the site
TERRESTRIAL LANDSCAPE FEATURES	
Forest	No distinct Forest is present within the affected footprint, forest elements can be found within thicket in protected niches.
Thicket	Predominant vegetation dominated by large to medium sized trees.
Grassland	None
Fynbos/Grassy Fynbos	Fynbos elements are present in a small patch on the south side of the development footprint. These are considered to be an element of the Dune Thicket, most likely a precursor.
Riparian	None
Wetland	None
River/Aquatic	None
Dunes/Coastal	The sit is situated on vegetated palaeodunes. No typical pioneer coastal vegetation is affected.
Rocky Outcrop Habitat	No significant rocky outcrop habitat was recorded within the proposed footprint. A small cutting on the southern boundary, due to road construction is present but is outside of the development footprint. This cutting creates artificial niche for certain species.
Fauna Nesting Sites	None present, trees may be utilised by various nesting bird, however none were noted.
Fauna Feeding Grounds	The thicket habitat may provide feeding habitat for a range of faunal species, including small mammals, which are likely to be transient to the site.
Ecotones	Ecotones are not well developed on the site.
Ecological Corridors	The Dune thicket does provide an ecological corridor. Development of the footprint is unlikely to significantly disrupt this corridor, other than minor displacement during construction.
Evolutionary Processes	None of significance within terrestrial environment.
Transformed (lands)	None
Transformed (other)	Minimal, surrounding area had been developed as an urban settlement with associated disruptions.
Degraded (modified)	Degradation is present in the form of some historical vegetation clearing of small patches and pathways within the site.
Secondary vegetation	Minimal, where historical clearing has occurred, secondary vegetation is present, in small cleared patches and pathways. Vegetation on the cutting outcrop is likely to be secondary.
DISTURBANCES, CURRENT LAND USES AND SOURCES OF DEGRADATION	

ASPECT	DESCRIPTION
Human disturbances	Human disturbance due to urban development are present in surrounding urbanised landscape
Habitat fragmentation	Fragmentation is present at the east, north and south of the site, as a result of urbanisation but mostly absent to the west side.
Invasive Alien Plants	Alien invasives are minimal on the site other than the occasional weedy species and a few small clumps of Rooikrantz.
Other degradation (Aquatic)	None
Remaining intact habitat:	Large areas of intact habitat are present in the surrounding landscape, in particular along the south-facing slopes to the west of the site within the affected erf.
Grazing (livestock)	None.
Hunting	None
Conservation (passive)	Intact corridors fulfil a passive conservation role to some extent.
Recreational (sport)	Recreational use of the wider area and river is present, mostly associated with beaches and urbanised landscape.
Other	None
PATTERNS OF BIODIVERSITY	
Flora	Flora diversity is moderate to high for the vegetation units, specifically due to the varied landscape, having fynbos, forest and coastal elements in the wider landscape.
Fauna	Fauna diversity is likely moderate, birds are likely to be most diverse resulting as well as mammal and likely a few amphibian species common to dune thicket and associated microclimate.
Species of Special Concern	Numerous species are potentially found in the region and vegetation units, none of significance were recorded on the site, other than some generally widespread PNCO species.
ECOLOGICAL PROCESSES	
Gene dispersal barriers	Roads, urban development, fences, habitat fragmentation.
Gene dispersal corridors	Dune Thicket and forest corridors as well as fynbos patches.
Aeolian (dune) processes	No aeolian (sand) dunes are present
Climatic gradients	No climatic gradients are present
Rivers and Drainage Lines (Riparian Vegetation)	None
Refuges (outcrops/islands)	Rocky and other refuges are not prevalent within the site, other than the small artificial outcrop cutting adjacent to the road.
Fire	Fire is important within the fynbos patches but unlikely to be prevalent within dune thicket and generally absent to intact forest.
Ecotones/Tension zones	Ecotones are limited because of the lack of complexity. Some is present between fynbos patches and thicket and where there has been historical disturbance and clearing of dune thicket.
Erosion	Erosion is absent. Slumping is noted to occur on dune areas on steep slopes in surrounding habitat. Such dune slopes should not be disturbed, without appropriate stabilisation, which would incur additional disturbances.
ECOLOGICAL SERVICES	
Carbon storage	Dune Thicket and forest is considered a moderate to high carbon accumulator. Dune Thicket and thicket-forest in the surrounding is well developed likely to be high.

ASPECT	DESCRIPTION
Provisioning Services	<p><u>Livestock grazing</u>: None.</p> <p><u>Timber (Building materials & fuelwood)</u>: Dune Thicket is tree dominated having several suitable timber species. Usage in the area is minimal, although where bush clearing has occurred, it is likely that some is used for building and also for fuelwood.</p> <p><u>Food</u>: Low. None known</p> <p><u>Fibre</u>: None in area</p> <p><u>Medicinal plants</u>: Various species have medicinal properties and may be harvested informally in the area.</p>
Other (ornamentals)	Few local species are considered to have ornamental value. Some species have been retained or planted at a later stage in surrounding urban gardens.
CONSERVATION IMPORTANCE	
Current Distribution (extent)	Vegetation units have a widespread regional distribution covering an extensive area outside of the site footprint and is regarded as being well-protected (NBA, 2018)
Red Listed Species and other Species of Special Concern	Several species are known from the surrounding area and vegetation units. None were recorded during the site visit.
Habitat for SCC (Species of Conservation Concern)	Several species of special concern are known from specific areas in proximity to the site, as well as the vegetation units that are present. The site does potentially provide habitat for some of these species, although none were recorded during the site survey. The small patch of fynbos on the southern site of the site provides the most likely habitat for such SCC and it is recommended to not be developed.
Relative Conservation importance	The general area has been identified as a priority area for conservation (i.e. designated as CBA).
OTHER SENSITIVITIES	
Conservation importance	Intact vegetation along ecological corridors is of importance, as a connector
Topography	Slopes vegetated with forest and thicket are unlikely to be susceptible to further development other than a few strategic footprints, as can be seen in the surrounding landscape. Large tracts of dune thicket are thus unlikely to be developed in the future.
Wetlands	None
Rehabilitation potential	Dune Thicket and Forest has a low rehabilitation potential, dune fynbos is high as it is a pioneer vegetation and considered to be a pre-cursor of the dune thicket.
Community structure	Community structure is generally moderate to high, with a range of growth forms including trees, shrubs, and lianas where disturbance allows. Within climax forest, this structure tends to decrease in complexity.

Flora

Protected Trees present include the Milkwood Tree (*Sideroxylon inerme*). Any removal of these trees will require a permit in terms of the National Forests Act. Several flora species protected in terms of the Provincial Nature Conservation Ordinance (PNCO) are also present (Table 6) and will require permits before removal. Despite these species being generally widespread and not threatened, they are protected in terms of regional legislation and any impacts to these species requires a permit from the relevant authorities before commencement. A flora search and rescue are also recommended. The implication is that a comprehensive list of species occurring within the footprint of the proposed

infrastructure is required and a permit application submitted for any of those listed as protected. A walk-through survey is therefore recommended once the final layout of the footprint as well as any temporary laydown areas have been finalised in order to obtain the required permits for destruction of these species.

A number of endemic and range restricted species are known from the general surrounding area and there is a residual likelihood that they could be present, but cannot be discounted without comprehensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the highly localised nature of the impact, with vegetation clearing only required for the development footprint, the risk of a species suffering any significant loss is low. There is always a residual risk to species for any activity.

Fauna

The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.

Mammals

The smaller mammal species that could potentially be found on the project site, are highly mobile species that would move away from disturbance and with extensive habitat available in the immediate surrounds would unlikely be negatively affected by the development. In addition, many larger mammal species are likely to have already been displaced due to existing urban activities. No species of concern have been highlighted during the screening process and none were recorded on site.

Small mammal species such as Bushbuck, are known from the general area, but are generally mobile and likely to be transient to the area. The minimal disturbance is unlikely to cause any significant disruptions other than minor displacement during construction. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Furthermore, such species that are present are likely to already be adapted to some extent to the unraised landscape and the additional development will have no significant impact.

Avifauna and Bats

Bird species identified by the screening tool, including *Circus maurus* (Black Harrier). This species may frequent the general area as foraging habitat, however it is highly unlikely that the small and localised footprint will have any impact on this species. No roosting or nesting sites were observed on or nearby the site.

Passerines (perching species) are more likely to be impacted upon through habitat destruction, while ground nesting birds are more likely to be impacted through disturbance. While species may utilise the area for breeding or foraging, they are unlikely to be significantly affected, as those species present are already living within an agricultural area. Larger species including raptors are unlikely to be significantly affected other than minor disturbance and displacement, again any species present would already be co-existing within an urbanised landscape.

Any disturbance or displacement associated with increased activity or habitat destruction is unlikely to pose a significant negative impact on birds, and when there is a specific activity, it would be temporary in nature, and within an already somewhat urbanised.

Reptiles

Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. Due to the limited loss of intact habitat, it is unlikely that there will be any significant impact to any

population or species. *Tetradactylus fitzsimonsi* (Fitzsimons' Long-tailed Seps) is known from the general area and suitable habitat is present. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway, and such a search and rescue may only find one or two specimens for such a limited area. A reptile handler should preferably be available should any specific species be found, that cannot be moved easily by hand. Due to the localised and small size of the footprint the significance of any impact to any population of this species is minimal.

Amphibians

Afrixalus knysna (Knysna Spiny Reed Frog) is known to inhabit Coastal mosaic of Mountain Fynbos and Afromontane Forest, hence suitable habitat is present. An amphibian search and rescue are unlikely to be required before commencement, should any wetland areas be disturbed. Due to the localised and small size of the footprint the significance of any impact to any population of this species is minimal.

No other amphibians of concern are known to be present or potentially present. No wetland habitat is present or will be affected, which precludes species from these habitats being present, comprising the majority of other reptiles species known from the general area.

Invertebrates

Invertebrate species noted to have an elevated conservation status, including *Aloeides pallida juno*, *Aloeides thyra orientis*, Sensitive species and Sensitive species 6 are known from the surrounding area and from similar habitat. There is a moderate to low likelihood that representatives of these species could be present, however their preferred habitat is predominantly fynbos habitat and the proposed development must be outside of such fynbos areas. The recommendations contained in this report, are that these fynbos patches are not developed, in order to retain potential habitat, even if they are not present. Due to the localised and small size of the footprint, as well as the recommendation to retain the fynbos patches, the significance of any impact to any population of these species is very low. The likelihood that there are Baboon Spiders and Scorpions, which are listed as Threatened or Protected Species (ToPS), present within the affected area and ToPS permits will be required.

Species of Special Concern occurring in the region

A number of endemic and range restricted species are known from the general surrounding area and there is a residual likelihood that they could be present, and cannot be discounted without comprehensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, with vegetation clearing only required for a small development footprint within a larger site, the risk of a species suffering any significant loss is low. There is however always a residual risk to species for any activity, which may not be recorded during site assessment. All reasonable measures are implemented to find such species, however it is not feasible to check every square meter of such a site.

Red Listed, Endemic and Protected Flora

The site falls within the general distribution range of several endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable or Rare. Some of these species are only known from a single or a few populations. As per Table 6, no Endangered or Critically Endangered or screening tool listed flora species were confirmed to be present nor are known to be present in the affected area. A number of endemic species were recorded and are listed below, however all of these are confirmed to have a wider distribution range and are not deemed to be at risk. Species (Table 6) were flagged from various database sources as occurring in the region as having an elevated status, and possibly present in the area, vegetation type or are associated with

features that are present (such as host plant species). All were cross checked for distribution overlay and were actively screened for presence/absence on site. Other species may be endemic, but distribution range has been checked and are generally widespread. Neither sensitive species 273 nor sensitive species 287 were found to be present within the site during the site assessment.

Flora Species of Special Concern:

SCIENTIFIC NAME ²	FAMILY	STATUS ³	COMMENT/PRESENCE
<i>Acmadenia alternifolia</i>	Rutaceae	Vu, Medium (ST), End	NOT RECORDED Knysna to Plettenberg Bay, possibly extending as far as Nature's Valley. South Outeniqua Sandstone Fynbos, Garden Route Shale Fynbos, Goukamma Dune Thicket. Coastal headlands and steep slopes, exposed positions on dry coastal cliffs.
<i>Acrolophia lunata</i>	Orchidaceae	EN, End, PNCO	NOT PRESENT
<i>Afrocarpus falcatus</i>		NFA	NOT PRESENT
<i>Agathosma pulchella</i>	Rutaceae	VU, End	Not recorded
<i>Aspalathus asparagoides</i>	Fabaceae	LC, End	Not recorded
<i>Aspalathus hystrix</i>	Fabaceae	LC, End	Not recorded
<i>Aspalathus spinosa</i>	Fabaceae	LC, End	Not recorded
<i>Chaenostoma integrifolium</i>	Scrophulariaceae	LC, End	Not recorded
<i>Cliffortia schlechteri</i>	Rosaceae	NT	Not recorded
<i>Cotyledon orbiculata</i>		End	Not recorded
<i>Crassula nudicaulis</i>		End	Not recorded
<i>Cussonia thyrsiflora</i>		End	Not recorded
<i>Cynanchum africanum</i>	Apocynaceae	LC, End	Not recorded
<i>Delosperma brevipetalum</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Delosperma litorale</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Delosperma pageanum</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Dioscorea mundii</i>	Dioscoreaceae	NT	Not recorded
<i>Disa hallackii</i>	Orchidaceae	EN, PNCO	Not recorded, May be present in surrounding landscape
<i>Ehrharta bulbosa</i>	Poaceae	LC, End	Not recorded
<i>Ehrharta ramosa</i>	Poaceae	LC, End	Not recorded
<i>Erica densifolia</i>	Ericaceae	LC, End, PNCO	PRESENT
<i>Erica glandulosa</i>	Ericaceae	VU, PNCO	Not recorded
<i>Erica glandulosa</i> subsp. <i>fourcadei</i>	Ericaceae	Vu, Medium (ST), End, PNCO	NOT RECORDED, noted in general area in particular slightly inland Mossel Bay (George) to Cape St Francis (Stormsriver). Groot Brak Dune Strandveld, Kouga Grassy Sandstone Fynbos, Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Southern Cape Dune Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Hartenbos Strandveld, Goukamma Dune Thicket. Coastal fynbos
<i>Erica glumiflora</i>	Ericaceae	Vu, Medium (ST), PNCO	NOT RECORDED EOO <6740 km ² , known from six locations. Although it is conserved in four nature reserves, these are all within the western portion of the range. In the eastern part of the range, coastal development and alien plant invasion are causing continuing declines to subpopulations. Wilderness to East London and extending inland around Grahamstown. South Eastern Coastal Thornveld, Groot

² Species indicated in green are listed in the [DEA screening tool](#), others are from various other database and literature sources that are [known from the general area](#).

³ IUCN - Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; PNCO – Provincial Nature Conservation Ordinance; NFA – National Forest Act; ToPS – Threatened or Protected Species.

SCIENTIFIC NAME ²	FAMILY	STATUS ³	COMMENT/PRESENCE
			Brak Dune Strandveld, Algoa Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Suurberg Quartzite Fynbos, Southern Cape Dune Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Nanaga Savanna Thicket, Kasouga Dune Thicket, Goukamma Dune Thicket. Sandy coastal flats and dunes and low coastal hills.
<i>Erica nevillei</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Erica newdigateae</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Erica onusta</i>	Ericaceae	CR, End, PNCO	Not recorded
<i>Erica sparsa</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Eulophia platypetala</i>	Orchidaceae	VU, PNCO	Not recorded
<i>Euphorbia silenifolia</i>	Euphorbiaceae	LC, End	South Africa (Western and Eastern Cape)
<i>Felicia aethiopica</i>	Asteraceae	LC, End	Not recorded
<i>Ficinia fascicularis</i>	Cyperaceae	LC, End	Not recorded
<i>Geissorhiza bracteata</i>	Iridaceae	LC, PNCO	Not recorded
<i>Gladiolus gueinzii</i>	Iridaceae	LC, PNCO	Not recorded
<i>Gymnosporia capitata</i>		End	PRESENT
<i>Helichrysum teretifolium</i>	Asteraceae	LC, End	Not recorded
<i>Indigofera erecta</i>		End	Not recorded
<i>Indigofera erecta</i>		End	Not recorded
<i>Indigofera hispida</i>	Fabaceae	VU, End	Not recorded
<i>Isoglossa woodii</i>	Acanthaceae	LC, End	South Africa (Eastern Cape, KwaZulu-Natal)
<i>Lachenalia youngii</i>	Hyacinthaceae	LC, PNCO	South Africa (Western and Eastern Cape), Not recorded
<i>Lampranthus pauciflorus</i>	Aizoaceae	En, Medium (ST)	NOT RECORDED EOO 1270 km ² , four known locations remain after most of this species' habitat has been transformed for coastal development. Habitat loss continues, especially around Plettenberg Bay, Mossel Bay and Knysna. Cape Infanta to Plettenberg Bay. Groot Brak Dune Strandveld, Blombos Strandveld, Overberg Dune Strandveld, Potberg Sandstone Fynbos, Garden Route Granite Fynbos, Albertinia Sand Fynbos, Knysna Sand Fynbos, Hartenbos Strandveld, Goukamma Dune Thicket Rocky coastal slopes and clayish hills.
<i>Leucadendron eucalyptifolium</i>	Proteaceae	LC, End, PNCO	South Africa (Western Cape), Not recorded
<i>Leucospermum cuneiforme</i>	Proteaceae	LC, End, PNCO	South Africa (Western and Eastern Cape), Not recorded
<i>Leucospermum glabrum</i>	Proteaceae	EN, End, PNCO	South Africa (Western Cape), Not recorded
<i>Leucospermum glabrum</i>	Proteaceae	En, Medium (ST), PNCO	NOT RECORDED EOO 1005 km ² , AOO 54 km ² , 14 severely fragmented subpopulations continue to decline due to alien plant invasion, afforestation and fire break maintenance. Fire-related population fluctuations occur in small subpopulations, only three subpopulations have more than 100 plants. Total population is less than 1000 mature individuals. Dormant subpopulations are easily missed in vegetation surveys and EIAs. Outeniqua and Tsitsikamma Mountains. Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Garden Route Shale Fynbos, Garden Route Granite Fynbos. Wet south slopes in sandstone fynbos. Mature individuals are killed by fires, and only seeds survive. Seeds are released after ripening, and dispersed by ants to their underground nests, where they are protected from predation and fire. It is pollinated by birds. George inland and Kurland inland
<i>Lichtensteinia interrupta</i>	Apiaceae	LC, End	Not recorded
<i>Limonium scabrum</i>	Plumbaginaceae	NE	Not recorded

SCIENTIFIC NAME ²	FAMILY	STATUS ³	COMMENT/PRESENCE
<i>Linum gracile</i>	Linaceae	LC, End	Not recorded
<i>Lobelia neglecta</i>	Lobeliaceae	LC, End	South Africa (Western and Eastern Cape), Not recorded
<i>Metalasia muricata</i>		LC, End	PRESENT
<i>Mohria caffrorum</i>	Anemiaceae	LC, End	Not recorded
<i>Moraea bellendenii</i>	Iridaceae	LC, PNCO	Not recorded
<i>Morella cordifolia</i>		End	Not recorded
<i>Muraltia knysnaensis</i>	Polygalaceae	EN, End	
<i>Muraltia knysnaensis</i>	Polygalaceae	En, Medium (ST)	NOT RECORDED EOO 2046 km ² , between three and eight severely fragmented subpopulations remain on remnants of natural habitat after most of this species' habitat has been transformed for crop cultivation, forestry plantations and coastal development around Knysna and Plettenberg Bay. It continues to decline due to ongoing habitat degradation as a result of fire exclusion on small fragments. Coastal lowlands between Mossel Bay and the Keurbooms River. Fynbos, on dry flats and hills. ALBERTINIA TO PLETT
<i>Muraltia knysnaensis</i>		End	Not recorded
<i>Otholobium fruticans</i>	Fabaceae	LC, End	Not recorded
<i>Otholobium virgatum</i>	Fabaceae	LC, End	Not recorded
<i>Othonna parviflora</i>	Asteraceae	LC, End	Not recorded
<i>Oxalis duriuscula</i>	Oxalidaceae	NT, End	Not recorded
<i>Passerina rigida</i>		End	PRESENT
<i>Pentameris thuarii</i>	Poaceae	LC, End	Not recorded
<i>Phalaris arundinacea</i>	Poaceae	NE, Not Ind; Nat	Europe, Asia, northern Africa and North America, Not recorded
<i>Podalyria myrtillifolia</i>	Fabaceae	LC, End	South Africa (Western and Eastern Cape), Not recorded
<i>Polygala microlopha</i>	Polygalaceae	LC, End	Not recorded
<i>Polygala peduncularis</i>	Polygalaceae	LC, End	Not recorded
<i>Polygala triquetra</i>	Polygalaceae	LC, End	Not recorded
<i>Polypogon viridis</i>	Poaceae	NE, Not Ind; Nat	Not recorded
<i>Pronium serratum</i>	Thurniaceae	LC, End	Not recorded
<i>Psoralea laxa</i>	Fabaceae	LC, End	Not recorded
<i>Pterygodium cleistogamum</i>	Orchidaceae	Vu, Medium (ST), PNCO	NOT RECORDED Knysna to Grahamstown, George Knysna area NB. Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, North Outeniqua Sandstone Fynbos, Suurberg Quartzite Fynbos, Knysna Sand Fynbos. Fynbos, stony slopes in sandstone derived soils, from sea-level to 340 m.
<i>Pterygodium newdigateae</i>	Orchidaceae	CR, End, PNCO	Not recorded
<i>Putterlickia pyracantha</i>	Celastraceae	LC, End	PRESENT
<i>Robsonodendron maritimum</i>		End	Not recorded
<i>Ruschia duthiae</i>	Aizoaceae	Vu, End, Very High, High (ST)	NOT RECORDED A highly range restricted (EOO 191 km ²), but locally still fairly common species. It is known from fewer than 10 locations and continues to decline due to ongoing habitat loss and degradation., Sedgfield to Nature's Valley. Natures Valley, Knysna-Sedgfield, Tsitsikamma Sandstone Fynbos, Garden Route Shale Fynbos, Knysna Sand Fynbos. Gentle north-facing sandstone or shale slopes with grassy fynbos. coastal fynbos habitat. Fairly common around Sedgfield
<i>Satyrium stenopetalum</i>	Orchidaceae	LC, End, PNCO	Not recorded
<i>Searsia pterota</i>		End	PRESENT
<i>Sebaea stricta</i>	Gentianaceae	LC, End	Not recorded
<i>Selago burchellii</i>		End	Not recorded
<i>Selago glomerata</i>	Scrophulariaceae	LC, End	Not recorded
<i>Senecio elegans</i>	Asteraceae	LC, End	Not recorded

SCIENTIFIC NAME ²	FAMILY	STATUS ³	COMMENT/PRESENCE
<i>Senecio ilicifolius</i>	Asteraceae	LC, End	Not recorded
<i>Sensitive species 273</i>	Dioscoreaceae	Vu, Medium (ST)	NOT RECORDED George to Humansdorp. Tsitsikamma Sandstone Fynbos, Garden Route Shale Fynbos, Knysna Sand Fynbos. Damp sandstone slopes in coastal fynbos.
<i>Sensitive species 287</i>	Orchidaceae	En, Medium (ST) , PNCO	NOT RECORDED A coastal lowland species that has lost most historical locations to urban expansion and crop cultivation. Known from between eight and 11 remaining subpopulations, the total population is estimated to number fewer than 1000 mature individuals and no subpopulation has more than 150 individuals. Declining due to ongoing habitat loss and degradation as a result of coastal development, alien plant invasion, grazing and road verge clearing. Cape Flats to Port Elizabeth. Overberg Dune Strandveld, Agulhas Limestone Fynbos, Garden Route Granite Fynbos, Hangklip Sand Fynbos, Cape Flats Sand Fynbos, Atlantis Sand Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Hartenbos Strandveld, Goukamma Dune Thicket. Lowland sandy flats, stabilised dunes and coastal rock promontories.
<i>Stipa dregeana</i>	Poaceae	LC, End	Not recorded
<i>Strelitzia alba</i>	Strelitziaceae	LC, End	Not recorded
<i>Struthiola martiana</i>	Thymelaeaceae	LC, End	Not recorded
<i>Tetragonia fruticosa</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Tetragonia sarcophylla</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Thamnochortus glaber</i>	Restionaceae	LC, End	Not recorded
<i>Thamnochortus insignis</i>		End	Not recorded
<i>Thesium ericaefolium</i>	Santalaceae	LC, End	Not recorded
<i>Thesium frisea</i>	Santalaceae	DD, End	Not recorded
<i>Tribolium uniolae</i>	Poaceae	LC, End	Not recorded
<i>Ursinia heterodonta</i>	Asteraceae	LC, End	Not recorded

Red Listed and Protected Fauna

As per Table 7, a few Endangered or Critically Endangered, or Range Restricted fauna species could be present in the affected area, mostly in a transient manner. Dune Thicket is well represented in the surrounding area and in conjunction with the recommended avoidance of habitat having fynbos elements, limited size of the development footprint (mostly outside of fynbos habitat), no significant risk to these species is anticipated. While the site does also provide suitable habitat for *Afrixalus knysna* (Knysna Spiny Reed Frog), the limited footprint is unlikely to pose any significant risk, also being represented in the immediate surrounding area. Sensitive species 1 is unlikely to be present, the site being outside of its normal range. Sensitive species 6 may be present, as described above.

Fauna Species of Special Concern:

SCIENTIFIC NAME ⁴	COMMON NAME	FAMILY	STATUS ⁵	COMMENT/PRESENCE
MAMMALS				
<i>Aonyx capensis</i>	African Clawless Otter	Mustelidae	NT (2016)	May be present in surrounding landscape as a transient visitor
<i>Damaliscus pygargus pygargus</i>	Bontebok	Bovidae	Vu (2016)	Absent
<i>Leptailurus serval</i>	Serval	Felidae	NT (2016)	May be present in surrounding landscape as a transient visitor

⁴ Species indicated in green are listed in the [DEA screening tool](#), others are from various other database and literature sources that are [known from the general area](#).

⁵ PNCO - Provincial Nature Conservation Ordinance (1974); ToPS – Threatened or Protected Species

SCIENTIFIC NAME ⁴	COMMON NAME	FAMILY	STATUS ⁵	COMMENT/PRESENCE
<i>Loxodonta africana</i>	African Bush Elephant	Elephantidae	Vu A2a (2008)	Absent
<i>Panthera pardus</i>	Leopard	Felidae	Vu (2016)	May be present in surrounding landscape as a transient visitor
<i>Philantomba monticola</i>	Blue Duiker	Bovidae	Vu (2016)	May be present in surrounding landscape as a transient visitor
BIRDS⁶				
<i>Anthropoides paradiseus</i>	Blue Crane	Gruidae	Global: VU; BLSA: NT	May be present in surrounding landscape as a transient visitor, unlikely to be affected by scope of proposed development
<i>Buteo trizonatus</i>	Forest Buzzard	Accipitridae	NT D1 (IUCN, 2017)	
<i>Calidris ferruginea</i>	Curlew Sandpiper	Scolopacidae	Global: NT; BLSA: LC	
<i>Campethera notata</i>	Knysna Woodpecker	Picidae	Global: NT; BLSA: NT	
<i>Circus maurus</i>	Black Harrier		High (ST)	
<i>Falco concolor</i>	Sooty Falcon	Falconidae	Global: NT; BLSA: NA	
<i>Haematopus moquini</i>	African Black Oystercatcher	Haematopodidae	Global: NT; BLSA: NA	
<i>Numenius arquata</i>	Eurasian (Curlew) Curlew	Scolopacidae	Global: NT; BLSA: NT	
<i>Streptopelia turtur</i>	European Turtle-Dove	Columbidae	Global: VU; BLSA: NA	
REPTILES				
<i>Tetradactylus fitzsimonsi</i>	Fitzsimons' Long-tailed Seps	Gerrhosauridae	LC, Medium (SC)	May be present
AMPHIBIANS				
<i>Afrixalus knysna</i>	Knysna Spiny Reed Frog	Hyperoliidae	En B1ab (i,ii,iii,v) +2ab (i,ii,iii,v) (2016), Medium (ST)	May be present, suitable habitat, unconfirmed. Wilderness, George inland. Groenvlei (3422BB) in the west to Covie (3323DC) in the east and is confined to the coastal region by the Outeniqua and Tsitsikamma mountains. Coastal mosaic of Mountain Fynbos and Afromontane Forest.
INVERTEBRATES				
Lepidoptera (Butterflies)				
<i>Aloeides pallida juno</i>	Giant Copper	Lycaenidae	Medium (ST)	May be present, suitable habitat, unconfirmed. Fynbos. The larvae of subspecies <i>A. p. pallida</i> and <i>A. p. jonathani</i> feed on <i>Aspalathus</i> species. The larvae of subspecies <i>A. p. grandis</i> are fed

⁶ BLSA – Birdlife South Africa

SCIENTIFIC NAME ⁴	COMMON NAME	FAMILY	STATUS ⁵	COMMENT/PRESENCE
				by trophallaxis by <i>Lepisiota capensis</i> ants. They also feed on the eggs of these ants.
<i>Aloeides pallida littoralis</i>	Giant russet	Lycaenidae	Data Deficient (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Aloeides thyra orientis</i>	Red Copper	Lycaenidae	Medium (SC)	May be present, suitable habitat, unconfirmed. The larvae of subspecies <i>A. p. pallida</i> and <i>A. p. jonathani</i> feed on <i>Aspalathus</i> species. The larvae of subspecies <i>A. p. grandis</i> are fed by trophallaxis by <i>Lepisiota capensis</i> ants. They also feed on the eggs of these ants.
<i>Ceratogomphus triceraticus</i>	Cape Thorntail	Gomphidae	NT	May be present in surrounding landscape as a transient visitor
<i>Sensitive species 1</i>			Medium (SC)	Outside of known distribution range, unlikely to be present
<i>Sensitive species 6</i>			Medium (SC)	May be present, suitable habitat, unconfirmed. George/Oudshoorn area. and to the east of, the Eastern Heads, which may have been close to Trimen's original locality. Extending eastwards to the Pezula Golf Estate. Also found along the coast close to sea level from Coney Glen beach for about 1 km eastwards.
Odonata (Dragonflies)				
<i>Ceratogomphus triceraticus</i>	Cape Thorntail	Gomphidae	NT	Unlikely to be present
<i>Ecchlorolestes nylephtha</i>	Queen Malachite	Synlestidae	NT	Unlikely to be present
<i>Pseudagrion furcigerum</i>	Palmiet Sprite	Coenagrionidae	NT	Unlikely to be present
Scorpions				
<i>Opisthacanthus capensis</i>		Hormuridae	Lc , TOPS	May be present
<i>Opisthacanthus diremptus</i>		Hormuridae	Lc , TOPS	May be present
<i>Opisthophthalmus macer</i>		Scorpionidae	Lc , TOPS	May be present
<i>Parabuthus planicauda</i>		Buthidae	Lc , TOPS	May be present
<i>Uroplectes lineatus</i>		Buthidae	Lc , TOPS	May be present
Baboon Spiders				
<i>Harpactira dictator</i>		Theraphosidae	Lc , TOPS	May be present

Alien Invasive Species

A single exotic invasive (*Acacia cyclops*) was noted within the site, particularly in disturbed areas, generally on the margins of intact vegetation patches. Additional weed species that are known to proliferate in disturbed areas, include predominantly herbaceous species such as Scotch Thistle, Blackjack, Thorn Apple, Verbena, Mexican Poppy, and a range of other common weeds. A weed management programme, as part of the construction and operational phases will be required to manage the weeds and invasives within the orchards and as a responsible land manager to minimise the spread into surrounding areas. A list of species is included in Table 9.

Aquatic Habitat

No aquatic habitat was recorded within the site or immediate surrounds.

Terrestrial Vegetation Sensitivity Assessment

An overall vulnerability assessment, incorporating key vegetation and ecological indicators (summarised in Table 5) was undertaken and includes the following key criteria:

- relative levels of *intactness* i.t.o. overall loss of indigenous vegetation cover.
- presence, diversity, and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

Habitat Sensitivity

- Areas scoring an overall LOW sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestation. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. Low sensitivity areas include areas where infrastructure is present, including a reservoir on the north-eastern corner, various pipelines and other infrastructure passing through the site (these are not mapped) as well as the road and pathway on the southern side.
- Areas scoring an overall MODERATE sensitivity include the portions of natural vegetation that is mostly intact, but not having specific biodiversity related issues of significance or where proposed activity will have limited overall impact and recovery will be good with minimal intervention. Moderate sensitivity area includes the central part of the site, where development is proposed. sites were identified in the vicinity of the activity, including the grassland thicket area, where post-construction rehabilitation will most likely achieve pre construction conditions within 2 years (as defined by the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (Section 9.8) which stipulates ‘excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase’
- Areas scoring an overall HIGH sensitivity include those areas deemed to have a sensitivity, including being within intact Critical Biodiversity Areas and connectivity corridors, or are deemed critical habitat for fauna and/or flora species that are considered to be vulnerable. High sensitivity are includes a dune fynbos patch and rocky outcrop (road cutting) on the southern side of the site, which could provide potential habitat for a number of species of conservation concern. Only sewer infrastructure will be sited within this area and will be negligible.
- Areas scoring an overall VERY HIGH sensitivity (No-Go Areas) include areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas, or are critical habitat (refer to Section 3.2.1) for any faunal species that is endangered or critically endangered. Very High sensitivity terrestrial areas on site were identified that are to be excluded. This includes a dune to the north-west having intact Dune Thicket and Forest Thicket.

GENERAL COMMENT: Some degradation and transformation is already present in the surrounding area and additional habitat loss and fragmentation will be negligible within the scope of existing impacts and as a result of the small footprint.

Critical Habitat

The following Critical Habitat features have been identified within the site:

1. Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species
 - No Endangered or Critically Endangered Flora species were recorded. Several species known from general area were screened to confirm that most likely localities do not overlap with the site.
 - No Endangered Mammals, Reptiles, Amphibians, or Invertebrates are known to be present on the site or will be affected (other than temporary displacement during construction). A number of species could be present; however it is the recommendation of this report that the small fynbos patch be retained, in order to minimise this risk and also to retain potential habitat for these species.
2. Criterion 2: Habitat for Endemic or Restricted-Range Species
 - Several range restricted flora species are potentially present in the surrounding area and vegetation types; however, none were confirmed to be present and likelihood of presence is not considered to be high. Several species known from general area were screened to confirm that most likely localities do not overlap with the site.
3. Criterion 3: Habitat for Migratory or congregatory species
 - No such terrestrial habitat will be directly or indirectly affected.
4. Criterion 4: Habitat for Highly threatened and/or unique ecosystems
 - No such terrestrial habitat will be directly or indirectly affected.
5. Criterion 5: Habitat for Key evolutionary processes
 - No such terrestrial habitat will be directly or indirectly affected.

No-Go Areas

No-go areas include the following:

- dune-thicket along the eastern slope
- the fynbos pocket on the southern portion
- forest-thicket due on the north-western side of the site.
- The remainder of the site (± 4 Ha), which includes Dune Thicket, Forest Thicket and fynbos elements. In addition, a portion of coastal vegetation and beach falls within the site boundary, which has been excluded from the above).

Conservation Targets

Within the site, the total area of the Erf 5.6 Ha, of which 3.7 Ha is natural, and 1.5 ha is degraded and near natural and 0.7 Ha is developed (on the western side). The 5 000 m² area that is proposed to be subdivided is comprised of the following:

- 1 800 m² Thicket Forest (largely excluded from development footprint except access road and services)
- 2 200 m² Dune Thicket (natural)
- 1 000 m² fynbos patch plus cutting outcrop

Within the Erf 155 (± 5.6 Ha), approximately 2 500 m² will be retained within the 5 000 m² subdivided area (i.e. 50 %). An estimated additional estimated 4 Ha of natural, near natural and degraded Dune Thicket and Forest Thicket will not be developed within the greater Erf. Thus, of the total 5.6 Ha, nearly 70 % (± 4 Ha) will be retained in a natural and near natural state. The remainder of the site is comprised of some previously developed areas on the western side of the site as well as a portion of beach and road, etc. that falls within the erf boundary).

The proportion of the actual development footprint is thus approximately 6 % of the total undeveloped erf. In terms of conservation targets, this is a small proportion of the site, since ± 70 % will be retained in a natural state (excluding beach) and only 6 % will be developed. With a conservation target of 19 % for the vegetation unit, the proposed dwellings will have no meaningful impact to conservation targets locally nor within the regional context of 728 square kilometres (i.e. 72 800 Ha). The proposed footprint accounts for a nominal 0.0003 percent of the total Goukamma Dune Thicket occurring nationally.

Potential Development Footprints

- The site does provide a potential footprint where there is some disturbance and is relatively flat compared to the surrounding landscape.
- The fynbos patch should not be significantly disturbed, other than for construction of sewage and other services, which are likely to rehabilitate affectively in the short term.

Risks and Potential Impacts to Biodiversity

Table 10 lists the terrestrial biodiversity impacts that may potentially occur in the site.

Potential Direct Impacts to Terrestrial Biodiversity:

IMPACT	Nature of Impact
Vegetation	<u>Permanent or temporary loss of indigenous vegetation</u> cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
Flora Species	<u>Loss of species of special concern</u> during pre-construction site clearing activities. Numerous species of special concern are present within the affected area, which will be destroyed during site preparation.
Alien Invasive Species	<u>Susceptibility of post construction disturbed areas to invasion</u> by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
Erosion	<u>Susceptibility of some areas to erosion</u> because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
Ecological Processes	<u>Disturbances to ecological processes:</u> Activity may result in disturbances to ecological processes.
Aquatic and Riparian processes	<u>Aquatic and Riparian processes:</u> Diversion and increased velocity of surface water flows – Changes to the hydrological regime and increased potential for erosion. Impact of changes to water quality. Loss of riparian vegetation / aquatic habitat. Loss of species of special concern.
Faunal Habitat	<u>Loss of Faunal Habitat:</u> Activity will result in the loss of habitat for faunal species.
Faunal Processes	Impacts to <u>faunal processes</u> because of the activity
Faunal Species	<u>Loss of faunal SSC</u> due to construction activities: Activities associated with bush clearing and ploughing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

Potential Terrestrial Biodiversity Impacts (Indirect)

No significant additional ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines, and railways, which can impact on biodiversity and ecosystem services are expected other than minor access roads.

Potential Terrestrial Biodiversity Impacts (Cumulative)

No cumulative impacts of significance are expected because of the development of the orchards, providing recommendation and mitigation measures are adhered to, due to the limited disturbance of intact vegetation and concentration in already transformed areas.

Assessment of Risks and Impacts to Biodiversity

Criteria of assigning significance to potential impacts

Criteria as per the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

Assessment of Terrestrial Biodiversity Impacts

Construction and Operations can result in a range of negative impacts on terrestrial, marine, and other aquatic ecosystems if not effectively managed. The predicted significance of these during the construction and operational phases are summarised in Table 11, as per DEA&DP requirements.

Assessment Scores for Construction Phase (Refer to Sections 3.4.1 & 9.6 for methodology):

ALTERNATIVE 1: PREFERRED ALTERNATIVE	
PLANNING, DESIGN AND DEVELOPMENT PHASE:	
Potential impact and risk:	
Nature of impact:	Impact on biodiversity (flora and fauna)
Extent and duration of impact:	Local, short-term
Consequence of impact:	Negative
Probability of occurrence:	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	Low
Indirect impacts:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Cumulative impact prior to mitigation:	Low risk
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	Most sensitive areas are excluded from development footprint. Dwelling should not extend into the fynbos on the south, the dune forest-thicket on the north-west and a band of dune thicket-forest along the slope on the eastern boundary. Refer to Table 10 for additional
Residual impacts:	Negligible
Cumulative impact post mitigation:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low
CONSTRUCTION PHASE:	

Potential impact and risk:	
Nature of impact:	Impact on biodiversity (flora and fauna)
Extent and duration of impact:	Local, short-term
Consequence of impact:	Negative
Probability of occurrence:	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	Low
Indirect impacts:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Cumulative impact prior to mitigation:	Low risk
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	Most sensitive areas are excluded from development footprint Refer to Table 10 for additional
Residual impacts:	Minor
Cumulative impact post mitigation:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low
OPERATIONAL PHASE	
Potential impact and risk:	
Nature of impact:	Impact on biodiversity (flora and fauna)
Extent and duration of impact:	Local, short-term
Consequence of impact:	Negative
Probability of occurrence:	Low
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect impacts:	Negligible
Cumulative impact prior to mitigation:	Low risk
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	Retained natural vegetation must not be cleared (recommend incorporating into title deed)
Residual impacts:	Negligible
Cumulative impact post mitigation:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.

Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low
DECOMMISSIONING AND CLOSURE PHASE	
Potential impact and risk:	
Nature of impact:	Impact on biodiversity (flora and fauna)
Extent and duration of impact:	Local, short-term
Consequence of impact:	Negative
Probability of occurrence:	Low
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect impacts:	Negligible
Cumulative impact prior to mitigation:	Low risk
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	Retained natural vegetation must not be cleared (recommend incorporating into title deed)
Residual impacts:	Negligible
Cumulative impact post mitigation:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low

- All impacts are assessed to be of medium to low significance before mitigation and can be reduced to low or very low with the implementation of the prescribed mitigation measures.
- All development alternatives are similar in extent and location within the site and hence impact significance). The preferred (linear) option should be adjusted to ensure that the dwellings do not extend into the dune on the north-western side of the site.
- Under status quo conditions it is likely that the disturbed areas will develop into Dune Thicket in time and the dune fynbos patch may develop into Dune Thicket also, if fire and other disturbance is excluded. It is likely that species diversity may decrease due to lack of disturbance.

Terrestrial Biodiversity Impact Reversibility

In general, impacts will have a high reversibility in the grassland and savanna habitat, as well as transformed or degraded areas and low reversibility in solid thicket habitat.

Impacts and Risks to Irreplaceable Biodiversity Resources

Risks to Irreplaceable Biodiversity Resources is low.

Residual Risks and Uncertainties

No significant ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines, and railways, which can impact on biodiversity and ecosystem services are expected other than minor access roads

Findings, Outcomes and Recommendations

Summary of Findings

The characteristics of the surrounding village and the complexity of the terrain limits the potential for mass clearing to take place. It is evident that the character of the village is such that elements of the natural environment are still retained between development. It is thus feasible to develop the portion of the site without significantly changing ecological processes. The following key characteristic support this conclusion:

- The vegetation is not considered to be under any imminent threat at a national level, nor at a regional level and can withstand further development without compromising conservation target significantly.
- No-go areas include the following:
 - dune-thicket along the eastern slope
 - the fynbos pocket on the southern portion
 - forest-thicket due on the north-western side of the site
- No cumulative impacts of significance are expected because of the development of the dwellings, providing recommendation and mitigation measures are adhered to, due to the limited disturbance of intact vegetation and concentration within an already urbanised context.
- Within the Erf 155 (± 5.6 Ha), approximately 2 500 m² will be retained within the 5 000 m² subdivided area (i.e. 50 %). An estimated additional estimated 4 Ha of natural, near natural and degraded Dune Thicket and Forest Thicket will not be developed within the greater Erf. Thus, of the total 5.6 Ha, nearly 70 % (± 4 Ha) will be retained in a natural and near natural state. The remainder of the site is comprised of some previously developed areas on the western side of the site as well as a portion of beach and road, etc. that falls within the erf boundary).
- The proportion of the actual development footprint is thus approximately 6 % of the total undeveloped Erf 155. In terms of conservation targets, this is a small proportion of the site, since ± 70 % will be retained in a natural state (excluding beach) and only 6 % will be developed. With a conservation target of 19 % for the vegetation unit, the proposed dwellings will have no meaningful impact to conservation targets locally nor within the regional context of 728 square kilometres (i.e. 72 800 Ha). **The proposed 2 500 m² footprint accounts for a nominal 0.003 percent of the total Goukamma Dune Thicket occurring nationally.**
- It is reiterated that around 70 % of the site will not be developed and is unlikely to be developed due to slope, which far exceeds the conservation target of 19 %, within a vegetation unit where conservation targets are already exceeded in designated protected areas.
- All impacts are assessed to be of low significance before mitigation and can be reduced to low or very low with the implementation of the mitigation measures.
- All development alternatives are similar in extent and location within the site and hence impact significance). The preferred (linear) option should be adjusted to ensure that the dwellings do not extend into the dune on the north-western side of the site.
- Under status quo conditions it is likely that the disturbed areas will develop into Dune Thicket in time and the dune fynbos patch may develop into Dune Thicket also, if fire and other disturbance is excluded. It is likely that species diversity may decrease due to lack of disturbance.

Recommendations

- It is the conclusion of this terrestrial biodiversity assessment that the limited footprint site and associated infrastructure, including pipeline, sewer and other services can be constructed within acceptable terrestrial biodiversity impact limits.

- The portions of intact vegetation should be retained as per the recommendation of this report, including the dune-thicket along the eastern slope, the fynbos pocket on the southern portion and the forest-thicket due on the north-western side of the site.
- Vegetation that will not require direct clearing for the dwellings to be constructed should be retained as far as possible, in order to fit in with the surrounding developed landscape.
- The undeveloped portions of Erf 155 have limited development potential due to the steep slope. These areas have good representation of dune thicket and forest-thicket as well as some fynbos patches at the base (between the dune base and the road). It is unlikely that these will be developable due to slope and should thus be retained. In this regard, development of the 2 500 m² within the dwelling footprints will only be 50 % of the proposed subdivision area (5 000 m²). In conjunction with the remainder of Erf 155 that will not be developed (\pm 4 Ha of Dune Thicket and Dune Forest, excluding some coastal vegetation and beach that falls on the south of the road but within the erf boundary), the footprint is well within regional and national conservation targets, even tho situated within a CBA area.
- It is noted that around 70 % of the site will not be developed and is unlikely to be developed due to slope, which far exceeds the conservation target of 19 %, within a vegetation unit where conservation targets are already exceeded in designated protected areas.

1 Introduction & Background

This report, including images, tables, and appendices, presents detailed clarification of the principles and background supporting as well as assessment of the findings or implications of these principles. Refer to the Executive summary for a synopsis of these findings and principles. A glossary of terms as well as abbreviations is provided in the preface and comprehensive references in the appendices, that have bearing on or have been sources for compilation of the report.

1.1 Purpose of Report

1.1.1 Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes

This report has been compiled to fulfil the requirement for a **Terrestrial Biodiversity Assessment** as per This report has been compiled to fulfil the requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020**. This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity. Refer to Section 9.8 (Appendix H: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity) for protocol and cross references to specific sections within this report.

In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal themes**, the proclamation notes that *'the requirements of these protocols will apply from the date of publication, except where the applicant provides proof to the competent authority that the specialist assessment affected by these protocols had been commissioned by the date of the publication of these protocols in the Government gazette, in which case Appendix 6 of the Environmental Impact Assessment Regulations, 2014, as amended will apply to such applications'*. In this regard and with reference to the appointment letter provided in Section 9.7 (Appendix G), these protocols have not been adopted as the appointment was before commencement of the regulations. However, due diligence regarding their presence has still been undertaken.

The principles that guide this process include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources which are fundamental to sustainable development.

Project Description

1.1.2 Activity Location and Description

The landowner proposes to subdivide a portion of Erf 155 in order to accommodate additional dwelling units as follows:

- Alternative 1 (preferred) having 3 units
- Alternative 2 having 6 units
- Alternative 3 having 12 units
- Alternative 4: No-Go option



Figure 1: Artistic impression of 3-unit dwelling option (Alternative 1).

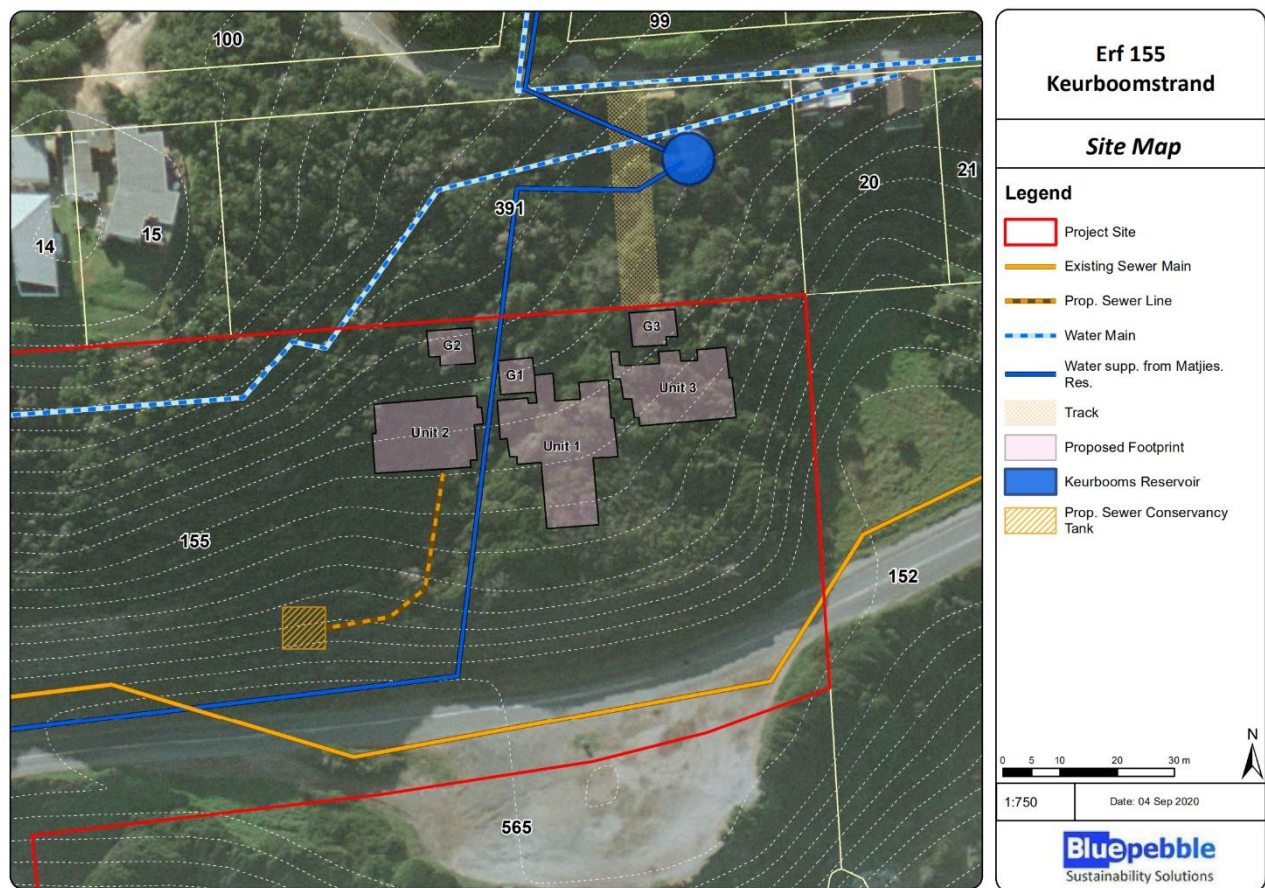


Figure 2: Proposed Alternative 1 (3-dwelling option)

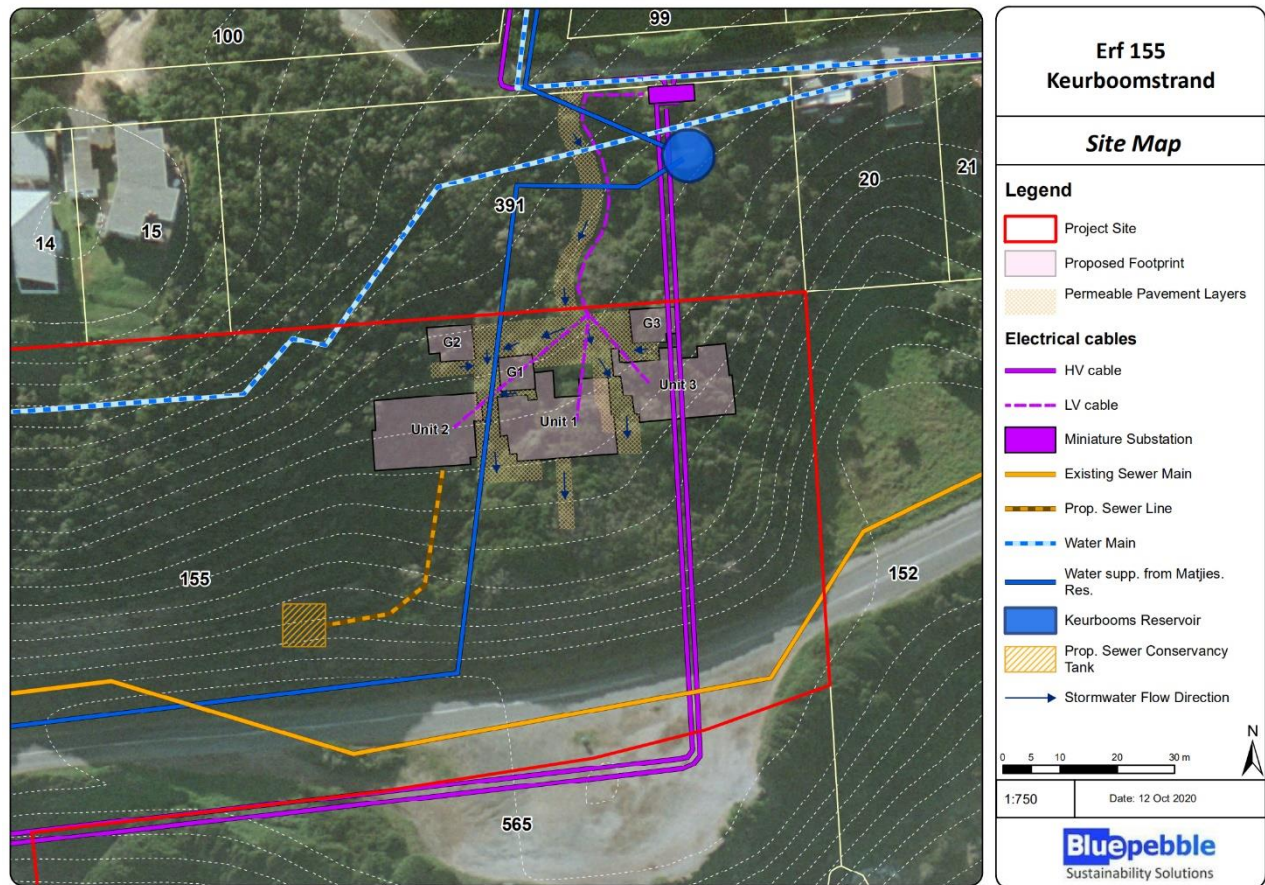


Figure 3: Proposed Alternative 1 (3-dwelling option) with services indicated.

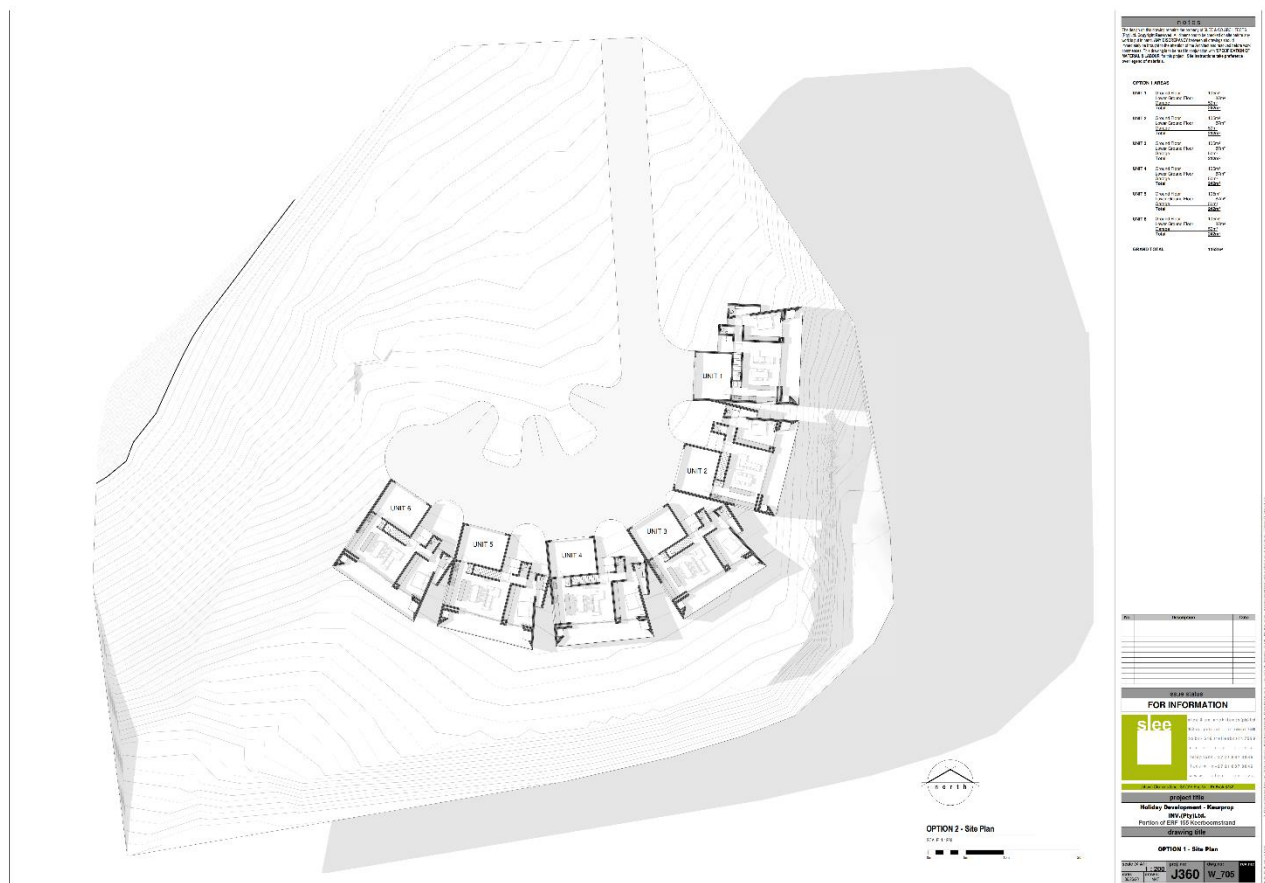


Figure 4: Proposed layout of 6-dwelling option (Alternative 2).



Figure 5: Proposed layout of 12-dwelling option (Alternative 3).

1.1.3 Aspects of the project that could potentially have Biodiversity related Impacts

The key components of the project and their respective impacts upon the terrestrial vegetation and floral environment are as follows:

Component	Potential Biodiversity and Ecological Impacts
Dwellings	
Clearing of land for construction of the dwellings will be required.	The terrestrial environment will be impacted where vegetation clearing is required for dwellings and associated infrastructure.
Infrastructure	
Clearing of vegetation and associated disturbance of habitat for roads and infrastructure (sewer, water, electrical) during operations could be required.	An access road will be constructed from the north in order to access the site. Additional vegetation clearing will be required to accommodate water, electrical and sewer infrastructure.

1.2 Methodology and Approach

The proposed methodology and approach are outlined below:

- Conduct a comprehensive desktop study and identify potential risks relating to vegetation and flora of the site and surrounding area, for a [Terrestrial Biodiversity Assessment Report](#). This will include the relevant Regional Planning and legislated frameworks, which will also be represented in a series of associated maps.
- Conduct a detailed site visit to assess the following:
 - Detailed field survey of vegetation, flora, and habitats present.

- Comprehensive species list, highlighting species that are of special concern, threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA and the Provincial Nature Conservation Ordinance No. 19 of 1974.
- Detailed mapping of the various habitat units and assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and species of special concern, the outcome being a detailed sensitivity map ranked into high, medium, or low classes.
- Reporting will be comprised of a preliminary summary, with identification of anticipated impacts and risks for the Scoping Report, a draft detailed Assessment Report (for public review and comment) and a Final Assessment Report for submission. The draft and final detailed reports will address the following:
 - Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
 - A detailed species list highlighting the various species of special concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds).
 - Description and assessment of the habitat units and site sensitivities ranked into high, medium, or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
 - Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.
 - A comprehensive EMPr for inclusion in the reports and EMP with specific management actions for construction and Operation.
 - A habitat sensitivity map will be compiled, indicating the sensitivities as described above.
 - A map indicating buffers (if required) to accommodate Regional Planning and other requirements.

This terrestrial biodiversity assessment and report has been undertaken as per the requirements of the *Procedures 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, 1998, when applying for environmental authorisation (GN 320, 20 March 2020)*.

1.2.1 Site visit

A mid-spring site visit was conducted on 13 & 14 October 2020. The site falls within a summer rainfall area and for the purposes of this report, this is deemed to be adequate, specifically due to the linear nature of the activity and also as large portions are constructed in already disturbed/transformed areas.

1.2.2 Data sources and references

A comprehensive list of references, including data sources is provided in Section 9.1. Data sources that were utilised for this report include the following:

- National (DEA) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI)

- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species
- Animal Demography Unit Virtual Museum (VM) – potential faunal species
- Global Biodiversity Information Facility (GBIF) – potential faunal species
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information
- Sub-Topical Ecosystem Planning (STEP, 2002) – bioregional plan
- Eastern Cape Biodiversity Conservation plan (ECBCP, 2007) – critical biodiversity areas
- SANBI BGIS – All other biodiversity GIS datasets
- Aerial Imagery – Google Earth, Esri, Chief Surveyor General (<http://csg.dla.gov.za>)
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>)
- Other sources include peer-reviewed journals, regional and local assessments and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

1.2.3 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, fire adapted vegetation composition may vary depending on level of maturity or time since last burn. As far as possible, this has been supplemented with desktop and database-centred distribution data.
- No aquatic assessment has been made relating to any wetlands, pans, and rivers/seeps and/or estuaries outside of the terrestrial scope of this report, where relevant.
- Should there be overlap with other aquatic and estuarine reports, and should any ambiguities occur, the author of this report defers to the respective expert opinion of the aquatic/estuarine specialist, where it relates specifically to aquatic aspects.

2 Policy

2.1 Company Policy

No company policy is applicable to this assessment.

2.2 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following specific listing notices have bearing on this report⁷:

Listing Notice 1 (GNR):

⁷ The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list. Those marked with ~~strikeout~~ have been considered but are not-applicable within the terrestrial vegetation context.

~~27. The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—
 (i) the undertaking of a linear activity; or
 (ii) maintenance purposes undertaken in accordance with a maintenance management plan.~~

Clearing of Indigenous Vegetation for the activity will be less than 1 hectare.

Listing Notice 2 (GNR):

None are applicable

Listing Notice 3 (GNR):

12. The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

(i) Western Cape

~~i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;~~

ii. Within critical biodiversity areas identified in bioregional plans;

iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;

iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or

v. On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.

Clearing of Indigenous Vegetation for the activity will be greater than 300 m² within a Critical Biodiversity Area, including 120 m² access road through an erf zoned as open space I on the north side of Erf 155. The southern boundary of the site footprint is situated approximately 100m inland from the high-water mark, hence vegetation clearing will be predominantly outside of 100m from the high watermark. A Basic Assessment is thus required.

2.2.1 DEA&DP Reporting Information Requirements (Biodiversity)

- (a) Highlight the applicable biodiversity planning categories of all areas on preferred and alternative sites and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category. Also describe the prevailing level of protection of the Critical Biodiversity Area (“CBA”) and Ecological Support Area (“ESA”) (how many hectares / what percentages are formally protected).

Systematic Biodiversity Planning Category	CBA	ESA	Other Natural Area (“ONA”)	No Natural Area Remaining (“NNR”)
If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan and the conservation management objectives	CBA 1 Terrestrial: areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. Objective is to maintain in a natural or near-natural state with no further loss of habitat. Only low-impact, biodiversity-sensitive land-uses are appropriate. ESA – not present			
Describe the site’s CBA/ESA quantitative values (hectares/percentage) in relation to the prevailing level of protection of CBA and ESA (how many hectares / what percentages are formally protected locally and, in the province).	Full extent of vegetation type is approximately 728.8 km ² , Conservation Status is Least Concern (NBA, 2019). Conservation target is 19%, with approximately 50.6 % currently under protection (well protected) within the Garden Route National Park, Goukamma Provincial Nature Reserve, Knysna National Lake Area, Robberg Nature Reserve and Lake Pleasant Private Nature Reserve Section No. 2. Area transformed is approximately 25.75 %.			

- (b) Highlight and describe the habitat condition on site.

Habitat Condition	Percentage of habitat condition class (up to 100%) and area of each in square metre (m ²)	Description and additional comments and observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing/harvesting regimes, etc.)
Natural	66 % 37 000 m ²	The site has sensitive vegetation yet been historically disturbed and further has municipal services across it.

Habitat Condition	Percentage of habitat condition class (up to 100%) and area of each in square metre (m ²)		Description and additional comments and observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing/harvesting regimes, etc.)
Near Natural (includes areas with low to moderate level of alien invasive plants)	18.75 %	10 500 m ²	The site has been historically disturbed and has municipal services on it.
Degraded (includes areas heavily invaded by alien plants)	3 %	1 500 m ²	The site has been historically disturbed and has municipal services on it.
Transformed (includes cultivation, dams, urban, plantation, roads, etc.)	12.5 %	7 000 m ²	The site has been historically disturbed and has municipal services on it.

(c) Complete the table to indicate:

- (i) the type of vegetation present on the site, including its ecosystem status; and
- (ii) whether an aquatic ecosystem is present on/or adjacent to the site.

Terrestrial Ecosystems	Description of Ecosystem, Vegetation Type, Original Extent, Threshold (ha, %), Ecosystem Status	
Ecosystem threat status as per the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Critically Endangered	None
	Endangered	None
	Vulnerable	None
	Least Threatened (or Least Concern)	Remnant thicket biome, hosting Gouritz Dune Thicket in broad-scale vegetation mapping. It is clear from the Site Assessment, that the site does currently host the Dune Thicket, as well as some fynbos and forest elements, which are deemed to be successional precursors and successors to the Dune Thicket.

Aquatic Ecosystems	Yes	No	Unsure
Wetland (including rivers, depressions, channelled and unchannelled wetlands, flats, seeps pans, and artificial wetlands) PES: N/A (No wetlands are present, supported by Low Sensitivity as per DEA screening tool)		X	
Estuary		X	
Coastline (High water mark is situated within 100m of the site, development footprint extends over 100m inland)		X	

(d) Provide a description of the vegetation type and/or aquatic ecosystem present on the site, including any important biodiversity features/information identified on the site (e.g. threatened species and special habitats). Clearly describe the biodiversity targets and management objectives in this regard.

The Project Site is classified as having Gouritz Dune Thicket-Forest (Vulnerable in 2011; Least Threatened 2019). The vegetation on site is representative of the vegetation unit.

Other relevant legislation of relevant to the Terrestrial Biodiversity Assessment includes the following:

- **NEMA:** Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMA's) should guide decision making throughout the project life cycle to reflect the objective of sustainable development. One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. This is supported by the Biodiversity Act as it relates to loss of biodiversity.
- **Liability for any environmental damage, pollution, or ecological degradation:** Arising from all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring,

continuing, or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.

- Public participation: Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and taken into account when the administrative discretion to grant or refuse the licence is made.
- Constitution of Republic of South Africa (1996): Section 24(a) of the Constitution states that everyone has the right ‘to an environment that is not harmful to their health or well-being’. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
- National Forests Act 84 of 1998 with Amendments: Lists Protected trees, requiring permits for removal (Department of Agriculture, Forestry and Fisheries). Section (3)(a) of the National Forests Act stipulate that ‘natural forests must 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’.
- Eastern Cape Nature and Environmental Conservation Ordinance 19 of 1974: Lists Protected species, requiring permits for removal (Department of Economic Development, Environmental Affairs and Tourism).
- Water Use Authorisations: the National Water Act (No. 36 of 1998): Requires that provision is made both in terms of water quantity and quality for ‘the reserve’, namely to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- Conservation of Agricultural Resources Act 43 of 1993: Lists Alien invasive species requiring removal (refer to Table 8).

2.3 Systematic Planning Frameworks

A screening of Systematic Planning Framework for the region was undertaken (summarised in Table 1), that included the following features:

- Critically Endangered and Endangered Ecosystems
- Critical Biodiversity Areas
- Ecological Support Areas
- Vulnerable Ecosystems
- River, Estuarine and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers
- Protected Areas (and buffers)
- Critical Habitat for listed, endemic or protected species

Table 1: Summary of Regional Planning Biodiversity features.

FEATURE ⁸	DESCRIPTION	IMPLICATIONS/COMMENT
National Vegetation Map (NVM, 2018)	Goukamma Dune Thicket South Outeniqua Sand Fynbos Southern Afrotemperate Forest	Least Concern (Most of site) Least Concern (elements present)

⁸ Refer to Map 2 to Map 8.

FEATURE ⁸	DESCRIPTION	IMPLICATIONS/COMMENT
	Garden Route Shale Fynbos Cape Seashore Vegetation	Least Concern (surrounding area with elements present) Vulnerable (elements present) Least Concern (adjacent area)
Regional Planning: Sub-Tropical Ecosystem Planning (STEP)	Gouritz Dune Thicket Tsitsikamma Plateau Fynbos Knysna Afromontane Forest	Vulnerable (Most of site) Vulnerable (elements present) Critically Endangered (surrounding area with elements present)
Regional Planning: Garden Route BSP (GRBSP)	Keurbooms Thicket-Forest Wilderness Forest-Thicket	No classification provided (Most of site)
Critically Endangered and Endangered Ecosystems (NBA 2018)	None	None
Vulnerable Ecosystems (NBA)	Garden Route Shale Fynbos?	Remnant elements of the unit present
Critical Biodiversity Areas (WC BSP)	CBA1 (Terrestrial)	Priority terrestrial CBA area – edge
Critical Biodiversity Areas (GR BSP)	CBA1 (Terrestrial)	Priority terrestrial CBA area -edge
Protected Areas (SAPAD)	None	No Protected areas are directly affected
Marine/Coastal areas or Estuaries	Site is situated within 100 m of high-water mark	Site is within 100 m of high-water mark but will have no direct or indirect affect, other than residual risk should significant sewer or other waste spills occur.
Ecological Support Areas	None	N/A
Within 32 m of Watercourse	Site is not within 32 m of any watercourse	N/A
Within 100 m of River	Site is not within 100 m of any watercourse	N/A
Within 500 m of Wetland	No natural wetlands present	N/A
Surrounding Land Uses	Urban (coastal village), forest, coastline and beaches (recreational use)	
Critical Habitat for listed endemic/ protected species	The endemic and other protected species that are present are generally having widespread distributions and the activity is unlikely to pose any significant threat to any species or population. No specific populations of threatened species were identified within the footprint and the affected footprint is largely disturbed or comprised of secondary vegetation. There are a number of red listed species in the surrounding vegetation units and area that are known to have limited distributions, however none were recorded on the footprint (refer to Sections 3.1.8 & 3.2.1). These are assessed in terms of	

2.3.1 DEA Screening Tool

The DEA screening tool identifies Very High Terrestrial Biodiversity (Critical Biodiversity Area & Vulnerable Ecosystem), High & Medium Animal Species and High & Medium Plant Species Sensitivities. Figure 6 to Figure 8 below are extracted directly from the Screening Tool report. The content of the report will address the findings of the screening tool as well as any site-specific sensitivities that may not have been identified the screening tool. With reference to Figure 6, Terrestrial CBA features are assessed in Section 3.2, Figure 7, Flora species and Figure 8, Fauna species are addressed in Section 3.1.8. The site assessment has physically screen for physical presence of these and other possible species not identified in the screening tool.

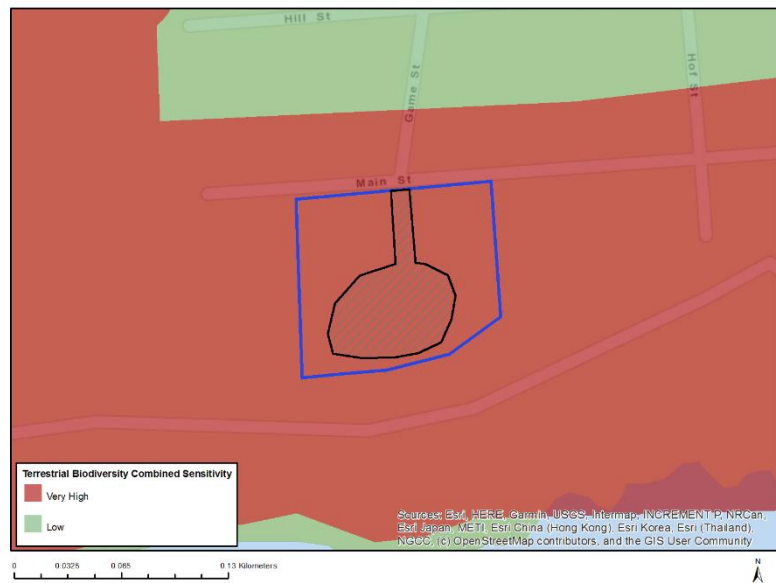


Figure 6: DEA Screening Tool – Terrestrial Biodiversity Theme (Very High Sensitivity)

Sensitivity	Feature(s)
Very High	Vulnerable ecosystem, Critical Biodiversity Area 1

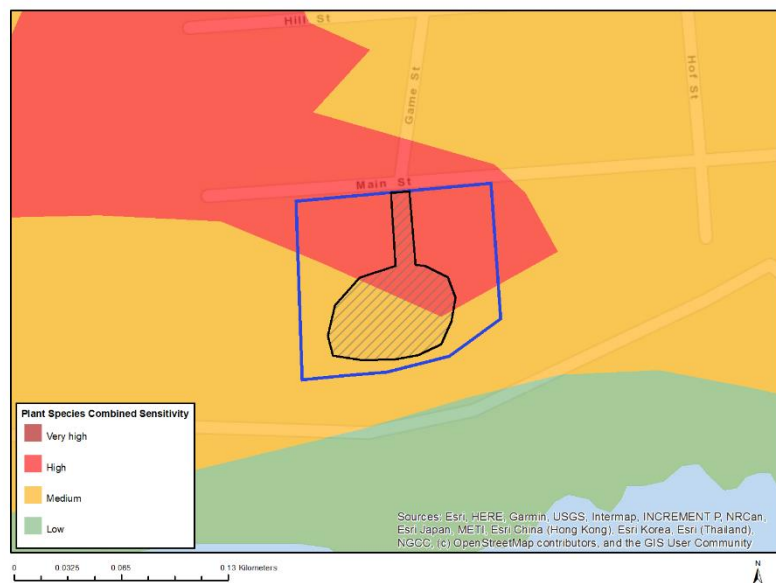


Figure 7: DEA Screening Tool – Plant Species Theme (High & Medium Sensitivity)

Sensitivity	Feature(s)
High	<i>Ruschia duthiae</i>
Medium	<i>Ruschia duthiae</i> , <i>Erica glandulosa</i> subsp. <i>Fourcadei</i> , <i>Erica glumiflora</i> , <i>Pterygodium cleistogamum</i> , <i>Acmadenia alternifolia</i> , <i>Muraltia knysnaensis</i> , <i>Leucospermum glabrum</i> , <i>Lampranthus pauciflorus</i> , Sensitive species 287, Sensitive species 273,

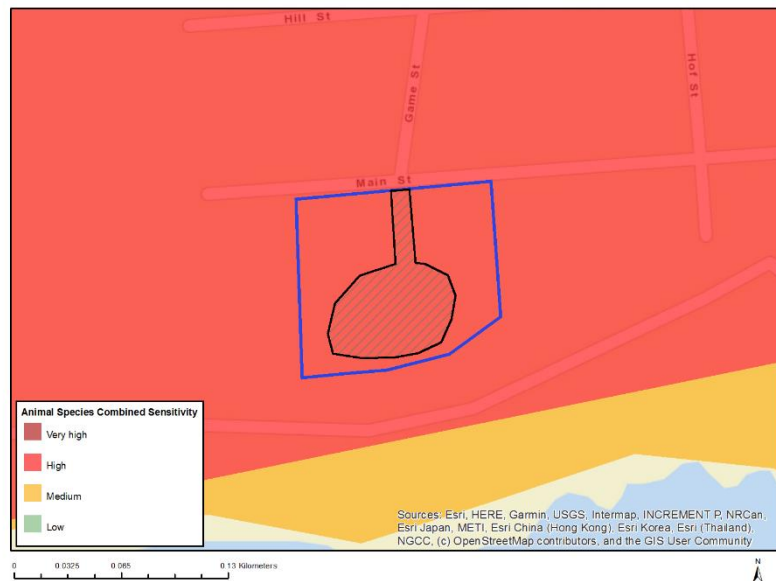


Figure 8: DEA Screening Tool – Animal Species Theme (High Sensitivity)

Sensitivity	Feature(s)
High	<i>Circus maurus</i> (bird)
Medium	<i>Tetradactylus fitzsimonsi</i> (reptile), <i>Afrivalus knysnae</i> (amphibian), <i>-Aloeides thyra orientis</i> & <i>Aloeides pallida juno</i> (insects), Sensitive species 1, Sensitive species 6

2.3.2 Integrated Biodiversity Assessment Tool (IBAT)

The Integrated Biodiversity Assessment Tool identifies the following Biodiversity related risks: **IUCN Red List** - 1645 species assessed on the IUCN Red List of Threatened Species that potentially occur **within 50 km of this site**. These data should be used to guide any further assessment (desktop review, expert consultation, field surveys), with the aim of confirming known or likely occurrence of these species within your project area. Further assessment may also confirm occurrence of additional species not identified here.

- 11 Critically Endangered (Cr)
- 35 Endangered (En)
- 55 Vulnerable (Vu)
- 68 Near Threatened (NT)
- 70 Data Deficient (DD)
- 1406 Least Concern (LC)

The presence on site and status of flagged species is provided in *Appendix C: Flora and Fauna Species Lists*.

Protected Areas (42 Protected Areas are within 50 km) - The World Database on Protected Areas (WDPA) is the most comprehensive global database on terrestrial and marine protected areas. Data for the WDPA is collected from international convention secretariats, governments, and collaborating NGOs. The WDPA uses the IUCN definition of a protected area as the main criteria for entries to be included in the database.

- 39 National
- 0 Natura 2000
- 0 Regional Seas
- 1 World Heritage
- 0 Ramsar
- 2 MAB

Key Biodiversity Areas (4 Important Bird and 0 Other Key Biodiversity Areas are within 50 km) - Key Biodiversity Areas (KBA) are 'sites contributing significantly to the global persistence of biodiversity', in terrestrial, freshwater, and marine ecosystems. Sites qualify as global KBAs if they meet one or more of 11 criteria, clustered into five categories: threatened biodiversity; geographically restricted biodiversity; ecological integrity; biological processes; and, irreplaceability. These, none of which are affected, include⁹:

- Tsitsikama National Park
- Outeniqua Mountains
- Kougaberg Mountains

Screening of associated species indicate that the site is low risk in terms of having any populations of the species that are known from these areas.

A map of Protected Areas indicates that no protected areas are directly affected. The three (3) nearby Protected Areas, which correspond to the protected areas indicated in the South Africa National Protected Area Database (SAPAD) include:

- Annex Arch Rock Private Nature Reserve
- Garden Route National Park
- Forest Hall Private Nature Reserve
- Brackenburn Private Nature Reserve
- The Gums Private Nature Reserve
- Kiaruna Private Nature Reserve
- Hog Hollow Private Nature Reserve
- Rivendell Private nature Reserve
- Olisshof Private Nature Reserve
- Whiskey Creek Nature Reserve
- Keurbooms River Nature Reserve
- Ted Brown nature reserve
- Keurbooms River Nature Reserve – Seagull Colony
- Plettenberg Bay Country Club Private Nature Reserve
- Robberg Nature Reserve

World Heritage Sites none in close proximity.

2.3.3 Sustainable Development Goals

The concept of National Sustainable Development Strategy (NSDS) was proposed in 1992 in Agenda 21 (§ 8.7) where countries were called upon to integrate economic, social and environmental objectives into one strategically focused blueprint for action at the national level. The NSDS “should be developed through the widest possible participation”. And it “should be based on a thorough assessment of the current situation and initiatives”. In the Programme for the Future Implementation of Agenda 21 adopted at the 19th Special Session of the General Assembly (23-28 June 1997), member States reaffirmed the importance of NSDS and set a target of 2002 for the formulation and elaboration of NSDS that reflect the contributions and responsibilities of all interested parties.

However, by 2002, based on national reports received from governments, only about 85 countries had developed some form of national strategies and the nature and effectiveness of these strategies varied considerably from country to country. The Johannesburg Plan of Implementation (JPOI) adopted at

⁹ All sites are KBA due to having significant populations of endemic species known only to be found in a limited area.

the 2002 World Summit on Sustainable Development (WSSD), through paragraph 162 b, recommitted member States to “take immediate steps to make progress in the formulation and elaboration of national strategies for sustainable development and to begin their implementation by 2005.”

During the preparatory process for the 2002 WSSD, the International Forum on NSDS was held in Accra, Ghana in 2001, which led to the launch of the Guidance in Preparing a National Sustainable Development Strategy. It defined National Sustainable Development Strategy (NSDS) as “a coordinated, participatory and iterative process of thoughts and actions to achieve economic, environmental and social objectives in a balanced and integrative manner”. Most importantly, NSDS is a call for an institutional change. It aims at a transition from the traditional static putting-a-plan-on-paper exercise towards the establishment of an adaptive system that can continuously improve. It should be a process which “encompasses situation analysis, formulation of policies and action plans, implementation, monitoring and regular review. It is a cyclical and interactive process of planning, participation and action in which the emphasis is on managing progress towards sustainability goals rather than producing a ‘plan’ as an end product.”

Every country needs to determine, for itself, how best to approach the preparation and implementation of its national sustainable development strategy depending upon the prevailing political, historical cultural, ecological circumstances. A "blueprint" approach for national sustainable development strategies is neither possible nor desirable. The particular label applied to a national sustainable development strategy is not important, as long as the underlying principles characterizing a national sustainable development strategy are adhered to and that economic, social and environmental objectives are balanced and integrated.

Today, when incorporating the 2030 Agenda for sustainable development and its 17 SDGs into national context, although countries do not necessarily label them as “national sustainable development strategies”, all the underlying core principles are deeply embedded in the national implementation of SDGs worldwide. As seen at the Voluntary National Reviews at the High Level Political Forum on Sustainable Development, issues such as country ownership and strong political commitment, the integration of economic, social and environmental objectives across sectors, territories and generations; broad participation and effective partnerships, the development of capacity and enabling environment, as well as the mobilization of means of implementations remain at the centre of policy debates at all levels.

Source: National Sustainable Development Strategies (NSDS): <https://sdgs.un.org/topics/national-sustainable-development-strategies>

Goal 15: Life on Land: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

The approach, assessment methodology and recommendations contained within this report are directly in line with this sustainable development goal.

2.3.4 Vegetation of Southern Africa

The vegetation on site is classified (Table 1, Map 2) as Goukamma Dune Thicket (Mucina & Rutherford, 2006, as amended) with found in the surrounding area (Least Threatened, NBA, 2019). A general description of the vegetation units is provided in the section below (as per Mucina & Rutherford, 2006, as amended) as a reference point for the baseline vegetation composition.

Goukamma Dune Thicket (AT 36)

(Type history: STEP map Goukamma Dune Thicket (89 %); 2012 VEGMAP - FFd 11 Southern Cape Dune Fynbos (86 %), FFh 9 Garden Route Shale Fynbos (6 %))

Distribution This vegetation type occurs in the Western Cape Province. In coastal stretches from Victoria Bay near Wilderness to the Knysna Heads, with smaller areas along the coast from Robberg Peninsula near Plettenberg Bay eastward to Keurboomstrand.

Vegetation & Landscape Features On flat to moderately undulating coastal dunes. A mosaic of low to tall (1 - 5 m), dense thicket, dominated by small trees and woody shrubs with lianas abundant, in a mosaic of low (1 - 2 m) asteraceous fynbos. Thicket clumps are best developed in fire-protected dune slacks, which occasionally also support pockets of coastal forest (*Celtis africana*, *Ekebergia capensis*, *Searsia chirindensis*). The fynbos shrubland occurs on upper dune slopes and crests where succulents may be common in more open areas.

Geology and Soils The area is dominated by Strandveld and Wankoe formations. Predominantly found on land type Hb.

Climate Non-seasonal rainfall dominates the region with MAP between 588 mm and 859 mm. Frost is present for approximately 3 days per year. The mean monthly maximum is 26.67 °C in February and the mean monthly minimum is 7.92 °C in July. Altitude ranges from 1 - 203 masl.

Important Taxa (d=dominant, e=South African endemic, et=possibly endemic to a vegetation type)

Growth form	Species
Small tree	<i>Pterocelastrus tricuspidatus</i> (d), <i>Schotia afra</i> , <i>Sideroxylon inerme</i> (d), <i>Tarchonanthus littoralis</i> (d)
Tall tree	<i>Afrocarpus falcatus</i> , <i>Calodendrum capense</i> , <i>Celtis africana</i> , <i>Ekebergia capensis</i> , <i>Olea capensis</i> , <i>Searsia chirindensis</i>
Succulent shrub	<i>Carpobrotus acinaciformis</i> (d), <i>Cotyledon orbiculata</i> (e), <i>Crassula nudicaulis</i> , <i>Euphorbia muirii</i> , <i>Gasteria acinacifolia</i> , <i>Zygophyllum morgsana</i>
Low shrub	<i>Eriocephalus paniculatus</i> (d), <i>Felicia echinata</i> (d), <i>Helichrysum patulum</i> (d), <i>Indigofera erecta</i> (e), <i>Muraltia spinosa</i> (d), <i>Salvia africana-lutea</i> (d), <i>Muraltia knysnaensis</i> (e), <i>Selago burchellii</i> (e)
Graminoid	<i>Restio eleocharis</i> (d), <i>Stenotaphrum secundatum</i> (d), <i>Thamnochortus insignis</i> (e)
Tall Shrub	<i>Azima tetracantha</i> , <i>Carissa bispinosa</i> , <i>Mystroxydon aethiopicum</i> , <i>Cassine peragua</i> (d), <i>Cussonia thyrsoiflora</i> (e), <i>Erica glandulosa</i> subsp. <i>fourcadei</i> (e), <i>Euclea racemosa</i> (d), <i>Grewia occidentalis</i> , <i>Gymnosporia capitata</i> (e), <i>Lauridia tetragona</i> (d), <i>Maytenus procumbens</i> (d), <i>Metalasia muricata</i> (d), <i>Morella cordifolia</i> (e), <i>Mystroxydon aethiopicum</i> subsp. <i>aethiopicum</i> (d), <i>Olea exasperata</i> (d), <i>Osteospermum moniliferum</i> , <i>Ptaeroxylon obliquum</i> , <i>Passerina rigida</i> (e), <i>Putterlickia pyracantha</i> (e), <i>Robsonodendron maritimum</i> (e), <i>Scutia myrtina</i> , <i>Searsia crenata</i> (d), <i>Searsia glauca</i> (d), <i>Searsia lucida</i> , <i>Searsia pterota</i> (e), <i>Zanthoxylum capense</i>
Herb	<i>Indigofera erecta</i> (e)
Woody Succulent Climber	<i>Cynanchum viminale</i>
Herbaceous Climber	<i>Cynanchum ellipticum</i> , <i>Rhoicissus digitata</i> , <i>Solanum africanum</i>
Conservation: Least Concern	
Conservation Target	19 %
Conserved in	Garden Route National Park, Goukamma Provincial Nature Reserve, Knysna National Lake Area, Robberg Nature Reserve and Lake Pleasant Private Nature Reserve Section No.2
Area transformed	25.75 %

Threat activities	No data
Protection Level	Well protected

*All taxonomic names are the latest names as they were listed in the Biodiversity Database of South Africa (BODATSA) on the 11 January 2019)

Implications:

- Vegetation assessed on site is generally characteristic of the vegetation units.
- The vegetation unit is not currently under imminent threat, not having an elevated conservation status.
- Several South Africa and Eastern Cape endemic species are recorded from the vegetation units, some have localised distributions and others are widespread. Refer to Sections 3.1.8 and 9.3 for further assessment of species, although no major conflicts were noted with the intended land use change.

2.3.5 National Biodiversity Assessment

The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategic objectives, and activities for managing and conserving biodiversity more effectively. The NBA is especially important for informing the National Biodiversity Strategy and Action Plan (NBSAP), the National Biodiversity Framework (NBF) and the National Protected Area Expansion Strategy (NPAES), and also informs other national strategies and frameworks across a range of sectors, such as the National Spatial Development Framework, the National Water and Sanitation Master Plan and the National Biodiversity Economy Strategy. Ecosystem protection level is an indicator that tracks how well represented an ecosystem type is in the protected area network. It has been used as a headline indicator in national reporting in South Africa since 2005. It is computed by intersecting maps of ecosystem types and ecological condition with the map of protected areas. Ecosystem types are then categorised based on the proportion of the biodiversity target for each ecosystem type that is included in one or more protected areas. For terrestrial ecosystems, biodiversity targets are set for each ecosystem type using established species–area accumulation curves (ranging between 16 and 34%).

The outcome of the most recent National Biodiversity Assessment (2018) indicate that none of the affected vegetation types are currently under threat (Map 2). The affected vegetation unit has a Least Threatened Conservation Status (Table 1).

Implications:

- Vegetation units are generally well represented regionally, and none are under any imminent threats that could pose a risk to the proposed development.
- No vegetation units present have an elevated conservation status.

2.3.6 Sub-Tropical Ecosystem Planning (STEP)

STEP (Map 3) identifies Gouritz Dune Thicket as being the dominant local vegetation units. At the time of the STEP classification (2002), it was deemed to be Vulnerable. The STEP classification aligns closely with the National Vegetation Map classification, as these specific units were derived from STEP. In addition, surrounding vegetation includes Tsitsikamma Plateau Fynbos and Knysna Afromontane Forest. Elements of these units may also be present, being in proximity and vegetation tends to have transitional elements.

Gouritz Dune Thicket

This unit is restricted to the Strandveld and Waenuiskrans Formations, which consists of white dune sands with fine shell material and occasionally with calcrete lenses present. It occurs as a narrow band (rarely more than 1 km wide) of vegetation along the coastline, usually just arid thicket of the primary dune system. Here the annual rainfall is approximately 350 mm, with approximately 150 mm falling in summer (October-March) and 200 mm occurring in winter (April-September). The mean maximum temperature during summer is 25.6 C, while mean minimum temperature during winter months is 7.7 C. The Dune Thicket vegetation is best developed in dune slacks, where it is well protected against salt laden winds from the sea and periodic fires that may penetrate the coastal zone from the inland areas. In these protected sites woody shrubs and trees, such as *Azima tetracantha*, *Carissa bispinosa*, *Mystroxyton aethiopicum*, *Cassine peragua*, *Cussonia thyrsoiflora*, *Euclea racemosa*, *Grewia occidentalis*, *Gymnosporia capitata*, *Maytenus procumbens*, *Ptaeroxylon obliquum*, *Pterocelastrus tricuspidatus*, *Putterlickia pyracantha*, *Rhus glauca*, *Rhus lucida*, *Rhus pterota*, *Robsonodendron maritimum*, *Sideroxylon inerme*, *Tarchonanthus camphoratus* and *Zanthoxylum capense*, form a dense layer. Lianas (e.g. *Cynanchum ellipticum*, *Rhoicissus digitata*, *Sarcostemma viminale*, *Solanum quadrangulare*, etc.) are abundant amongst these woody species, while succulents (e.g. *Carpobrotus acinaciformis*, *Cotyledon orbiculata*, *Crassula nudicaulis*, *Euphorbia muirii*, *Gasteria acicacifolia*, etc.) are only abundant in more open sites. The crests and upper slopes of the dunes have a different subset of shrubs, often with graminoids present. Most common on these more open slopes are species such as *Chrysanthemoides monilifera*, *Eriocephalus paniculatus*, *Helichrysum patulum*, *Ischyrolepis eleocharis*, *Olea exasperata*, *Metalasia muricata*, *Myrica cordifolia*, *Nylandtia spinosa*, *Passerina rigida*, *Rhus crenata*, *Salvia africana-lutea*, *Stenotaphrum secundatum*, *Thamnochortus insignis* and *Zygophyllum morgsana*. An interesting element in this unit, is the occasional presence of stunted *Schotia afra* plants.

Endemic Species¹⁰: *Agathosma apiculata*, *Agathosma muirii*, *Athanasia cochlearifolia*, *Carpobrotus muirii*, *Euchaetis albertiana*, *Eriospermum vermiforme*, *Haworthia mirabilis* var. *paradoxa*, *Hermannia muirii*, *Muraltia barkerae*, *Muraltia depressa*, *Muraltia knysnaensis*, *Pentaschistis barbata* ssp. *orientalis*, *Selago villicaulis* and *Sutera placida*.

Implications:

- Vegetation assessed on site is typical of the vegetation unit, as described in Section 3.1.
- No localised endemics were recorded within the affected footprint.

2.3.7 Western Cape Biodiversity Spatial Plan

The Western Cape is endowed with world-renowned biodiversity and natural resources. Together with this unparalleled endowment comes international responsibilities as well as significant opportunities for our people and the biodiversity economy. The Western Cape Biodiversity Spatial Plan (WCBSP, 2017) represents the “state of the art” provincial systematic biodiversity planning product. It represents the priority biodiversity areas and ecological infrastructure that need to be secured in the long-term in order that we, together with CapeNature, fulfil our core provincial mandate for biodiversity management.

The development and implementation of the Western Cape Biodiversity Spatial Plan (WCBSP, 2017) is a core output for the Provincial Biodiversity Strategy and Action Plan (2016) which is aligned to the

¹⁰ Species classed as endemic will undergo further screening to ascertain distribution and scarceness and conservation status (3.1.8).

Aichi Targets for the United Nations Convention on Biological Diversity as well as the National Biodiversity Strategy and Action Plan (2015). This *Western Cape Biodiversity Spatial Plan Handbook* thus provides all stakeholders with the strategic and practical guidance on how to ensure that planning and decision-making build resilience of our ecological infrastructure. Critically, the WCBSP must be used to inform how we invest in ecological infrastructure to ensure that our natural resources are managed to improve resilience and water security into the future. This will be crucial in enabling “future proof” development as part of our response to climate change, including adaptation and disaster risk reduction.

The CBA map (Map 6) indicates areas of land as well as aquatic features which must to be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. Land in this category is referred to as a Critical Biodiversity Area. CBAs incorporate:

- (i) areas that need to be safeguarded in order to meet national biodiversity thresholds
- (ii) areas required to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services; and/or
- (iii) important locations for biodiversity features or rare species.

Ecological Support Areas (ESAs) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. None are present within the site or immediate vicinity.

Table 2: Criteria defining Critical Biodiversity Areas (Source: WC BSP, 2017)

CBA MAP CATEGORY:	DEFINING CRITERIA
Protected Areas (Not present)	Areas that are proclaimed as protected areas under national or provincial legislation. Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.
Critical Biodiversity Areas 1 (CBA) (Present)	Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. Maintain in a natural or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.
Critical Biodiversity Areas 1 (CBA 2) (Not present)	Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. Maintain in a functional, natural or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated.
Ecological Support Areas 1 (ESA 1) (Not present)	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs and are often vital for delivering ecosystem services. Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.
Ecological Support Areas 2 (ESA 2) (Not present)	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs and are often vital for delivering ecosystem services. Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services.
Other Natural Areas (ONA) (Not present)	Areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem.

CBA MAP CATEGORY:	DEFINING CRITERIA
	Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high-impact land uses.
No Natural Area Remaining (NNAR) (Not present)	Areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action. Manage in a biodiversity-sensitive manner, aiming to maximise ecological functionality. Offers the most flexibility regarding potential land uses, but some authorisation may still be required for high impact land uses.

Implications:

- The site falls within a designated WC BSP designated Critical Biodiversity Area, on the eastern extremity of a band that corresponds to an extensive band of forest-thicket to the west of the site situated on steep, but undevelopable slopes.
- Refer to implications outlined in Table 4.
- Fragmentation of CBA, as a result of the development will be limited to the footprint, and generally within areas that already have disturbance, relating to the proposed dwellings and infrastructure requirements. **Refer to Map 10 and Section 3.2.**
- The activities fall outside of the recommended land use parameters for the category. Dwellings are generally not acceptable within CBA 1 areas within the recommended land-use guidelines.
- Impacts to intact CBA will however be minimal with majority of impact occurring within previously disturbed areas of the site.
- A large portion of the Erf to the west, outside of the potential development footprints are likely to never be developed due to slope constraints and vegetation in these areas is intact and natural.

2.3.8 Garden Route BSP

The Garden Route BSP (GRBSP, 2010) identified the vegetation as being Keurbooms Thicket-Forest with Wilderness Forest-Thicket. The Garden Route BSP further indicates the site as being on the edge of designated Critical Biodiversity Area.

Coastal Dune Milkwood & Ekebergia Forest

This habitat is restricted to deep sandy soils in the lowlands. It is best developed next to extensive water bodies, where fires originate and burn upslope. The tall, closed canopy is similar to those of the Afromontane Plateau Forest, with tall *Afrocarpus falcatus* often emerging above the canopy. It does, however, differ in its floristic component and in having deciduous trees such as *Celtis africana* often locally abundant. It is most easily recognized as it has trees with a subtropical affiliation such as *Calodendrum africana*, *Ekebergia capensis*, *Strychnos decussata* and even sometimes *Olea europaea spp. africana* present. No rare plant species are known from this unit, but it is the habitat of the rare Knysna Woodpecker (*Campethera notata*). These forests were probably more extensive in the past as they were initially not afforded much protection. The Tsitsikamma Dune Forest has *Sideroxylon inerme* more prevalent.

Coastal Forest Mosaic Thicket

This habitat is restricted to more nutrient rich soils that are often derived from shale. It usually occurs on steep slopes and since it often has duplex soils it tends to be sensitive to physical disturbance. Once the vegetation has been disturbed soil slip-faces occur readily after heavy rain. The outer edges consist of impenetrable stands of thorny shrubs and trees, such as *Azima tetraantha*, *Gymnosporia buxifolia* and *Scutia myrtina*, of which the

canopy is not much above the ground. A non-thorny species that tend to be very abundant along the outer edge is the aromatic *Tarchonanthus camphoratus*. These are all species with specific defences against browsing, so one cannot help but to wonder if this habitat was much exposed to browsing impacts of large herbivores in the past. Towards the inner parts the tree canopy does lift above the ground with tall trees such as *Afrocarpus falcatus*, *Calodendrum capense*, *Olinia ventosa* and *Sideroxylon inerme* present that are often adorned with climbers such as *Rhoicissus tomentosa*. This habitat is thus intermediate in structure and the species present in the Coastal Forests and the Dune Thicket vegetation. **The species however mix to such an extent that it is impossible to separate them into two distinct units.** This habitat seems to be particularly rich in bird life, which is one of the reasons why we retained it as a distinct habitat type.

The Keurbooms Thicket-Forest occurs on steep slopes where the vegetation of south and north slopes differs much. In being centrally located it assimilated an enormous range of non-fire adapted species typical from both the western and eastern sectors. Even succulents such as *Aloe arborescens* and *Aloe pluridens* are present in arid sites.

Implications:

- The vegetation on site falls within the broad description of the above, dominant and common tree species including *Tarchonanthus camphoratus*, *Azima tetraantha*, *Gymnosporia buxifolia*, *Scutia myrtina* and *Sideroxylon inerme*, with occasional, generally small *Celtis africana*, *Ekebergia capensis* and *Olea europaea spp. africana* trees also noted. The climber *Rhoicissus tomentosa* as well as the succulents *Aloe arborescens* and *Aloe pluridens* were also noted in more open areas.
- It is noted and confirmed that this habitat is intermediate in structure and the species present are from both the typical Coastal Forest and the Dune Thicket vegetation. The species however mix to such an extent that it is impossible to separate them into two distinct units.
- Larger trees, typical of the surrounding forest, such as *Afrocarpus falcatus* and *Calodendrum africana* were noted to be absent, suggesting that it is structurally and floristically more inclined towards dune thicket than Coastal Forest. The surrounding steeper slopes appear to have more typical coastal forest, which is generally intact, being on slopes too steep to be suitable for development.
- The Knysna Woodpecker (*Campethera notata*), although not confirmed may be a transient visitor.
- Evidence of slip faces as described above were noted in the wider area and suggest that the slopes within the site should be avoided or not blanket cleared of vegetation.
- The site is deemed to be situated on the edge of designated Critical Biodiversity Area by the GRBSP.

2.3.9 Protected areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa (Map 4 and Map 6). A total of 3 land-based protected areas are situated within 50 km of the site (Table 3), but all are outside of the immediate study area.

Table 3: List of Protected Areas in vicinity

NAME	NSBA CATEGORY	SIZE (HA)	DISTANCE
Annex Arch Rock Private Nature Reserve	Nature Reserve	53 Ha	0.8 km E
Garden Route National Park	National Park	126 106 Ha	1.4 km E
The Gums Private Nature Reserve	Nature Reserve	62 Ha	1.5 km NW
Brackenburn Private Nature Reserve	Nature Reserve	91 Ha	2.0 km NE

NAME	NSBA CATEGORY	SIZE (HA)	DISTANCE
Kiaruna Private Nature Reserve	Nature Reserve	66 Ha	3.0 km N
Forest Hall Private Nature Reserve	Nature Reserve	49 Ha	3.2 km E

When projects are located in legally protected and internationally recognized areas, clients should ensure that project activities are consistent with any national land use, resource use, and management criteria (including Protected Area Management Plans, National Biodiversity Strategy and Action Plans (NBSAP's), or similar documents).

This project is not located within any legally protected conservation area. No RAMSAR nor Marine Protected Areas are directly affected, Tsitsikama National Park and Marine Protected Area is situated to the east.

Implications:

- The activity will have no direct, indirect, or cumulative impact on any protected environment, however bird and mammal species may be transient to the site.

2.3.10 Strategic Water Source Areas

Strategic water source areas (Figure 9) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy.

Strategic water source areas can be regarded as natural "water factories", supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

In South Africa, such management is particularly important for enhancing downstream water quality and quantity. Not only are the country's surface water resources extremely limited – South Africa is considered to be one of the driest countries (per capita), with 98 per cent of its surface water already developed – but the country also has a growing water quality problem.

Overloading with nutrients and other pollutants from urban, agricultural, and industrial waste has resulted in many dams shifting to an algae-dominated, or eutrophic, state. Sixty-five per cent of the country's dams are now estimated to be eutrophic or borderline eutrophic, with most of these algal blooms containing cyanobacteria (blue-green algae) that is toxic to human health. This renders water of high quality unavailable if not treated, which coupled with failing water infrastructure, represents a major challenge to water security in the near future. Water managers are inevitably faced with finding new and innovative ways of improving both water quality and quantity to meet the increasing water demands of the country. Managing strategic water source areas is one way to meet this challenge.

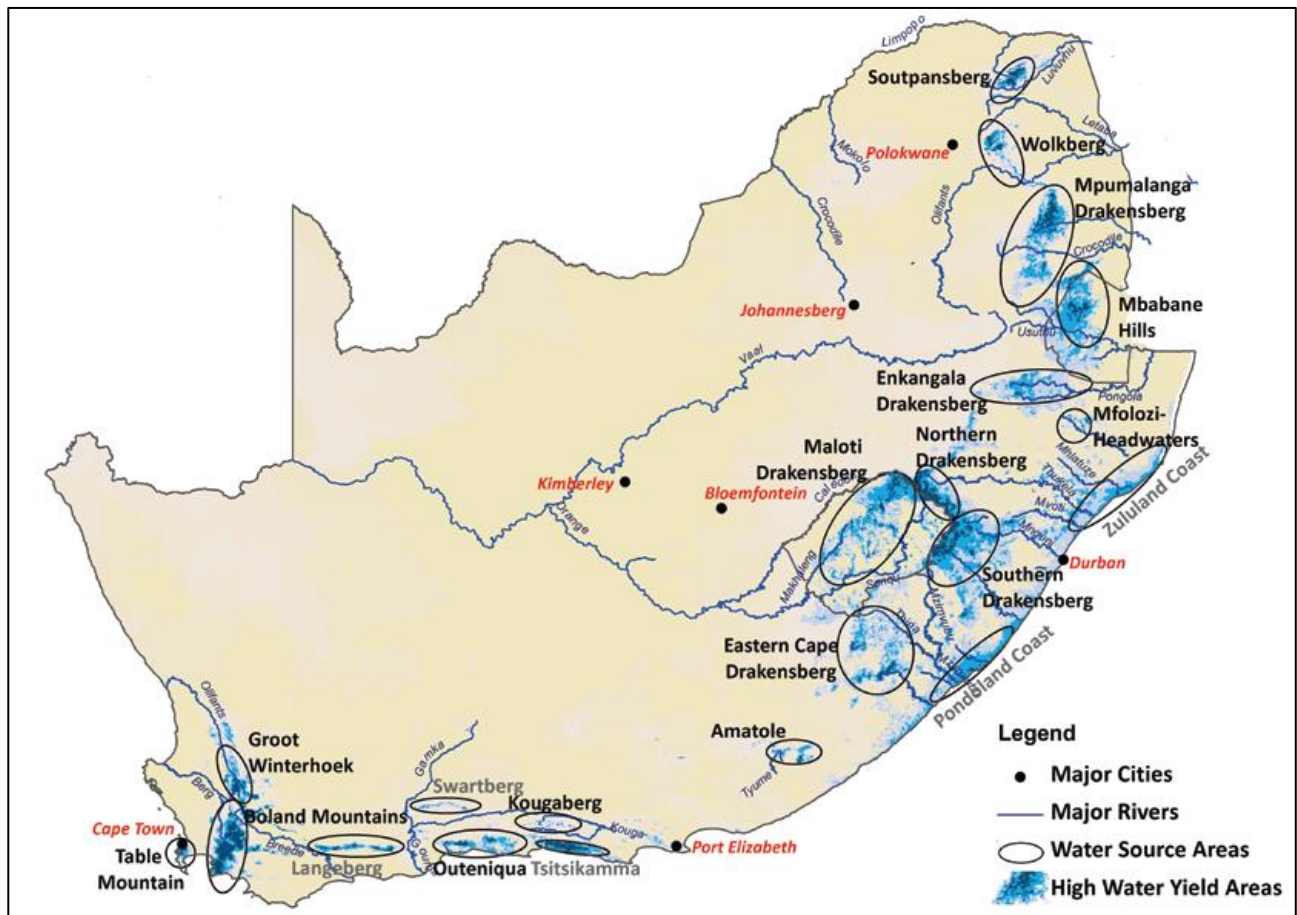


Figure 9: South Africa Water Source Areas [Source: Nel, et al, 2013]

This site is located outside of any Strategic Water Source area.

Implications:

- There will be no downstream impacts to any critical water supply to downstream economies and urban centres.

2.3.11 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland, and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or 'FEPAs'.

Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves. Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

1. Threatened and near-threatened freshwater fish species – all populations (100%) of considered to be critically endangered or endangered species, and at least ten populations of species that are in the International Union for Conservation of Nature (IUCN) vulnerable or near threatened categories and some populations of special concern (e.g. very restricted distributions in South Africa)
2. River ecosystem types – 20% of total length per type
3. Wetland ecosystem types – 20% of total area per type

4. Wetland clusters – 20% of total area per wetland vegetation group
5. Free-flowing rivers – 20% of total length per ecoregion group
6. Priority estuaries – 100% of all priority estuaries, which already took into account biodiversity targets of 20% for estuary ecosystem types and habitat, 50% of the populations of threatened species; 40% of the populations of exploited estuarine species; 30% of the populations of all other estuarine species.

Faunal and aquatic process components relating to the FEPA will be directly addressed in the separate aquatic specialist report. Regarding terrestrial fauna and flora components associated with Freshwater Ecosystem Priority Areas.

- As such, there are no significant non-perennial drainage lines that will be affected. The entire northern boundary of the site is adjacent to the perennial Fish. The agricultural activities are all further that 32 m from the river and more or less on the 100m buffer boundary. Infrastructure requirements for a proposed hydroturbine facility as well as pump house will extend into the river functional zone, including riparian vegetation. There are thus likely to be direct and/or indirect impacts to riparian vegetation associated with the perennial river (refer to Map 7). The context assessed in this report will only be those relating to terrestrial aspects, where these features are comprised of riparian vegetation and could also provide habitat for faunal species.
- No natural wetlands are found within the site, nor within 500m of the site, as per NFEPA and NBA (2018).
- The site is not within any designated fish sanctuary areas.
- A number of artificial wetland, comprising farm dams are situated within the site, one of which appears to be mostly dry and providing limited habitat. The second are a series of ponds adjacent to the dairy that are used to treat slurry manure. These are to be decommissioned during the course of the project, as once the dairy is decommissioned, they will no longer function as the water source will be removed.

Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands and estuaries, it is essential to protect mountain catchment areas where the water originates, and to safeguard riverside vegetation because these plants prevent soil erosion, sedimentation and water pollution (Vromans et al., 2012).

The health of a river ecosystem is largely dependent on the presence of natural vegetation or “riparian habitat” along its banks, including good vegetative cover within the surrounding landscape (catchment area). Riparian bank vegetation filters pollutants, helps maintain water temperatures, supplies organic matter (“food”) in support of aquatic life (fish, insects etc.) and acts as a buffer to adjacent land-uses. The roots of the riparian plants also reduce the effects of floods, by binding riverbanks and thus preventing erosion. Furthermore, bank storage is increased by slowing run off during floods. For these reasons, it is essential that new developments are separated from a river and its “riparian habitat” by a buffer area.

This site is located outside of any Freshwater Ecosystem Priority Areas.

Implications:

- There will be no downstream impacts to any Freshwater Ecosystem Priority Areas.

2.3.12 Regional Hotspots and Centres of Endemism

The site is situated within the Cape Floristic Region.

The location of the proposed activity within the centre of Endemism would encourage the screening for possible endemic species, which has been undertaken and provided in Section 3.1.8.

Implications:

- Several endemic species could possibly occur within the general area, including the site, none of which have been found within the proposed site footprint. A residual risk will be present, although all reasonable attempts have been made to locate any such species.
- Due to the nature of the footprint being predominantly within already disturbed areas as well as the slightly disturbed nature of the affected area, the risk is deemed to be moderate and acceptable, since the site falls within a village area and is suited to development of dwellings.
- The site can be developed without having significant repercussions i.t.o ecological integrity and ecological processes within the wider area.
- Erven in surrounding areas have been developed, while still maintain strong elements of the natural habitat, which can be considered to be a feature of Keurboomstrand and other coastal villages in the vicinity having similar vegetation.

2.3.13 Key Biodiversity Areas

Important Bird Areas

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. By conserving IBA's, we look after all the ecosystem goods and services they provide, which means in effect that we support a meaningful component of the South African economy (such as water management and agriculture). Since the late 1970s, more than 12 000 IBA's have been identified in virtually all of the world's countries and territories, both on land and at sea. In 1998, 122 South African IBA's were identified and listed in Barnes (1998). This inventory was revised to 112 IBA's in 2015. IBA's have also had considerable and increasing relevance when responses have been developed to several wider environmental issues, such as habitat loss, ecosystem degradation, climate change and the sustainable use of resources.

The core aims of the IBA Programme are:

- To identify, monitor and conserve the sites and habitats that support South Africa's priority bird species.
- To develop a network of partners, from grassroots to national level, who collaborate to conserve IBA's.
- To gather new data regularly and monitor IBA's to track status and trends across the network and so that up-to-date information can be passed on to decision-makers, enabling them to take appropriate conservation action.
- To confirm periodically that existing IBA's continue to meet the selection criteria and to identify other critical sites that may qualify for recognition as IBA's as new information becomes available.
- To build capacity in the IBA Programme by sourcing funding, and to acquire and develop appropriate skills in staff and volunteers so that these objectives can be implemented at a regional scale.

The extension of the IBA approach to several other wildlife groups has led to the identification of Important Plant Areas, Prime Butterfly Areas, Important Mammal Areas and Key Biodiversity Areas for Freshwater Biodiversity. The site falls within 50 km of Important Bird Areas, but not directly within and such IBA.

The closest IBA's include Tsitsikamma National Park, located 11 km to the east. Species that are within the IBA may be transient to the site, as foraging and nesting habitat, however, they are unlikely to be affected other than minor displacement from a very small area and the surrounding habitat will remain intact. The activities are thus unlikely to have any impact on surrounding IBA's or ecological processes associated with them, other than potential minor displacement from the specific footprint.

Implications:

- The activities are unlikely to have any impact on surrounding IBA's or ecological processes associated with them.

2.4 Vegetation and Ecological Processes and Corridors

2.4.1 Critical Biodiversity Areas

Given that the objective of CBAs is identify biodiversity priority areas which should be maintained in a natural to near natural state, development within these areas is not encouraged. However, as a result of the scale of the current development, most of the activities listed under NEMA with regards to development within CBAs have already been triggered because the extent of transformation and size of the roads exceed the thresholds required for a full EIA regardless of CBA status. In terms of the regulations there do not therefore appear to be any additional measures beyond those which are already in place which must be taken because of the CBA status of a large proportion of the site. However, it is nonetheless necessary to justify why the development should take place within the CBA as well as assess the extent to which the development is likely to compromise the overall ecological functioning of the CBA. The following issues need to be considered when considering development within a CBA:

- Are there alternative areas within the site but outside of the CBA that could be developed?
- Does the project undermine the overall ecological functioning of the broad CBA area?
- Can mitigation measures reduce the impact of the development on ecological processes?

2.4.2 Ecosystem Processes

Distinct ecological processes are generally associated with surface geology and soils, climate, topography, drainage systems, and the make-up of the remaining native vegetation. These features could be missed or only partly incorporated into land use plans unless they are specifically identified and targeted. Ideally, areas maintaining adaptive diversification (e.g. environmental gradients) or containing historically isolated populations should be identified and protected. The spatial aspect of ecological processes also needs to be determined and such insights incorporated in conservation planning. Finally, connectivity within these areas should be ensured to maintain species migration and gene flow. However, the spatial components of processes have rarely been considered in conservation planning – an approach that is also especially useful for development planning in biodiversity hotspots. The ecological processes within thicket and specifically Fish River Thicket types is explained in Table 4 below.

Table 4: Thicket Ecological Processes

Thicket Ecological Processes

Ecological processes work at various levels, some at the regional level that often determine the condition of the vegetation at a community and higher level, while the small-scale processes often determine pattern and the intrinsic biodiversity within these communities These include climatic and

edaphic conditions as determinants of the plant productivity of the Thicket vegetation as well as the dynamic role of fire and herbivory to retain variance within the Thicket vegetation types.

- There is little that one can do about the dynamics of climatic condition, except noting the potential impacts of periodic shifts in the climate.
- In terms of edaphic conditions, the Thicket vegetation in itself is probably the largest determining factor, as it is the largest contributor towards build-up of leaf litter and thus soil forming processes. One should, however, take note of the vital importance of retaining this leaf litter layer as its demise will undoubtedly also result in the demise of the Thicket vegetation. This seems particularly so in the case of the Valley Thicket units. Here the mulch layer may not only have an important water retaining function, but also have allelopathic properties to prevent grasses from establishing under the bush-clumps.
- Once grasses are abundant, they can fuel the eternal enemy of this Thicket type, fire. Especially along riverbanks and in floodplains where the soils are vulnerable to erosion, soil building and retaining factors are important processes to maintain the local ecological system in a healthy condition. The soil and water “binding” ability of the Thicket vegetation is an important aspect in regional ecological processes, not only because much of the Thicket vegetation occurs in river valleys, but also because much of it occurs in regions where it “never rains, but pours”.
- The other two factors that operate on a regional scale are both associated with the most important disturbance regimes of the Thicket Biome, herbivory, and fire. The complexities of the interrelationship between herbivory and fire limit the understanding of the local dynamics of the different Thicket vegetation units. Fire is undoubtedly required to periodically create gaps in extensive stands of the Thicket vegetation. Without these gaps in the Thicket vegetation the full complement of faunal and floral diversity associated with the Thicket Biome could not exist.
- Species richness levels of all biota would be least in extensive stands of Thicket where the canopy is closed. The same would be true at the extreme opposite side of the scale, where the Thicket is extremely fragmented. Plant species richness, measured at whatever scale, is highest at the contact zone between solid stands of Thicket and those of a different vegetation type. The high diversity in these tension zones is not only due to the fact that species from two (or more) Biomes co-occur in these areas, but also because it is often enriched by highly localized species endemic to the Thicket Biome. When in a pristine condition the Thicket clumps often appear as neatly defined units in the matrix vegetation. Some balance is here retained in the disturbance regime, which ensures that both the Thicket clumps and the matrix vegetation is retained. This balance seemed to be retained by a specific herbivory regime, where fires are only periodically able to enter during drought conditions. When fires burn, it would burn rapidly through the matrix vegetation, it would thus not be able to enter through the protective “skirt” that these Thicket clumps have. The importance of retaining a balance between grazing and browsing herbivores in these mosaic Thicket units is obvious, as it would affect the fire regime of the area. These mosaic Thicket units probably also contain the highest richness levels of fauna, as a great variety of different microhabitats co-occur in close proximity.
- The importance of large herbivores to retain a particular disturbance regime seems to be particularly important towards the upper end of the rainfall regime (600-800 mm per annum) in which the Thicket vegetation occurs. Here gaps created and maintained by herbivores probably retained a mosaic of different vegetation types, even at a small scale. We suspect that these disturbance regimes are no longer operative in many of our Forest Thicket units (e.g. Sardinia-, Vanstadens-, Umtiza- and Zuurberg Forest Thicket). Some of the species which may have been dependant on these disturbance regimes (e.g. *Umtiza listeriana*) are now very rare.
- An interesting feature of the tension zones between Thicket and Grassland and/or the Fynbos is that the endemic species often consist of a number of localized species within a specific genus. The genera *Brachystelma* and *Faucaria* seem to have “exploded” in these sites in the Grahamstown area, so did *Gasteria* in Gamtoos-Groot area and *Haworthia* in Gouritz-Gamka area. The same holds for the genus *Euphorbia* in the entire Thicket Biome. The disturbance regimes that maintain the fine balance of retaining both the matrix vegetation and Thicket

vegetation in an area are believed to be vital to maintain these “species-pump” zones. Many of these localized endemics may well be close sister taxa and their taxonomic position sometimes viciously debated, but they are undoubtedly packages of independent genetic material that are morphologically identifiable.

- It is, however, not only the fragmented Thicket vegetation units that are important refugia for unique genetic material. The solid stands of Thicket may be less obviously, but equally important harbors of unique genetic material. In the case of highly localized taxa we have some taxonomic understanding of the variance in genetic material between taxa, but in the case of certain common and widespread species we often do not have a mechanism to communicate the genetic variance within a taxon. One of the best examples in the Thicket Biome is the relatively abundant *Cotyledon orbiculata*. This species exhibits enormous morphological variance in the Thicket Biome, but its variation is clinal of nature and is thus poorly recognized in its taxonomy. It is probably one of the best examples of a ring-cline species in the planning domain, as completely different morphological forms of *Cotyledon orbiculata* often co-occur in certain sites. We suspect that many of the common Thicket species (e.g. *Schotia afra*) may also exhibit a high degree of genetic variance, but that it is less clearly exhibited in their macro morphology. The lattice of Thicket units probably enabled the species of the Thicket vegetation to retain a high degree of plasticity, as they could exchange genetic material spatially and temporally. Even during periods of climate change the Thicket species did not become isolated in fragmented units in most of the landscapes of the planning domain. They probably shifted spatially as entire communities from time to time. A high degree of connectivity thus enabled the dominant species within the Thicket to retain a high degree of plasticity and thus the ability to migrate spatially when climatic conditions altered. Genetically these species may occur as heterogeneous entities, a vital character that could probably only be retained by maintaining the connectivity of the various Thicket units. These continuous links between the various Thicket units is obviously also equally important to retain the faunal component of the Thicket Biome. Retaining both the coastal links (Dune Thicket) and the inland links (river systems) in the Thicket vegetation is vitally important for long-term conservation objectives.
- A specific feature of the flora of the Thicket Biome is the often-rapid east-west turnover in species from one river system to another. The same also happens in a north-south pattern, but these floristic changes are often more diffuse as it is an internal change brought about by structural changes in the Thicket vegetation as different climatic regimes are intersected. A somewhat peculiar feature of these species changeover zones, especially from one regional Thicket unit to the other, is the degree to which one find hybrids between the species typical of the two adjacent Thicket units in this border zone. Most easily detectable are the hybrids between species of the genera *Aloe* and *Euphorbia*, but this pattern may not be replicated in other genera. It may well be that these species tension zones are the placentas of species that become common and widespread in time.
- Small-scale ecological processes are the building blocks of the larger biodiversity picture. With small-scale processes we imply those required maintaining the dynamics of individual species within the Thicket units. Thus, the daily business of life in the Thicket, or the issue of local extinction and immigration rates. Where there has been a local extinction event of a Thicket clump, there has to be a series of events to re-establish the Thicket clump or a number of them to maintain a solid stand of Thicket vegetation. For all the Thicket units this initial establishment event depends on an initial seed dispersal event of a woody tree species that would be the pioneer of the Thicket clump. Birds are the main dispersal agents of these pioneer woody species (e.g. *Azima*, *Gymnosporia*, *Lycium*, *Rhus*, etc.) for all the mainland Thicket units, but some of the pioneer Dune Thicket species (e.g. *Brachylaena*, *Tarchonanthus*, etc.) also utilize wind as a dispersal agent. The importance of especially frugivorous birds in this system cannot be over emphasized. The retention of an unbroken habitat to retain these initial seed dispersal vectors is of obvious consequence. The availability of perches for these birds is obviously equally important, as is very evident at present along roadside fences.

- A somewhat peculiar feature of many of these important pioneer species of the Valley Thicket is that they are all highly spinescent taxa that have recurved branches once they have grown up to a height of ± 1.5 meters. They retain this recurved branch character when mature and form a solid, tangled clump of thorny branches that produce a deep shade underneath the bush clump. This growth form ensure that the pioneer Thicket clumps are resilient against the impacts of herbivory and the establishment of understorey grass species, which could enable fires to enter into these bush clumps. This guild of pioneer Thicket species consists of a range of taxa from several plant families, a fact pointing to a rigid regime selecting for a very specific mode of growth to be a successful pioneer species in disturbed Thicket environments. Once the initial Valley Thicket bush clumps have established in the disturbed environment, a series of other events are required to ensure that the local process of “Thicket-building” is completed.
- The most important next step is the consolidation of individual Thicket bush clumps. The establishment of several spinescent liana species, which produce connective strands between the individual Thicket clumps, largely facilitates this process. Species of *Asparagus*, also a group of bird-dispersed taxa, are some of the most common lianas that bind the Thicket clumps together. The post-disturbance processes in the higher rainfall areas, where our Thicket units occur, seem to follow a very different recovery process. Here non-spinescent, upright growing, resprouting species such as *Plumbago auriculata* and *Tecomaria capensis* are the most important initial woody species to establish after disturbance, with a set of non-spinescent lianas such as *Senecio* species, acting as the binding factor between pioneer bush clumps. In the latter case bird dispersal is not very prominent, unlike the case of the Valley Thicket unit example.
- Apart from the evidence indicating that frugivorous birds are very important seed dispersal agents in the Thicket Biome (even for rare taxa such as *Encephalartos* species), we have little other information on other potential important seed dispersal agents. Very little is known about the autecology of most of the Thicket species. Even the seed dispersal mechanism of a common species such as *Schotia afra* is not yet determined. We wonder if it’s wide distribution and the lack of an aril (as compared to the other *Schotia* species) point to dispersal by Elephants. We also have little information pollination agents for Thicket plants, except that nectivorous birds are important pollinating agents for a range of Thicket plants, e.g. species of *Aloe*, *Erythrina*, *Schotia*, etc. None of these birds, however, seem to be exclusive to any specific taxon or group of taxa. Even the local plants with seemingly highly unusual flower structures, such as *Ceropegia* and *Strelitzia* do not use very specific pollination agents. The rule for success in flower pollination in the Thicket Biome has seemingly been to utilize generalists, however fancy your flower may be.

Gouritz Dune Thicket Dynamic Processes

The successional process where littoral vegetation on the primary dune systems is gradually replaced by Dune Thicket vegetation is well known. The limitation of this woody shrub and tree dominated vegetation to a narrow band along the coastline, which is brought about by salt laden winds from the seaside and periodic fires that burn from the inland, is also well known. So also, is the fact that this vegetation tends to sweep inland, mainly along the edges of estuaries where large rivers mouth into the sea. Many of the initial pioneer species (e.g. *Rhus crenata*) that result in the formation of Dune Thicket are restricted to the quaternary sands along the coastline. Many of the species typical of the climax unit (e.g. *Azima tetracantha*, *Rhus glauca*, *Sideroxylon inerme*, etc.) are, however, able to grow very well on loamy or even clayey soils in more inland sites, especially in sites where fire and frost do not occur. Many of these Dune Thicket species are thus also abundant in the fire- and frost protected valleys that occur in more inland sites along these rivers. Hypothetically these Dune Thicket species may occur deep inland along these rivers, but this is rarely the case, as the rainfall tends to decrease away from the sea, while frosts often occur in these arid sites. At this point in the landscape, usually where the rainfall is less than 300 mm per annum (less than 200 mm in summer), the Dune Thicket species have to give way to species that are better adapted to withstand periodic summer droughts and frost in winter (Nama Karoo vegetation). At some point along these river valleys, there would obviously occur a mixture of these Dune Thicket and Karoo elements, this vegetation we call the Valley Thicket vegetation. With this super-simple model we

suggest that the Dune Thicket vegetation be closely related to the Valley Thicket, which in turn, is closely related to the Arid Thicket of the inland valleys. This simple model also explains why there is such a gradual change in plant species along the seemingly steep climatic gradient from the coastline to the arid inland valleys. It also explains why certain species typical of the coastal environment, such as *Azima tetracantha*, *Chironia baccifera*, *Grewia occidentalis*, *Nylandtia spinosa*, *Olea exasperata*, *Rhus glauca*, *Sideroxylon inerme*, etc., occur from the west- to the east coast, often with extensions into arid inland areas. The rivers, in which the Valley Thicket occurs, obviously run parallel to each other and the Thicket vegetation of these river systems is only linked via the Dune Thicket linking them along the coastline. The Dune Thicket thus plays an important role as a corridor through which genetic material of plants, and animals, can migrate. The linking of these river systems, via the Dune Thicket vegetation, has probably played an important role in preventing the fragmentation of plant populations. This maintained the integrity of many species over a wide area, from the east- to the West Coast. Fires are, however, able to burn right onto the coastline along the West Coast, which has brought about a greater fragmentation of the Dune Thicket vegetation north of the Cape Peninsula. The survival of some typical Gouritz Dune Thicket species (e.g. *Rhus pterota*) in fire protected sites at Saldanha Bay probably indicates that the fragmentation of this vegetation is of relatively recent origin. It is interesting to note how recent evidence for the origin of modern man is often from sites where this vegetation unit occurs. It probably provided an acquainted and easily recognizable vegetation type, known to be a safe harbour from extreme climatic conditions, for a very long period of time for early modern man. The abundance of middens and fragmented shell material so often present in the sands where this unit occurs, clearly attest to this simple fact.

Implications:

- Additional fragmentation of thicket and riviere vegetation will be minimal, and the key corridors to the west will not be significantly affected, as the site is situated directly adjacent to existing developed erven.

2.4.3 Ecosystem Services

“Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services, recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling”. (Millennium Ecosystem Assessment (MEA), 2005)

Terrestrial (or land) ecosystems provide valuable ecosystem services that contribute to human well-being. They can provide¹¹:

- buffers against natural hazards such as fire and floods^(e)
- carbon sequestration (storage), important for reducing the impacts of climate change^(e)
- regulation of water supply
- grazing for wild animals and livestock^(e)
- natural spaces for recreation & tourism^(e)
- the air we breathe^(e)
- spiritual, ritual and ceremonies
- horticultural & wildflower industries
- natural heritage^(e)
- food, fibre, and medicinal plants

¹¹ Within the study area, terrestrial ecosystem services are marked ^(e).

Rivers are central to human welfare and economic development. They provide:

- water for agricultural, industrial, and domestic uses^(e)
- flood attenuation and regulation^(e)
- food and medicinal plants
- transport and/or purification of biodegradable wastes^(e)
- tourism, recreational and cultural use^(e)
- enhanced property values^(e)

Estuaries, together with an associated buffer of natural vegetation, perform several valuable functions, especially in relation to:

- subsistence fishing
- commercial fisheries (as they provide a refuge for commercial fishes when they are young)
- wildlife habitat e.g. nursery and refuge (providing habitat for amphibians, birds, fish and mammals for all or portions of their life cycles)
- tourism, recreational, cultural use, and craft materials
- enhanced property values

Ecological corridors provide valuable ecosystem services that are often impossible or very costly to replicate or offset. For example, they:

- support the migration (movement) and long-term survival of plant and animal species and their ecological processes (e.g. fire, pollination, seed dispersal), in response to global climate change^(e)
- are important areas for storing carbon to reduce the impacts of global climate change^(e)
- are important areas for regulating water supply (e.g. filtering and storing drinking water, keeping excess nutrients out of wetlands and rivers, ensuring a high-water yield from mountain catchments)^(e)
- supply good quality water from mountain catchment areas, both surface and groundwater.
- the supply of water quality and quantity is not only for human consumption but for ensuring the survival of downstream estuaries, wetlands (vleis) and streams (which in turn provide us with other ecosystem services).^(e)
- are of important scenic value, contributing to tourism and the ‘sense of place’.^(e)
- Coastal & marine areas
- Subsistence & commercial fishing (food)
- Medicinal & Cosmetic resources e.g. kelp & microscopic plants for the feed, food, cosmetics, & pharmaceutical industries.
- Mining (sand and heavy mineral)
- Recreational value (sport and fishing)
- Retail value (market-value of housing)^(e)

Net Primary production^(e): This critical ecological process involves the process of photosynthesis – which translates into the amount of carbon plants can fix on an annual basis. This is important for each LM within the district as the amount of carbon fixed translates directly into the amount of forage produced and thus made available for grazing. Consequently, livestock management directly impacts upon forage production as overgrazing reduces the vegetations’ ability to maintain this ecosystem process. This ecological process is especially significant for the NLM, as the main land use comprises of livestock grazing. Therefore, this factor has a direct bearing on both the amount of food available for livestock, and the amount of plant material available regarding reducing runoff in wetland areas.

Water production^(e): In more arid areas, many municipalities and towns rely on groundwater or local water resources to supply to town with drinking water. Thus, the higher rainfall areas are key recharge

zones for these groundwater resources. Consequently, land use management of these catchment areas are critical for the maintenance of the quality and quantity of water sourced from each area. For example, water courses and wetlands that have been cleared for agricultural purposes, or overgrazed, will not only cause soil erosion, but most importantly cause increased water runoff, thus reducing the amount of water that feeds back into the water table for consumption. Groundwater is also a critical resource for agriculture and food production.

Species movement corridors and climatic refuges^(e): Global climate change is undoubtedly one of the most significant threats to the Succulent Karoo in the coming decades. A key action to mitigate its effects is the maintenance of species' ability to migrate to new locations as the climatic conditions which they require move across the landscape. These corridor and refuge migration strategies occur on both a micro and macro level. On the macro scale corridors provide for species movement at landscape scales. This entails the ability of fauna and flora to undertake large scale movements towards areas which continue to provide the conditions required by a species for growth and reproduction. Movements could entail migrations of up to hundreds of kilometres, and corridors of mostly natural or near natural vegetation across the landscape are needed to permit this to occur. Climatic refuges can be localized areas that have moderated climates – such as mountain kloofs and south facing slopes. These areas provide cooler habitats where species under threat from changing climates can colonise or species and vegetation not widely found in surrounding area.

Within the site, the most important ecosystem services are species movement corridors, habitat for faunal species (nursery, refuge and foraging) as well as tourism, recreational and cultural use. There is already a significant change to ecosystem services from predevelopment conditions because of historical development and progressive degradation as a result of surrounding village development.

Implications:

- In principle, with appropriate after-care and rehabilitation and implementation of recommended mitigation measures, these ecosystem services should not be adversely affected in the medium to long term by this specific activity.

2.4.4 Ecological Support Areas

Ecological Support Areas include supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature.

No ESA's are identified in proximity to the site.

Implications:

- Development of the site will have no impact on Ecological Support Areas.

2.4.5 Critical/Important Terrestrial Habitats

Special Habitats include areas that are rare within the region, or which support important species, ecosystems, or ecological processes. Species of Special Concern refers to red data species and includes the locations where these species are known to occur. Red data species are plant, animal, or other organisms (e.g. reptiles, insects etc) that have been assessed and classified according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern. Red Data species are those species classified as Extinct, Critically Endangered, Endangered or Vulnerable. Some

of the red data species are listed within the NEMBA Threatened or Protected Species (TOPS), and some are protected by provincial ordinances. The Eastern Cape Biodiversity Conservation plan (ECBCP) does not identify specific Important Critical or Important Terrestrial Habitats; however, a number are identified within the Regional Plans as described below:

Rocky Outcrops

In general, rocky outcrops are absent from the landscape, other than occasional calcrete outcrops which do occur in places. These generally provide habitat for species not common to the surrounding landscape. No natural rocky outcrops are present, however along the southern boundary of the site is a road cutting, which has created suitable habitat to some extent. The recommendation is to avoid this area, which is in any event inaccessible.

Wetland habitat

Wetlands are special habitats as they provide a refuge for birds and other organisms, such as frogs and insects. They are important hydrological process areas that are linked to ground or surface water flows. Natural wetlands are all considered to be Critical Biodiversity Areas. Wetlands are protected by the National Water Act and the Conservation of Agricultural Resources Act. No natural wetlands are present, as per FEPA and NBA datasets, hence no natural wetlands will be directly or significantly affected. The aquatic components are not considered in detail in this assessment, as they will be dealt with in a separate aquatic assessment (Refer to separate aquatic specialist assessment). Where observational comments in this report contradict any made in aquatic assessment report, the aquatic specialist will supersede those made in this report. None are deemed to have any significant flora, and any fauna is unlikely to be affected by the proposed activity significantly. Wetlands or Estuaries are protected by various pieces of legislation, such as:

- The *National Water Act* (NWA) 36 of 1998, which stipulates that reserve determination studies need to be undertaken to identify the ecological reserve requirements of a wetland.
- The *NEMA* in terms of principle (r) and the listed activities (Section 24).
- The *Conservation of Agricultural Resources Act* (CARA) 43 of 1983; in which no activities are allowed within the flood area or within 10 meters horizontally outside the flood area.

No wetlands are present.

Priority Estuaries

No estuaries are present.

Forest

Forest and forest-thicket is abundant in the surrounding landscape and does extend into the site, although the vegetation does appear to be on the side of dune thicket but is also regarded as scrub or pre-cursor forest. Where microclimatic and soil conditions allow and in the absence of fire, the scrub forest/thicket can become forest. In terms of the definition of natural forest, the site vegetation on site generally meets the criteria, although the indicator species such as *Afrocarpus falcatus*, *Celtis africana* and *Calodendrum africana* are absent. In addition it is noted that where crown cover is > 75 %, it is usually not interlocking and mostly provided by a large tree (usually multistemmed Milkwood Trees).

Fynbos

Some fynbos elements are present, but unlikely to be affected significantly under the proposed development plan, as they are excluded. The fynbos present appears to be a precursor or pioneer vegetation to the dune thicket, possibly an early successional stage after fire or other disturbance. It appears to be replaced by thicket species in the absence of disturbance or fire, hence would not be

considered a standalone vegetation unit. The coastal fynbos in the region is known to provide habitat for a number of faunal species with limited ranges and any impacts must be limited to those relating to installation of services (i.e. sewer, electrical, water). These impacts should be limited in extent as far as possible.

Colonies or Populations of Threatened or Protected Species

No colonies of threatened fauna or flora species are recorded that are directly affected, however transient bird, mammal and other species that have colonies or populations in surrounding areas may well frequent the site in a transitional manner. Development of the site may cause some displacement of these individuals but is unlikely to pose a risk to any species, population or colony.

Implications:

- No critical or important terrestrial habitats, as described above, that would be adversely affected directly by the proposed activity, have been identified.

3 Biodiversity Risk Identification and Assessment

3.1 Baseline Biodiversity Description

3.1.1 Site Locality

The site is situated in Keurboomstrand, a coastal village comprised of several clusters, generally interspaced with undeveloped areas. The site is situated on the western side of such a cluster and is bound on all sides by developed erven or infrastructure. Erven in the area generally have restricted footprints that are tucked away within a natural forest-thicket matrix that is retained.

3.1.2 Topography and Drainage

The site is situated on a south facing coastal palaeodune, running in an east-west direction. The site is located on a small bench approximately 100 m inland from the high-water mark.

3.1.3 Terrestrial Landscape Features (Habitat)

Overview

The project area is generally characterised by undulating to steep south facing palaeodunes, deeply incised by drainage lines and rivers where slopes are generally vegetated in solid dune thicket with dune forest in places and occasional patches having coastal fynbos.

Within the site, the predominant vegetation is the Dune Thicket, becoming forest and with a patch of moribund pre-cursor fynbos along the southern edge and at the base of the slope (historical dune slack, which has been cut off from the coast by a road). Dominant species (typical of the dune thicket) include *Pterocelastrus tricuspidatus*, *Schotia afra*, *Sideroxylon inerme*, *Tarchonanthus littoralis*, *Azima tetraacantha*, *Carissa bispinosa*, *Mystroxydon aethiopicum*, *Cassine peragua*, *Euclea racemosa*, *Grewia occidentalis*, *Gymnosporia capitata*, *Maytenus procumbens*, *Mystroxydon aethiopicum*, *Olea exasperata*, *Passerina rigida*, *Putterlickia pyracantha*, *Scutia myrtina* and various *Searsia (Rhus) spp.*

It is clear from the Site Assessment, that a portion of the site does currently host the Dune Thicket, as well as fynbos and forest elements, which are deemed to be successional pre-cursors (fynbos) and successors (forest) to the Dune Thicket. Dune Thicket may not necessarily become forest and fynbos may not necessarily develop into Dune Thicket.

A summary of Terrestrial Landscape Features and indicators is provided in Table 5. The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence

the localised impact associated with any footprint would in general be of low to very low significance with implementation of a number of mitigation, as well as some possible minor alignment adjustments.

3.1.4 Site Vegetation

Based on literature and site observations, the vegetation in a mosaic of transitional vegetation, where a coastal fynbos develops and in the absence of fire or disturbance can develop into a dune thicket vegetation. Over long time periods and with the absence of disturbances and fire, as well as where microclimate and soil conditions allow, this can become forest.

The vegetation present on site can be categorised as follows (Figure 12 to Figure 11):

- Natural vegetation (Scrub Forest/Thicket) – The predominant vegetation with dominant species largely being trees (mostly 2 – 5 meters in height) with poorly developed ground cover except where opening in the canopy (disturbed patches) allow sunlight penetrating.
- Natural vegetation (Dune Forest) – Forest and forest like vegetation can occur where thicket reaches a climax stage. This climax state is only prevalent where specific conditions allow.
- Natural Vegetation (Fynbos) – a fynbos vegetation, usually a precursor to the dune-thicket.



Figure 10: View of site from east

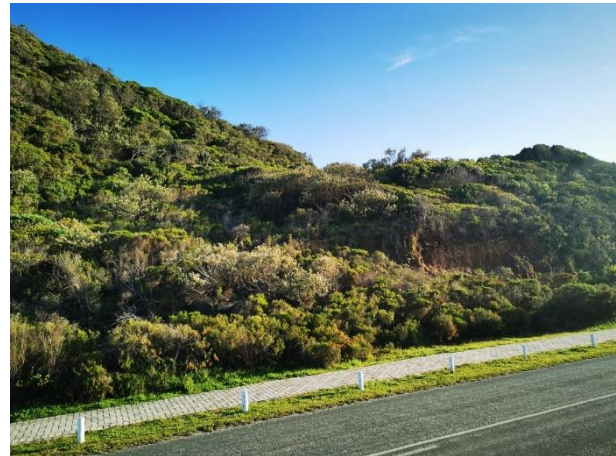


Figure 11: View of site from south-west

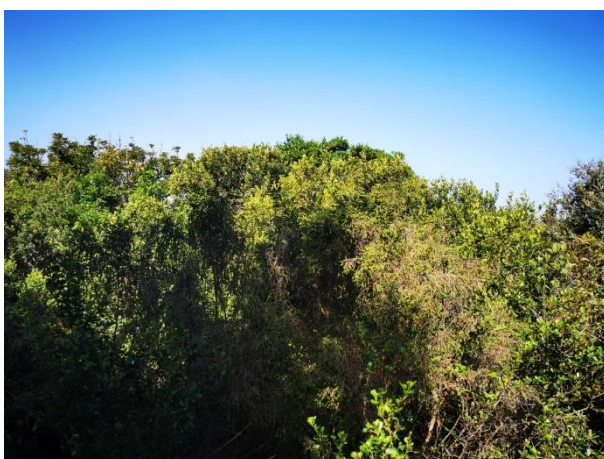


Figure 12: Dune Thicket



Figure 13: Dune Thicket



Figure 14: Disturbed areas



Figure 15: Disturbed areas



Figure 16: Remnant Forest elements



Figure 17: Remnant Forest elements

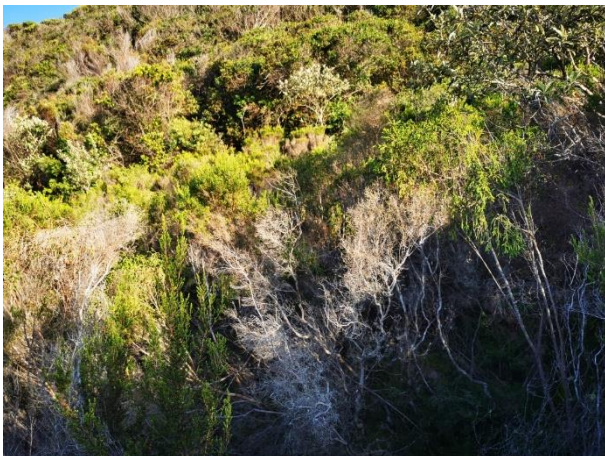


Figure 18: Fynbos patches

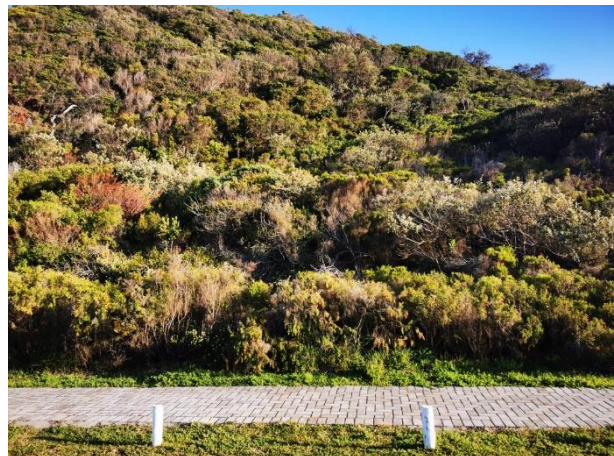


Figure 19: Fynbos patches

3.1.5 Present Ecological State

Table 5 provides a comprehensive description and assessment of biodiversity and ecological indicators for the site. In summary, the following general observations can be noted regarding the site:

- Vegetation on site can be considered to range from semi intact (with pockets of still intact – dune-thicket) through varying degrees of degraded where there has been disturbance, most likely due to historical bush clearing to access the site. Evidence is present (ct area) of historical intent to prepare a portion of the site for construction of a small dwelling.
- Alien invasion is generally low.

- To the immediate west of the site is a large steep area having generally natural and undisturbed dune thicket with forest elements.
- To the east is predominantly urban development interspersed with remnant pockets and elements of natural vegetation that has been retained.

Table 5: Summary of Key Biodiversity and Ecological Indicators

ASPECT	DESCRIPTION
LANDSCAPE AND COMMUNITY DESCRIPTION	
Aspect, Slope, Topography	South facing coastal palaeodune, running in an east-west direction. The site is located on a small bench approximately 100 m plus inland from the high-water mark
Substrate	Consolidated and unconsolidated palaeodunes
Vegetation units	Dune Thicket, as well as fynbos and forest elements, which are deemed to be successional pre-cursors (fynbos) and successors (forest) to the Dune Thicket. Dune Thicket may not necessarily become forest and fynbos may not necessarily develop into Dune Thicket.
Total Ground Cover (%)	60 – 80 %
Tree Height (m) – Median	2-8 m in dune thicket and forest 0.50 to 1.5 m in fynbos & disturbed areas
Tree Cover (%) Aerial	70 – 90 % in dune thicket < 10 % in disturbed and fynbos areas
Shrub Cover (%)	< 20 in dune thicket
Herbaceous Cover (%)	> 80 % in fynbos and disturbed areas
Grass Cover (%)	Grass cover is low in all areas, < than 5 %
Bare soil/rock (%)	Usually less than 5 %, except on rock face adjacent to road cutting to the south of the site
TERRESTRIAL LANDSCAPE FEATURES	
Forest	No distinct Forest is present within the affected footprint, forest elements can be found within thicket in protected niches.
Thicket	Predominant vegetation dominated by large to medium sized trees.
Grassland	None
Fynbos/Grassy Fynbos	Fynbos elements are present in a small patch on the south side of the development footprint. These are considered to be an element of the Dune Thicket, most likely a precursor.
Riparian	None
Wetland	None
River/Aquatic	None
Dunes/Coastal	The sit is situated on vegetated palaeodunes. No typical pioneer coastal vegetation is affected.
Rocky Outcrop Habitat	No significant rocky outcrop habitat was recorded within the proposed footprint. A small cutting on the southern boundary, due to road construction is present but is outside of the development footprint. This cutting creates artificial niche for certain species.
Fauna Nesting Sites	None present, trees may be utilised by various nesting bird, however none were noted.
Fauna Feeding Grounds	The thicket habitat may provide feeding habitat for a range of faunal species, including small mammals, which are likely to be transient to the site.
Ecotones	Ecotones are not well developed on the site.
Ecological Corridors	The Dune thicket does provide an ecological corridor. Development of the footprint is unlikely to significantly disrupt this corridor, other than minor displacement during construction.
Evolutionary Processes	None of significance within terrestrial environment.

ASPECT	DESCRIPTION
Transformed (lands)	None
Transformed (other)	Minimal, surrounding area had been developed as an urban settlement with associated disruptions.
Degraded (modified)	Degradation is present in the form of some historical vegetation clearing of small patches and pathways within the site.
Secondary vegetation	Minimal, where historical clearing has occurred, secondary vegetation is present, in small cleared patches and pathways. Vegetation on the cutting outcrop is likely to be secondary.
DISTURBANCES, CURRENT LAND USES AND SOURCES OF DEGRADATION	
Human disturbances	Human disturbance due to urban development are present in surrounding urbanised landscape
Habitat fragmentation	Fragmentation is present at the east, north and south of the site, as a result of urbanisation but mostly absent to the west side.
Invasive Alien Plants	Alien invasives are minimal on the site other than the occasional weedy species and a few small clumps of Rooikrantz.
Other degradation (Aquatic)	None
Remaining intact habitat:	Large areas of intact habitat are present in the surrounding landscape, in particular along the south-facing slopes to the west of the site within the affected erf.
Grazing (livestock)	None.
Hunting	None
Conservation (passive)	Intact corridors fulfil a passive conservation role to some extent.
Recreational (sport)	Recreational use of the wider area and river is present, mostly associated with beaches and urbanised landscape.
Other	None
PATTERNS OF BIODIVERSITY	
Flora	Flora diversity is moderate to high for the vegetation units, specifically due to the varied landscape, having fynbos, forest and coastal elements in the wider landscape.
Fauna	Fauna diversity is likely moderate, birds are likely to be most diverse resulting as well as mammal and likely a few amphibian species common to dune thicket and associated microclimate.
Species of Special Concern	Numerous species are potentially found in the region and vegetation units, none of significance were recorded on the site, other than some generally widespread PNCO species.
ECOLOGICAL PROCESSES	
Gene dispersal barriers	Roads, urban development, fences, habitat fragmentation.
Gene dispersal corridors	Dune Thicket and forest corridors as well as fynbos patches.
Aeolian (dune) processes	No aeolian (sand) dunes are present
Climatic gradients	No climatic gradients are present
Rivers and Drainage Lines (Riparian Vegetation)	None
Refuges (outcrops/islands)	Rocky and other refuges are not prevalent within the site, other than the small artificial outcrop cutting adjacent to the road.
Fire	Fire is important within the fynbos patches but unlikely to be prevalent within dune thicket and generally absent to intact forest.

ASPECT	DESCRIPTION
Ecotones/Tension zones	Ecotones are limited because of the lack of complexity. Some is present between fynbos patches and thicket and where there has been historical disturbance and clearing of dune thicket.
Erosion	Erosion is absent. Slumping is noted to occur on dune areas on steep slopes in surrounding habitat. Such dune slopes should not be disturbed, without appropriate stabilisation, which would incur additional disturbances.
ECOLOGICAL SERVICES	
Carbon storage	Dune Thicket and forest is considered a moderate to high carbon accumulator. Dune Thicket and thicket-forest in the surrounding is well developed likely to be high.
Provisioning Services	<u>Livestock grazing</u> : None. <u>Timber (Building materials & fuelwood)</u> : Dune Thicket is tree dominated having several suitable timber species. Usage in the area is minimal, although where bush clearing has occurred, it is likely that some is used for building and also for fuelwood. <u>Food</u> : Low. None known <u>Fibre</u> : None in area <u>Medicinal plants</u> : Various species have medicinal properties and may be harvested informally in the area.
Other (ornamentals)	Few local species are considered to have ornamental value. Some species have been retained or planted at a later stage in surrounding urban gardens.
CONSERVATION IMPORTANCE	
Current Distribution (extent)	Vegetation units have a widespread regional distribution covering an extensive area outside of the site footprint and is regarded as being well-protected (NBA, 2018)
Red Listed Species and other Species of Special Concern	Several species are known from the surrounding area and vegetation units. None were recorded during the site visit.
Habitat for SCC (Species of Conservation Concern)	Several species of special concern are known from specific areas in proximity to the site, as well as the vegetation units that are present. The site does potentially provide habitat for some of these species, although none were recorded during the site survey. The small patch of fynbos on the southern site of the site provides the most likely habitat for such SCC and it is recommended to not be developed.
Relative Conservation importance	The general area has been identified as a priority area for conservation (i.e. designated as CBA).
OTHER SENSITIVITIES	
Conservation importance	Intact vegetation along ecological corridors is of importance, as a connector
Topography	Slopes vegetated with forest and thicket are unlikely to be susceptible to further development other than a few strategic footprints, as can be seen in the surrounding landscape. Large tracts of dune thicket are thus unlikely to be developed in the future.
Wetlands	None
Rehabilitation potential	Dune Thicket and Forest has a low rehabilitation potential, dune fynbos is high as it is a pioneer vegetation and considered to be a pre-cursor of the dune thicket.
Community structure	Community structure is generally moderate to high, with a range of growth forms including trees, shrubs, and lianas where disturbance allows. Within climax forest, this structure tends to decrease in complexity.

3.1.6 Flora

Protected Trees present include the Milkwood Tree (*Sideroxylon inerme*). Any removal of these trees will require a permit in terms of the National Forests Act. Several flora species protected in terms of the Provincial Nature Conservation Ordinance (PNCO) are also present (Table 6) and will require permits before removal. Despite these species being generally widespread and not threatened, they are protected in terms of regional legislation and any impacts to these species requires a permit from the relevant authorities before commencement. A flora search and rescue are also recommended. The implication is that a comprehensive list of species occurring within the footprint of the proposed infrastructure is required and a permit application submitted for any of those listed as protected. A walk-through survey is therefore recommended once the final layout of the footprint as well as any temporary laydown areas have been finalised in order to obtain the required permits for destruction of these species.

A number of endemic and range restricted species are known from the general surrounding area and there is a residual likelihood that they could be present, but cannot be discounted without comprehensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the highly localised nature of the impact, with vegetation clearing only required for the development footprint, the risk of a species suffering any significant loss is low. There is always a residual risk to species for any activity.

3.1.7 Fauna

The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.

Mammals

The smaller mammal species that could potentially be found on the project site, are highly mobile species that would move away from disturbance and with extensive habitat available in the immediate surrounds would unlikely be negatively affected by the development. In addition, many larger mammal species are likely to have already been displaced due to existing urban activities. No species of concern have been highlighted during the screening process and none were recorded on site.

Small mammal species such as Bushbuck, are known from the general area, but are generally mobile and likely to be transient to the area. The minimal disturbance is unlikely to cause any significant disruptions other than minor displacement during construction. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Furthermore, such species that are present are likely to already be adapted to some extent to the unraised landscape and the additional development will have no significant impact.

Avifauna and Bats

Bird species identified by the screening tool, including *Circus maurus* (Black Harrier). This species may frequent the general area as foraging habitat, however it is highly unlikely that the small and localised footprint will have any impact on this species. No roosting or nesting sites were observed on or nearby the site.

Passerines (perching species) are more likely to be impacted upon through habitat destruction, while ground nesting birds are more likely to be impacted through disturbance. While species may utilise the area for breeding or foraging, they are unlikely to be significantly affected, as those species present are already living within an agricultural area. Larger species including raptors are unlikely to be

significantly affected other than minor disturbance and displacement, again any species present would already be co-existing within an urbanised landscape.

Any disturbance or displacement associated with increased activity or habitat destruction is unlikely to pose a significant negative impact on birds, and when there is a specific activity, it would be temporary in nature, and within an already somewhat urbanised.

Reptiles

Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. Due to the limited loss of intact habitat, it is unlikely that there will be any significant impact to any population or species. *Tetradactylus fitzsimonsi* (Fitzsimons' Long-tailed Seps) is known from the general area and suitable habitat is present. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway, and such a search and rescue may only find one or two specimens for such a limited area. A reptile handler should preferably be available should any specific species be found, that cannot be moved easily by hand. Due to the localised and small size of the footprint the significance of any impact to any population of this species is minimal.

Amphibians

Afrivalus knysna (Knysna Spiny Reed Frog) is known to inhabit Coastal mosaic of Mountain Fynbos and Afromontane Forest, hence suitable habitat is present. An amphibian search and rescue are unlikely to be required before commencement, should any wetland areas be disturbed. Due to the localised and small size of the footprint the significance of any impact to any population of this species is minimal.

No other amphibians of concern are known to be present or potentially present. No wetland habitat is present or will be affected, which precludes species from these habitats being present, comprising the majority of other reptiles species known from the general area.

Invertebrates

Invertebrate species noted to have an elevated conservation status, including *Aloeides pallida junco*, *Aloeides thyra orientis*, Sensitive species and Sensitive species 6 are known from the surrounding area and from similar habitat. There is a moderate to low likelihood that representatives of these species could be present, however their preferred habitat is predominantly fynbos habitat and the proposed development must be outside of such fynbos areas. The recommendations contained in this report, are that these fynbos patches are not developed, in order to retain potential habitat, even if they are not present. Due to the localised and small size of the footprint, as well as the recommendation to retain the fynbos patches, the significance of any impact to any population of these species is very low. The likelihood that there are Baboon Spiders and Scorpions, which are listed as Threatened or Protected Species (ToPS), present within the affected area and ToPS permits will be required.

3.1.8 Species of Special Concern occurring in the region

In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal themes**, the proclamation notes that *'the requirements of these protocols will apply from the date of publication, except where the applicant provides proof to the competent authority that the specialist assessment affected by these protocols had been commissioned by the date of the publication of these protocols in the Government gazette, in which case Appendix 6 of the Environmental Impact Assessment Regulations, 2014, as amended will apply to such applications'*. In this regard and with reference to the appointment

letter provided in Section 9.7 (Appendix G), these protocols have not been adopted as the appointment was before commencement of the regulations. However, due diligence regarding their presence has still been undertaken.

A number of endemic and range restricted species are known from the general surrounding area and there is a residual likelihood that they could be present, and cannot be discounted without comprehensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, with vegetation clearing only required for a small development footprint within a larger site, the risk of a species suffering any significant loss is low. There is however always a residual risk to species for any activity, which may not be recorded during site assessment. All reasonable measures are implemented to find such species, however it is not feasible to check every square meter of such a site.

Red Listed, Endemic and Protected Flora

The site falls within the general distribution range of several endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable or Rare. Some of these species are only known from a single or a few populations. As per Table 6, no Endangered or Critically Endangered or screening tool listed flora species were confirmed to be present nor are known to be present in the affected area. A number of endemic species were recorded and are listed below, however all of these are confirmed to have a wider distribution range and are not deemed to be at risk. Species (Table 6) were flagged from various database sources as occurring in the region as having an elevated status, and possibly present in the area, vegetation type or are associated with features that are present (such as host plant species). All were cross checked for distribution overlay and were actively screened for presence/absence on site. Other species may be endemic, but distribution range has been checked and are generally widespread. Neither sensitive species 273 nor sensitive species 287 were found to be present within the site during the site assessment.

Table 6: Flora Species of Special Concern

SCIENTIFIC NAME ¹²	FAMILY	STATUS ¹³	COMMENT/PRESENCE
<i>Acmadenia alternifolia</i>	Rutaceae	Vu, Medium (ST), End	NOT RECORDED Knysna to Plettenberg Bay, possibly extending as far as Nature's Valley. South Outeniqua Sandstone Fynbos, Garden Route Shale Fynbos, Goukamma Dune Thicket. Coastal headlands and steep slopes, exposed positions on dry coastal cliffs.
<i>Acrolophia lunata</i>	Orchidaceae	EN, End, PNCO	NOT PRESENT
<i>Afrocarpus falcatus</i>		NFA	NOT PRESENT
<i>Agathosma pulchella</i>	Rutaceae	VU, End	Not recorded
<i>Aspalathus asparagoides</i>	Fabaceae	LC, End	Not recorded
<i>Aspalathus hystrix</i>	Fabaceae	LC, End	Not recorded
<i>Aspalathus spinosa</i>	Fabaceae	LC, End	Not recorded
<i>Chaenostoma integrifolium</i>	Scrophulariaceae	LC, End	Not recorded
<i>Cliffortia schlechteri</i>	Rosaceae	NT	Not recorded
<i>Cotyledon orbiculata</i>		End	Not recorded
<i>Crassula nudicaulis</i>		End	Not recorded
<i>Cussonia thyrsiflora</i>		End	Not recorded
<i>Cynanchum africanum</i>	Apocynaceae	LC, End	Not recorded
<i>Delosperma brevipetalum</i>	Aizoaceae	LC, End, PNCO	Not recorded

¹² Species indicated in green are listed in the [DEA screening tool](#), others are from various other database and literature sources that are [known from the general area](#).

¹³ IUCN - Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; PNCO – Provincial Nature Conservation Ordinance; NFA – National Forest Act; ToPS – Threatened or Protected Species.

SCIENTIFIC NAME ¹²	FAMILY	STATUS ³	COMMENT/PRESENCE
<i>Delosperma litorale</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Delosperma pageanum</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Dioscorea mundii</i>	Dioscoreaceae	NT	Not recorded
<i>Disa hallackii</i>	Orchidaceae	EN, PNCO	Not recorded, May be present in surrounding landscape
<i>Ehrharta bulbosa</i>	Poaceae	LC, End	Not recorded
<i>Ehrharta ramosa</i>	Poaceae	LC, End	Not recorded
<i>Erica densifolia</i>	Ericaceae	LC, End, PNCO	PRESENT
<i>Erica glandulosa</i>	Ericaceae	VU, PNCO	Not recorded
<i>Erica glandulosa subsp. fourcadei</i>	Ericaceae	Vu, Medium (ST), End, PNCO	NOT RECORDED, noted in general area in particular slightly inland Mossel Bay (George) to Cape St Francis (Stormsriver). Groot Brak Dune Strandveld, Kouga Grassy Sandstone Fynbos, Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Southern Cape Dune Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Hartenbos Strandveld, Goukamma Dune Thicket. Coastal fynbos
<i>Erica glumiflora</i>	Ericaceae	Vu, Medium (ST), PNCO	NOT RECORDED EOO <6740 km ² , known from six locations. Although it is conserved in four nature reserves, these are all within the western portion of the range. In the eastern part of the range, coastal development and alien plant invasion are causing continuing declines to subpopulations. Wilderness to East London and extending inland around Grahamstown. South Eastern Coastal Thornveld, Groot Brak Dune Strandveld, Algoa Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Suurberg Quartzite Fynbos, Southern Cape Dune Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Nanaga Savanna Thicket, Kasouga Dune Thicket, Goukamma Dune Thicket. Sandy coastal flats and dunes and low coastal hills.
<i>Erica nevillei</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Erica newdigateae</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Erica onusta</i>	Ericaceae	CR, End, PNCO	Not recorded
<i>Erica sparsa</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Eulophia platypetala</i>	Orchidaceae	VU, PNCO	Not recorded
<i>Euphorbia silenifolia</i>	Euphorbiaceae	LC, End	South Africa (Western and Eastern Cape)
<i>Felicia aethiopica</i>	Asteraceae	LC, End	Not recorded
<i>Ficinia fascicularis</i>	Cyperaceae	LC, End	Not recorded
<i>Geissorhiza bracteata</i>	Iridaceae	LC, PNCO	Not recorded
<i>Gladiolus gueinzii</i>	Iridaceae	LC, PNCO	Not recorded
<i>Gymnosporia capitata</i>		End	PRESENT
<i>Helichrysum teretifolium</i>	Asteraceae	LC, End	Not recorded
<i>Indigofera erecta</i>		End	Not recorded
<i>Indigofera erecta</i>		End	Not recorded
<i>Indigofera hispida</i>	Fabaceae	VU, End	Not recorded
<i>Isoglossa woodii</i>	Acanthaceae	LC, End	South Africa (Eastern Cape, KwaZulu-Natal)
<i>Lachenalia youngii</i>	Hyacinthaceae	LC, PNCO	South Africa (Western and Eastern Cape), Not recorded
<i>Lampranthus pauciflorus</i>	Aizoaceae	En, Medium (ST)	NOT RECORDED EOO 1270 km ² , four known locations remain after most of this species' habitat has been transformed for coastal development. Habitat loss continues, especially around Plettenberg Bay, Mossel Bay and Knysna. Cape Infanta to Plettenberg Bay. Groot Brak Dune Strandveld, Blombos Strandveld, Overberg Dune Strandveld, Potberg Sandstone Fynbos, Garden Route Granite Fynbos, Albertinia Sand Fynbos, Knysna Sand Fynbos, Hartenbos

SCIENTIFIC NAME ¹²	FAMILY	STATUS ³	COMMENT/PRESENCE
			Strandveld, Goukamma Dune Thicket Rocky coastal slopes and clayish hills.
<i>Leucadendron eucalyptifolium</i>	Proteaceae	LC, End, PNCO	South Africa (Western Cape), Not recorded
<i>Leucospermum cuneiforme</i>	Proteaceae	LC, End, PNCO	South Africa (Western and Eastern Cape), Not recorded
<i>Leucospermum glabrum</i>	Proteaceae	EN, End, PNCO	South Africa (Western Cape), Not recorded
<i>Leucospermum glabrum</i>	Proteaceae	En, Medium (ST), PNCO	NOT RECORDED EOO 1005 km ² , AOO 54 km ² , 14 severely fragmented subpopulations continue to decline due to alien plant invasion, afforestation and fire break maintenance. Fire-related population fluctuations occur in small subpopulations, only three subpopulations have more than 100 plants. Total population is less than 1000 mature individuals. Dormant subpopulations are easily missed in vegetation surveys and EIAs. Outeniqua and Tsitsikamma Mountains. Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Garden Route Shale Fynbos, Garden Route Granite Fynbos. Wet south slopes in sandstone fynbos. Mature individuals are killed by fires, and only seeds survive. Seeds are released after ripening, and dispersed by ants to their underground nests, where they are protected from predation and fire. It is pollinated by birds. George inland and Kurland inland
<i>Lichtensteinia interrupta</i>	Apiaceae	LC, End	Not recorded
<i>Limonium scabrum</i>	Plumbaginaceae	NE	Not recorded
<i>Linum gracile</i>	Linaceae	LC, End	Not recorded
<i>Lobelia neglecta</i>	Lobeliaceae	LC, End	South Africa (Western and Eastern Cape), Not recorded
<i>Metalsia muricata</i>		LC, End	PRESENT
<i>Mohria caffrorum</i>	Anemiaceae	LC, End	Not recorded
<i>Moraea bellendenii</i>	Iridaceae	LC, PNCO	Not recorded
<i>Morella cordifolia</i>		End	Not recorded
<i>Muraltia knysnaensis</i>	Polygalaceae	EN, End	
<i>Muraltia knysnaensis</i>	Polygalaceae	En, Medium (ST)	NOT RECORDED EOO 2046 km ² , between three and eight severely fragmented subpopulations remain on remnants of natural habitat after most of this species' habitat has been transformed for crop cultivation, forestry plantations and coastal development around Knysna and Plettenberg Bay. It continues to decline due to ongoing habitat degradation as a result of fire exclusion on small fragments. Coastal lowlands between Mossel Bay and the Keurbooms River. Fynbos, on dry flats and hills. ALBERTINIA TO PLETT
<i>Muraltia knysnaensis</i>		End	Not recorded
<i>Otholobium fruticans</i>	Fabaceae	LC, End	Not recorded
<i>Otholobium virgatum</i>	Fabaceae	LC, End	Not recorded
<i>Othonna parviflora</i>	Asteraceae	LC, End	Not recorded
<i>Oxalis duriuscula</i>	Oxalidaceae	NT, End	Not recorded
<i>Passerina rigida</i>		End	PRESENT
<i>Pentameris thuarii</i>	Poaceae	LC, End	Not recorded
<i>Phalaris arundinacea</i>	Poaceae	NE, Not Ind; Nat	Europe, Asia, northern Africa and North America, Not recorded
<i>Podalyria myrtillifolia</i>	Fabaceae	LC, End	South Africa (Western and Eastern Cape), Not recorded
<i>Polygala microlopha</i>	Polygalaceae	LC, End	Not recorded
<i>Polygala peduncularis</i>	Polygalaceae	LC, End	Not recorded
<i>Polygala triquetra</i>	Polygalaceae	LC, End	Not recorded
<i>Polypogon viridis</i>	Poaceae	NE, Not Ind; Nat	Not recorded
<i>Prionium serratum</i>	Thurniaceae	LC, End	Not recorded
<i>Psoralea laxa</i>	Fabaceae	LC, End	Not recorded
<i>Pterygodium cleistogamum</i>	Orchidaceae	Vu, Medium (ST), PNCO	NOT RECORDED

SCIENTIFIC NAME ¹²	FAMILY	STATUS ³	COMMENT/PRESENCE
			Knysna to Grahamstown, George Knysna area NB. Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, North Outeniqua Sandstone Fynbos, Suurburg Quartzite Fynbos, Knysna Sand Fynbos. Fynbos, stony slopes in sandstone derived soils, from sea-level to 340 m.
<i>Pterygodium newdigateae</i>	Orchidaceae	CR, End, PNCO	Not recorded
<i>Putterlickia pyracantha</i>	Celastraceae	LC, End	PRESENT
<i>Robsonodendron maritimum</i>		End	Not recorded
<i>Ruschia duthiae</i>	Aizoaceae	Vu, End, Very High, High (ST)	NOT RECORDED A highly range restricted (EOO 191 km ²), but locally still fairly common species. It is known from fewer than 10 locations and continues to decline due to ongoing habitat loss and degradation., Sedgefield to Nature's Valley. Natures Valley, Knysna-Sedgefield, Tsitsikamma Sandstone Fynbos, Garden Route Shale Fynbos, Knysna Sand Fynbos. Gentle north-facing sandstone or shale slopes with grassy fynbos. coastal fynbos habitat. Fairly common around Sedgefield
<i>Satyrium stenopetalum</i>	Orchidaceae	LC, End, PNCO	Not recorded
<i>Searsia pterota</i>		End	PRESENT
<i>Sebaea stricta</i>	Gentianaceae	LC, End	Not recorded
<i>Selago burchellii</i>		End	Not recorded
<i>Selago glomerata</i>	Scrophulariaceae	LC, End	Not recorded
<i>Senecio elegans</i>	Asteraceae	LC, End	Not recorded
<i>Senecio ilicifolius</i>	Asteraceae	LC, End	Not recorded
<i>Sensitive species 273</i>	Dioscoreaceae	Vu, Medium (ST)	NOT RECORDED George to Humansdorp. Tsitsikamma Sandstone Fynbos, Garden Route Shale Fynbos, Knysna Sand Fynbos. Damp sandstone slopes in coastal fynbos.
<i>Sensitive species 287</i>	Orchidaceae	En, Medium (ST), PNCO	NOT RECORDED A coastal lowland species that has lost most historical locations to urban expansion and crop cultivation. Known from between eight and 11 remaining subpopulations, the total population is estimated to number fewer than 1000 mature individuals and no subpopulation has more than 150 individuals. Declining due to ongoing habitat loss and degradation as a result of coastal development, alien plant invasion, grazing and road verge clearing. Cape Flats to Port Elizabeth. Overberg Dune Strandveld, Agulhas Limestone Fynbos, Garden Route Granite Fynbos, Hangklip Sand Fynbos, Cape Flats Sand Fynbos, Atlantis Sand Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Hartenbos Strandveld, Goukamma Dune Thicket. Lowland sandy flats, stabilised dunes and coastal rock promontories.
<i>Stipa dregeana</i>	Poaceae	LC, End	Not recorded
<i>Strelitzia alba</i>	Strelitziaceae	LC, End	Not recorded
<i>Struthiola martiana</i>	Thymelaeaceae	LC, End	Not recorded
<i>Tetragonia fruticosa</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Tetragonia sarcophylla</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Thamnochortus glaber</i>	Restionaceae	LC, End	Not recorded
<i>Thamnochortus insignis</i>		End	Not recorded
<i>Thesium ericaefolium</i>	Santalaceae	LC, End	Not recorded
<i>Thesium frisea</i>	Santalaceae	DD, End	Not recorded
<i>Tribolium uniolae</i>	Poaceae	LC, End	Not recorded
<i>Ursinia heterodonta</i>	Asteraceae	LC, End	Not recorded

Red Listed and Protected Fauna

As per Table 7, a few Endangered or Critically Endangered, or Range Restricted fauna species could be present in the affected area, mostly in a transient manner. Dune Thicket is well represented in the surrounding area and in conjunction with the recommended avoidance of habitat having fynbos elements, limited size of the development footprint (mostly outside of fynbos habitat), no significant risk to these species is anticipated. While the site does also provide suitable habitat for *Afrivalus knysna* (Knysna Spiny Reed Frog), the limited footprint is unlikely to pose any significant risk, also being represented in the immediate surrounding area. Sensitive species 1 is unlikely to be present, the site being outside of its normal range. Sensitive species 6 may be present, as described above.

Table 7: Fauna Species of Special Concern

SCIENTIFIC NAME ¹⁴	COMMON NAME	FAMILY	STATUS ¹⁵	COMMENT/PRESENCE
MAMMALS				
<i>Aonyx capensis</i>	African Clawless Otter	Mustelidae	NT (2016)	May be present in surrounding landscape as a transient visitor
<i>Damaliscus pygargus pygargus</i>	Bontebok	Bovidae	Vu (2016)	Absent
<i>Leptailurus serval</i>	Serval	Felidae	NT (2016)	May be present in surrounding landscape as a transient visitor
<i>Loxodonta africana</i>	African Bush Elephant	Elephantidae	Vu A2a (2008)	Absent
<i>Panthera pardus</i>	Leopard	Felidae	Vu (2016)	May be present in surrounding landscape as a transient visitor
<i>Philantomba monticola</i>	Blue Duiker	Bovidae	Vu (2016)	May be present in surrounding landscape as a transient visitor
BIRDS¹⁶				
<i>Anthropoides paradiseus</i>	Blue Crane	Gruidae	Global: VU; BLSA: NT	May be present in surrounding landscape as a transient visitor, unlikely to be affected by scope of proposed development
<i>Buteo trizonatus</i>	Forest Buzzard	Accipitridae	NT D1 (IUCN, 2017)	
<i>Calidris ferruginea</i>	Curlew Sandpiper	Scolopacidae	Global: NT; BLSA: LC	
<i>Campethera notata</i>	Knysna Woodpecker	Picidae	Global: NT; BLSA: NT	
<i>Circus maurus</i>	Black Harrier		High (ST)	
<i>Falco concolor</i>	Sooty Falcon	Falconidae	Global: NT; BLSA: NA	
<i>Haematopus moquini</i>	African Black Oystercatcher	Haematopodidae	Global: NT; BLSA: NA	
<i>Numenius arquata</i>	Eurasian (Curlew) Curlew	Scolopacidae	Global: NT; BLSA: NT	
<i>Streptopelia turtur</i>	European Turtle-Dove	Columbidae	Global: VU; BLSA: NA	

¹⁴ Species indicated in green are listed in the [DEA screening tool](#), others are from various other database and literature sources that are [known from the general area](#).

¹⁵ PNCO - Provincial Nature Conservation Ordinance (1974); ToPS - Threatened or Protected Species

¹⁶ BLSA - Birdlife South Africa

SCIENTIFIC NAME ¹⁴	COMMON NAME	FAMILY	STATUS ¹⁵	COMMENT/PRESENCE
REPTILES				
<i>Tetradactylus fitzsimonsi</i>	Fitzsimons' Long-tailed Seps	Gerrhosauridae	LC, Medium (SC)	May be present
AMPHIBIANS				
<i>Afrixalus knysna</i>	Knysna Spiny Reed Frog	Hyperoliidae	En B1ab (i,ii,iii,v) +2ab (i,ii,iii,v) (2016), Medium (ST)	May be present, suitable habitat, unconfirmed. Wilderness, George inland. Groenvlei (3422BB) in the west to Covie (3323DC) in the east and is confined to the coastal region by the Outeniqua and Tsitsikamma mountains. Coastal mosaic of Mountain Fynbos and Afromontane Forest.
INVERTEBRATES				
Lepidoptera (Butterflies)				
<i>Aloeides pallida juno</i>	Giant Copper	Lycaenidae	Medium (ST)	May be present, suitable habitat, unconfirmed. Fynbos. The larvae of subspecies <i>A. p. pallida</i> and <i>A. p. jonathani</i> feed on <i>Aspalathus</i> species. The larvae of subspecies <i>A. p. grandis</i> are fed by trophallaxis by <i>Lepisiota capensis</i> ants. They also feed on the eggs of these ants.
<i>Aloeides pallida littoralis</i>	Giant russet	Lycaenidae	Data Deficient (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Aloeides thyra orientis</i>	Red Copper	Lycaenidae	Medium (SC)	May be present, suitable habitat, unconfirmed. The larvae of subspecies <i>A. p. pallida</i> and <i>A. p. jonathani</i> feed on <i>Aspalathus</i> species. The larvae of subspecies <i>A. p. grandis</i> are fed by trophallaxis by <i>Lepisiota capensis</i> ants. They also feed on the eggs of these ants.
<i>Ceratogomphus triceraticus</i>	Cape Thorntail	Gomphidae	NT	May be present in surrounding landscape as a transient visitor
<i>Sensitive species 1</i>			Medium (SC)	Outside of known distribution range, unlikely to be present
<i>Sensitive species 6</i>			Medium (SC)	May be present, suitable habitat, unconfirmed. George/Oudshoorn area. and to the east of, the Eastern Heads, which may have been close to Trimen's original locality. Extending eastwards to the Pezula Golf Estate. Also found along the coast close to sea level from Coney Glen beach for about 1 km eastwards.
Odonata (Dragonflies)				

SCIENTIFIC NAME ¹⁴	COMMON NAME	FAMILY	STATUS ¹⁵	COMMENT/PRESENCE
<i>Ceratogomphus triceraticus</i>	Cape Thorntail	Gomphidae	NT	Unlikely to be present
<i>Ecchlorolestes nylephtha</i>	Queen Malachite	Synlestidae	NT	Unlikely to be present
<i>Pseudagrion furcigerum</i>	Palmiet Sprite	Coenagrionidae	NT	Unlikely to be present
Scorpions				
<i>Opisthacanthus capensis</i>		Hormuridae	Lc , TOPS	May be present
<i>Opisthacanthus diremptus</i>		Hormuridae	Lc , TOPS	May be present
<i>Opisthophthalmus macer</i>		Scorpionidae	Lc , TOPS	May be present
<i>Parabuthus planicauda</i>		Buthidae	Lc , TOPS	May be present
<i>Uroplectes lineatus</i>		Buthidae	Lc , TOPS	May be present
Baboon Spiders				
<i>Harpactira dictator</i>		Theraphosidae	Lc , TOPS	May be present

Alien Invasive Species

On 1 August 2014, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations (“the Regulations”) which came into effect on the 1st of October 2014 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a land owner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

Category 1a and 1b listed invasive species must be controlled and eradicated. Category 2 plants may only be grown if a permit is obtained and the property owner ensures that the invasive species do not spread beyond his or her property. The growing of Category 3 species is subject to various exemptions and prohibitions. Some invasive plants are categorised differently in different provinces. For example: the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money, and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control. The act required the removal of these species, being the responsibility of the landowner, as described in Section 2.2 & Table 8 .

Table 8: Legislation regarding invasive alien species.

The Conservation of Agricultural Resources Act 43 of 1983 (Gazette No. 8673, Notice No. 883, dated 27 April 1983) stipulates the following:

6. Control measures

- (1) In order to achieve the objects of this Act the Minister may prescribe control measures which shall be complied with by land users to whom they apply.
- (2) Such control measures may relate to –
 - (1) the control of weeds and invader plants.

(3) A control measure may –

(a) contain a prohibition or an obligation with regard to any matter referred to in subsection (2).

(5) Any land user who refuses or fails to comply with any control measure which is binding on him, shall be guilty of an offence. In this regard, Government Notice R. 598 - National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014 (Gazette number 37885), dated August 2014, further stipulates the following:

CHAPTER 2: CATEGORIES OF LISTED INVASIVE SPECIES

2. Category 1a Listed Invasive Species

(1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.

(2) A person in control of a Category 1a Listed Invasive Species must-

(a) comply with the provisions of section 73(2) of the Act.

(b) immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and

(c) allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.

If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme.

3. Category 1b Listed Invasive Species

(1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.

(2) A person in control of a Category 1b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.

4. Category 2 Listed Invasive Species

(1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.

(2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.

(3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.

(4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3.

(6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

5. Category 3 Listed Invasive Species

(1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

(2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

CHAPTER 7: ISSUING, AMENDMENT AND CANCELLATION OF PERMITS

29. Sale or transfer of alien and listed invasive species

(1) If a permit-holder sells a specimen of an alien or listed invasive species, or sells the property on which a specimen of an alien or listed invasive species is under the permit-holder's control, the new owner of such specimen or such property must apply for a permit in terms of Chapter 7 of the Act.

(2) The new permit-holder contemplated in sub-regulation (1) will be subject to the same conditions as the permit-holder who has sold the specimen of an alien or listed invasive species, or the property on which a specimen of an alien or listed invasive species occurs, unless specific circumstances require all such permit conditions to be revised, in which case full reasons must be giving in writing by the issuing authority.

(3) The seller of any immovable property must, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed invasive species on that property.

CHAPTER 9: COMPLIANCE AND ENFORCEMENT

35. Offences and penalties

(1) Any offence committed in terms of section 101 of the Act shall, upon conviction, carry the penalties referred to in section 102 of the Act.

(2) Any person who contravenes or fails to comply with a provision of these regulations is guilty of an offence and is liable, on conviction, to-

(a) a fine not exceeding five million rand, and in the case of a second or subsequent conviction, to a fine not exceeding R 10 million; or

(b) imprisonment for a period not exceeding 10 years; or

(c) to both such fine and imprisonment.

The seller of any immovable property must also, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed IAPs on the property. Property sales agreements dated 1 October 2014 and onwards, should also incorporate a clause in terms of which the purchaser acknowledges that he has acquainted himself with the extent and the nature of the property he is buying and that he accepts the property as such, including the vegetation on the property.

A single exotic invasive (*Acacia cyclops*) was noted within the site, particularly in disturbed areas, generally on the margins of intact vegetation patches. Additional weed species that are known to proliferate in disturbed areas, include predominantly herbaceous species such as Scotch Thistle, Blackjack, Thorn Apple, Verbena, Mexican Poppy, and a range of other common weeds. A weed management programme, as part of the construction and operational phases will be required to manage the weeds and invasives within the orchards and as a responsible land manager to minimise the spread into surrounding areas. A list of species is included in Table 9.

Table 9: Alien (exotic) invasive and other weed species and status.

SCIENTIFIC NAME	COMMON NAME	FAMILY	STATUS ¹⁷	COMMENT/PRESENCE
<i>Acacia cyclops</i>	Rooikrantz	Fabaceae	CARA 1	Scattered clumps/ individuals

Eradication protocol

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species and weeds, as they tend to require species specific techniques. A comprehensive management plan should be incorporated into the EMP and a detailed action plan compiled and implemented by the landowner. Any removed alien trees must either be removed from site or disposed of at a registered waste disposal facility. Alternatively, the plant material can be mulched using a woodchipper on site. And seed-bearing material is to be disposed of at a registered landfill.

3.1.9 Aquatic Habitat

Perennial & Non-perennial watercourse and wetlands are present within the study area. Specific assessment of these features will be addressed as a separate specialist assessment, however it is noted that these aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are very closely linked to the terrestrial system. For the purposes of this report, the following has been undertaken and will be incorporated into the terrestrial component:

- Aquatic features (wetlands, dams, perennial rivers, and non-perennial drainage lines) have been delineated from aerial photographs and/or based on vegetation characteristics. This is not a physical delineation, which would be the responsibility of the aquatic specialist, but they have been delineated for the purposes of demarcating any vegetation associated directly with such aquatic features. This includes the riparian vegetation and reedbeds surrounding watercourses and found within and around wetlands and/or farm dams. This also serves to identify the aquatic features within the terrestrial landscape.

¹⁷ CARA - Conservation of Agricultural Resources Act (1993); National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A (2016). Refer to Section 2.2 & Table 8 for detailed procedures and requirements.

- All aquatic features are given a high sensitivity as default in this terrestrial assessment report, since the purpose of this report is of a terrestrial nature, not aquatic. The condition of the high rating is not that they are determined to be no go areas, but that the aquatic specialist will determine, within their field of expertise, what the specific sensitivities are.
- Watercourse centre lines have been corrected from topographical and NFEPA data sources, and any watercourse polygons have similarly been adjusted to incorporate fine scale mapping.

No aquatic habitat was recorded with the site or immediate surrounds.

3.2 Terrestrial Vegetation Sensitivity Assessment

An overall vulnerability assessment, incorporating key vegetation and ecological indicators (summarised in Table 5) was undertaken and includes the following key criteria:

- relative levels of *intactness* i.t.o. overall loss of indigenous vegetation cover.
- presence, diversity, and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

Intactness

Three basic classes are differentiated as follows:

- **Low:** > 75 % of original vegetation has been removed or lost; and/or no species of special concern present that are critically endangered, endangered, or endemic with highly localised distribution.
- **Moderate:** 25 - 75 % of original vegetation has been removed/lost; and or presence of species of special concern but not having high conservation status or high levels of endemism or highly localised distributions.
- **High:** < 25 % of original vegetation has been removed or lost; and or presence of species with a highly endemism and or high conservation status (endangered or critically endangered).

Alien Invasion

Three classes are differentiated as follows:

- **Low:** no or few scattered individuals.
- **Moderate:** individual clumps of invasives present but cover less than 50% of original area.
- **High:** dense, impenetrable stands of invasives present, or cover > 50 % of area with substantial loss functioning. Rehabilitation will most likely require specialised techniques over an extended period (> 5 years).

Degradation

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

INTACTNESS	INVASION		
	LOW	MODERATE	HIGH
High	Pristine	Near Pristine	Moderately Degraded
Moderate	Near Pristine	Moderately Degraded	Severely Degraded
Low	Moderately Degraded	Severely Degraded	Transformed

Overall Sensitivity score

Overall vulnerability (or Sensitivity) of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site. An overall Vegetation and Sensitivity map is provided in Map 10.

DEGRADATION	CONSERVATION STATUS			
	LEAST THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED
Severely degraded/ Transformed	Very Low	Low	Moderate	Moderate - High
Moderately degraded	Low	Moderate	High	High
Ecologically Pristine or near Pristine	Moderate	Moderate - High	High	Very High (No-Go area)

Habitat Sensitivity

- Areas scoring an overall **LOW** sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestation. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. **Low sensitivity areas include areas where infrastructure is present, including a reservoir on the north-eastern corner, various pipelines and other infrastructure passing through the site (these are not mapped) as well as the road and pathway on the southern side.**
- Areas scoring an overall **MODERATE** sensitivity include the portions of natural vegetation that is mostly intact, but not having specific biodiversity related issues of significance or where proposed activity will have limited overall impact and recovery will be good with minimal intervention. **Moderate sensitivity area includes the central part of the site, where development is proposed. sites were identified in the vicinity of the activity, including the grassland thicket area, where post-construction rehabilitation will most likely achieve pre construction conditions within 2 years (as defined by the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (Section 9.8) which stipulates ‘excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase’**
- Areas scoring an overall **HIGH** sensitivity include those areas deemed to have a sensitivity, including being within intact Critical Biodiversity Areas and connectivity corridors, or are deemed critical habitat for fauna and/or flora species that are considered to be vulnerable. **High sensitivity are includes a dune fynbos patch and rocky outcrop (road cutting) on the southern side of the site, which could provide potential habitat for a number of species of conservation concern. Only sewer infrastructure will be sited within this area and will be negligible.**
- Areas scoring an overall **VERY HIGH** sensitivity (No-Go Areas) include areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas, or are critical habitat (refer to [Section 3.2.1](#)) for any faunal species that is endangered or critically endangered. **Very High sensitivity terrestrial areas on site were identified that are to be excluded. This includes a dune to the north-west having intact Dune Thicket and Forest Thicket.**

Project : Keurboomstrand Erf 155

Layout -Vegetation & Sensitivity

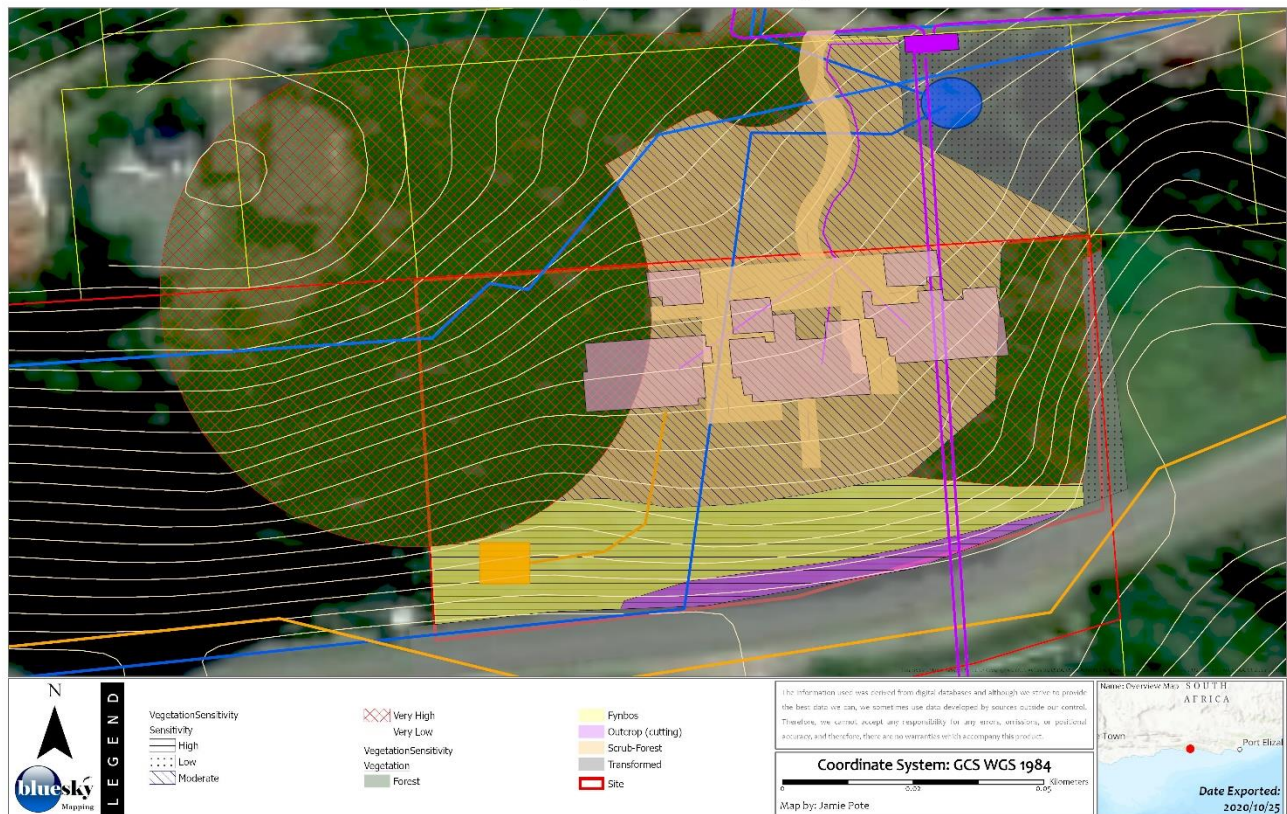


Figure 20: Overview of vegetation and sensitivity relative to proposed preferred development footprint.

GENERAL COMMENT: Some degradation and transformation is already present in the surrounding area and additional habitat loss and fragmentation will be negligible within the scope of existing impacts and as a result of the small footprint.

3.2.1 Critical Habitat

The following Critical Habitat features have been identified within the site:

6. Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species
 - No Endangered or Critically Endangered Flora species were recorded. Several species known from general area were screened to confirm that most likely localities do not overlap with the site.
 - No Endangered Mammals, Reptiles, Amphibians, or Invertebrates are known to be present on the site or will be affected (other than temporary displacement during construction). A number of species could be present; however it is the recommendation of this report that the small fynbos patch be retained, in order to minimise this risk and also to retain potential habitat for these species.
7. Criterion 2: Habitat for Endemic or Restricted-Range Species
 - Several range restricted flora species are potentially present in the surrounding area and vegetation types; however, none were confirmed to be present and likelihood of presence is not considered to be high. Several species known from general area were screened to confirm that most likely localities do not overlap with the site.
8. Criterion 3: Habitat for Migratory or congregatory species
 - No such terrestrial habitat will be directly or indirectly affected.
9. Criterion 4: Habitat for Highly threatened and/or unique ecosystems

- No such terrestrial habitat will be directly or indirectly affected.

10. Criterion 5: Habitat for Key evolutionary processes

- No such terrestrial habitat will be directly or indirectly affected.

3.2.2 No-Go Areas

No-go areas include the following:

- dune-thicket along the eastern slope
- the fynbos pocket on the southern portion
- forest-thicket due on the north-western side of the site.
- The remainder of the site (± 4 Ha), which includes Dune Thicket, Forest Thicket and fynbos elements. In addition, a portion of coastal vegetation and beach falls within the site boundary, which has been excluded from the above).

3.2.3 Conservation Targets

Within the site, the total area of the Erf 5.6 Ha, of which 3.7 Ha is natural, and 1.5 ha is degraded and near natural and 0.7 Ha is developed (on the western side). The 5 000 m² area that is proposed to be subdivided is comprised of the following:

- 1 800 m² Thicket Forest (largely excluded from development footprint except access road and services)
- 2 200 m² Dune Thicket (natural)
- 1 000 m² fynbos patch plus cutting outcrop

Within the Erf 155 (± 5.6 Ha), approximately 2 500 m² will be retained within the 5 000 m² subdivided area (i.e. 50 %). An estimated additional estimated 4 Ha of natural, near natural and degraded Dune Thicket and Forest Thicket will not be developed within the greater Erf. Thus, of the total 5.6 Ha, nearly 70 % (± 4 Ha) will be retained in a natural and near natural state. The remainder of the site is comprised of some previously developed areas on the western side of the site as well as a portion of beach and road, etc. that falls within the erf boundary).

The proportion of the actual development footprint is thus approximately 6 % of the total undeveloped erf. In terms of conservation targets, this is a small proportion of the site, since ± 70 % will be retained in a natural state (excluding beach) and only 6 % will be developed. With a conservation target of 19 % for the vegetation unit, the proposed dwellings will have no meaningful impact to conservation targets locally nor within the regional context of 728 square kilometres (i.e. 72 800 Ha). The proposed footprint accounts for a nominal 0.0003 percent of the total Goukamma Dune Thicket occurring nationally.

3.2.4 Potential Development Footprints

- The site does provide a potential footprint where there is some disturbance and is relatively flat compared to the surrounding landscape.
- The fynbos patch should not be significantly disturbed, other than for construction of sewage and other services, which are likely to rehabilitate affectively in the short term.

3.3 Risks and Potential Impacts to Biodiversity

3.3.1 Summary of actions, activities, or processes that have sufficiently significant impacts to require mitigation

The main impacts likely to result from the proposed activity include the following:

1. Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.

2. Loss of species of special concern during pre-construction site clearing activities. Numerous species of special concern are present within the affected area, which will be destroyed during site preparation.
3. Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
4. Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
5. Disturbances to ecological processes. Activity may result in disturbances to ecological processes.
6. Aquatic and Riparian processes. Diversion and increased velocity of surface water flows – Changes to the hydrological regime and increased potential for erosion. Impact of changes to water quality. Loss of riparian vegetation / aquatic habitat. Loss of species of special concern.
7. Loss of Faunal Habitat: Activity will result in the loss of habitat for faunal species.
8. Loss of faunal SSC due to construction activities: Activities associated with bush clearing and ploughing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

3.3.2 Potential Terrestrial Biodiversity Impacts (Direct)

Table 10 lists the terrestrial biodiversity impacts that may potentially occur in the site.

Table 10: Potential Impacts to Terrestrial Biodiversity

IMPACT	Nature of Impact
Vegetation	<u>Permanent or temporary loss of indigenous vegetation cover</u> because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
Flora Species	<u>Loss of species of special concern</u> during pre-construction site clearing activities. Numerous species of special concern are present within the affected area, which will be destroyed during site preparation.
Alien Invasive Species	<u>Susceptibility of post construction disturbed areas to invasion</u> by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
Erosion	<u>Susceptibility of some areas to erosion</u> because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
Ecological Processes	<u>Disturbances to ecological processes</u> : Activity may result in disturbances to ecological processes.
Aquatic and Riparian processes	<u>Aquatic and Riparian processes</u> : Diversion and increased velocity of surface water flows – Changes to the hydrological regime and increased potential for erosion. Impact of changes to water quality. Loss of riparian vegetation / aquatic habitat. Loss of species of special concern.
Faunal Habitat	<u>Loss of Faunal Habitat</u> : Activity will result in the loss of habitat for faunal species.
Faunal Processes	Impacts to <u>faunal processes</u> because of the activity
Faunal Species	<u>Loss of faunal SSC</u> due to construction activities: Activities associated with bush clearing and ploughing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

3.3.3 Potential Terrestrial Biodiversity Impacts (Indirect)

No significant additional ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines, and railways, which can impact on biodiversity and ecosystem services are expected other than minor access roads.

3.3.4 Potential Terrestrial Biodiversity Impacts (Cumulative)

No cumulative impacts of significance are expected because of the development of the orchards, providing recommendation and mitigation measures are adhered to, due to the limited disturbance of intact vegetation and concentration in already transformed areas.

3.4 Assessment of Risks and Impacts to Biodiversity

3.4.1 Criteria of assigning significance to potential impacts

Criteria as per the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

3.4.2 Assessment of Terrestrial Biodiversity Impacts

Construction and Operations can result in a range of negative impacts on terrestrial, marine, and other aquatic ecosystems if not effectively managed. The predicted significance of these during the construction and operational phases are summarised in Table 11, as per DEA&DP requirements.

Table 11: Assessment Scores for Construction Phase (Refer to Sections 3.4.1 & 9.6 for methodology).

ALTERNATIVE 1: PREFERRED ALTERNATIVE	
PLANNING, DESIGN AND DEVELOPMENT PHASE:	
Potential impact and risk:	
Nature of impact:	Impact on biodiversity (flora and fauna)
Extent and duration of impact:	Local, short-term
Consequence of impact:	Negative
Probability of occurrence:	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	Low
Indirect impacts:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Cumulative impact prior to mitigation:	Low risk
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	Most sensitive areas are excluded from development footprint. Dwelling should not extend into the fynbos on the south, the dune forest-thicket on the north-west and a band of dune thicket-forest along the slope on the eastern boundary. Refer to Table 10 for additional
Residual impacts:	Negligible

Cumulative impact post mitigation:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low
CONSTRUCTION PHASE:	
Potential impact and risk:	
Nature of impact:	Impact on biodiversity (flora and fauna)
Extent and duration of impact:	Local, short-term
Consequence of impact:	Negative
Probability of occurrence:	High
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	Low
Indirect impacts:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Cumulative impact prior to mitigation:	Low risk
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	Most sensitive areas are excluded from development footprint Refer to Table 10 for additional
Residual impacts:	Minor
Cumulative impact post mitigation:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low
OPERATIONAL PHASE	
Potential impact and risk:	
Nature of impact:	Impact on biodiversity (flora and fauna)
Extent and duration of impact:	Local, short-term
Consequence of impact:	Negative
Probability of occurrence:	Low
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect impacts:	Negligible
Cumulative impact prior to mitigation:	Low risk
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	Medium

Proposed mitigation:	Retained natural vegetation must not be cleared (recommend incorporating into title deed)
Residual impacts:	Negligible
Cumulative impact post mitigation:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low
DECOMMISSIONING AND CLOSURE PHASE	
Potential impact and risk:	
Nature of impact:	Impact on biodiversity (flora and fauna)
Extent and duration of impact:	Local, short-term
Consequence of impact:	Negative
Probability of occurrence:	Low
Degree to which the impact may cause irreplaceable loss of resources:	Low
Degree to which the impact can be reversed:	High
Indirect impacts:	Negligible
Cumulative impact prior to mitigation:	Low risk
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low
Degree to which the impact can be avoided:	High
Degree to which the impact can be managed:	High
Degree to which the impact can be mitigated:	Medium
Proposed mitigation:	Retained natural vegetation must not be cleared (recommend incorporating into title deed)
Residual impacts:	Negligible
Cumulative impact post mitigation:	Negligible, loss of 0.0003 percent of vegetation unit that is already well protected and exceeds conservation target of 19 %.
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very Low

- All impacts are assessed to be of medium to low significance before mitigation and can be reduced to low or very low with the implementation of the prescribed mitigation measures.
- All development alternatives are similar in extent and location within the site and hence impact significance). The preferred (linear) option should be adjusted to ensure that the dwellings do not extend into the dune on the north-western side of the site.
- Under status quo conditions it is likely that the disturbed areas will develop into Dune Thicket in time and the dune fynbos patch may develop into Dune Thicket also, if fire and other disturbance is excluded. It is likely that species diversity may decrease due to lack of disturbance.

3.4.3 Terrestrial Biodiversity Impact Reversibility

In general, impacts will have a high reversibility in the grassland and savanna habitat, as well as transformed or degraded areas and low reversibility in solid thicket habitat.

3.4.4 Impacts and Risks to Irreplaceable Biodiversity Resources

Risks to Irreplaceable Biodiversity Resources is low.

3.4.5 Residual Risks and Uncertainties

No significant ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines, and railways, which can impact on biodiversity and ecosystem services are expected other than minor access roads

3.5 Findings, Outcomes and Recommendations

3.5.1 Summary of Findings

The characteristics of the surrounding village and the complexity of the terrain limits the potential for mass clearing to take place. It is evident that the character of the village is such that elements of the natural environment are still retained between development. It is thus feasible to develop the portion of the site without significantly changing ecological processes. The following key characteristic support this conclusion:

- The vegetation is not considered to be under any imminent threat at a national level, nor at a regional level and can withstand further development without compromising conservation target significantly.
- No-go areas include the following:
 - dune-thicket along the eastern slope
 - the fynbos pocket on the southern portion
 - forest-thicket due on the north-western side of the site
- No cumulative impacts of significance are expected because of the development of the dwellings, providing recommendation and mitigation measures are adhered to, due to the limited disturbance of intact vegetation and concentration within an already urbanised context.
- Within the Erf 155 (± 5.6 Ha), approximately 2 500 m² will be retained within the 5 000 m² subdivided area (i.e. 50 %). An estimated additional estimated 4 Ha of natural, near natural and degraded Dune Thicket and Forest Thicket will not be developed within the greater Erf. Thus, of the total 5.6 Ha, nearly 70 % (± 4 Ha) will be retained in a natural and near natural state. The remainder of the site is comprised of some previously developed areas on the western side of the site as well as a portion of beach and road, etc. that falls within the erf boundary).
- The proportion of the actual development footprint is thus approximately 6 % of the total undeveloped Erf 155. In terms of conservation targets, this is a small proportion of the site, since ± 70 % will be retained in a natural state (excluding beach) and only 6 % will be developed. With a conservation target of 19 % for the vegetation unit, the proposed dwellings will have no meaningful impact to conservation targets locally nor within the regional context of 728 square kilometres (i.e. 72 800 Ha). **The proposed 2 500 m² footprint accounts for a nominal 0.003 percent of the total Goukamma Dune Thicket occurring nationally.**
- It is reiterated that around 70 % of the site will not be developed and is unlikely to be developed due to slope, which far exceeds the conservation target of 19 %, within a vegetation unit where conservation targets are already exceeded in designated protected areas.
- All impacts are assessed to be of low significance before mitigation and can be reduced to low or very low with the implementation of the mitigation measures.
- All development alternatives are similar in extent and location within the site and hence impact significance). The preferred (linear) option should be adjusted to ensure that the dwellings do not extend into the dune on the north-western side of the site.

- Under status quo conditions it is likely that the disturbed areas will develop into Dune Thicket in time and the dune fynbos patch may develop into Dune Thicket also, if fire and other disturbance is excluded. It is likely that species diversity may decrease due to lack of disturbance.

3.5.2 Recommendations

- It is the conclusion of this terrestrial biodiversity assessment that the limited footprint site and associated infrastructure, including pipeline, sewer and other services can be constructed within acceptable terrestrial biodiversity impact limits.
- The portions of intact vegetation should be retained as per the recommendation of this report, including the dune-thicket along the eastern slope, the fynbos pocket on the southern portion and the forest-thicket due on the north-western side of the site.
- Vegetation that will not require direct clearing for the dwellings to be constructed should be retained as far as possible, in order to fit in with the surrounding developed landscape.
- The undeveloped portions of Erf 155 have limited development potential due to the steep slope. These areas have good representation of dune thicket and forest-thicket as well as some fynbos patches at the base (between the dune base and the road). It is unlikely that these will be developable due to slope and should thus be retained. In this regard, development of the 2 500 m² within the dwelling footprints will only be 50 % of the proposed subdivision area (5 000 m²). In conjunction with the remainder of Erf 155 that will not be developed (\pm 4 Ha of Dune Thicket and Dune Forest, excluding some coastal vegetation and beach that falls on the south of the road but within the erf boundary), the footprint is well within regional and national conservation targets, even tho situated within a CBA area.
- It is noted that around 70 % of the site will not be developed and is unlikely to be developed due to slope, which far exceeds the conservation target of 19 %, within a vegetation unit where conservation targets are already exceeded in designated protected areas.

4 Management Programs

Table 12 lists specific mitigation measures that must be implemented and adhered to. These must be considered to be conditions of authorisation.

Table 12: Specific Mitigation Measures and Recommendations

IMPACT	MITIGATION MEASURES
Vegetation	<ul style="list-style-type: none"> • Final siting of any pipelines or other underground services should be undertaken in consultation with respective specialists, including a botanist. • Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences. No clearing outside of minimum required footprint to take place. • Topsoil must be striped and stockpiled separately during site preparation and replaced over the servitude on completion. • Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses.
Flora Species	<ul style="list-style-type: none"> • The protected species that are present are primarily geophytes and are conducive to relocation. • These geophytic species will most likely persist after removal and replacement of topsoil during construction. • Respective permits must be obtained timeously (1 – 2 months) before vegetation clearing commences and a flora search and rescue

IMPACT	MITIGATION MEASURES
	<p>plan must be implemented. Rescued plants should be replanted into nearby disturbed areas of similar habitat.</p> <ul style="list-style-type: none"> Permits from DEDEAT must always be kept on site and in the possession of the flora search and rescue team. Once flora search and rescue are complete, a clearance certificate must be issued by the botanist and copies of a post audit report supplied to DEDEAT
Alien Invasive Species	<ul style="list-style-type: none"> Alien trees must be removed from the site as per NEMBA requirements. A suitable weed management strategy to be implemented in construction and operation phases. After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner.
Erosion	<ul style="list-style-type: none"> Suitable measures must be implemented in areas that are susceptible to erosion (i.e. on slopes and near watercourses), including but not limited to gabions and runoff diversion berms (if necessary). Areas must be rehabilitated, and a suitable cover crop planted once construction is completed. Topsoil must be stripped and stockpiled separately and replace over servitude on completion. Disturbances to the watercourses must be kept to a minimum and measures implemented to mitigate any erosion risk. If natural vegetation re-establishment does not occur, a suitable grass crop must be applied.
Ecological Processes	<ul style="list-style-type: none"> Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences. Disturbances to the watercourses must be kept to a minimum. On completion of temporary discharge point, any areas that have been affected must be rehabilitated to the approval of the botanist/ECO. A suitable after care period (recommended minimum 2 years) must be allowed in order to monitor and rehabilitate any erosion.
Aquatic and Riparian processes	<ul style="list-style-type: none"> Impacts to terrestrial components related to aquatic and riparian processes are negligible. Refer to separate aquatic/estuarine report. Removal of riparian vegetation at crossings should be kept to minimum. Post construction weed management is critical in riparian areas, including a suitable after-care period. Riparian and drainage line crossings must be kept to minimal number and length and the final route should be verified during a final site walkdown with appropriate specialists before commencement or clearing commences.
Faunal Habitat	<ul style="list-style-type: none"> Blanket clearing of vegetation must be limited to the footprint. It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
Faunal Processes	<ul style="list-style-type: none"> The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local

IMPACT	MITIGATION MEASURES
	<p>impact associated with the footprint would be of low significance if mitigation measures are adhered to.</p> <ul style="list-style-type: none"> • Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity. • Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A reptile handler should be on call for such circumstances. • Should any amphibian migrations occur between wetland areas during construction, appropriate measures (including suspending works in the affected area temporarily) should be implemented.
Faunal Species	<ul style="list-style-type: none"> • A faunal search and rescue may be undertaken before bush clearing by a competent person, especially for reptiles, if deemed necessary on commencement. • No animals are to be harmed or killed during operations. • Workers are NOT allowed to snare any faunal species.

4.1 Site Preparation and Vegetation Clearing Plan

The following flora relocation plan is recommended for inclusion in the EMP and Flora removal permit applications:

- Once the final planting plan has been determined the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Areas to be cleared of vegetation will be clearly demarcated before clearing commences.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Plants to be rescued should include both species of special concern requiring removal for relocation as well as species that would be suitable for use in rehabilitation and that are amenable to transplanting.
- Areas should only be stripped of vegetation as and when required and in particular once species of special concern have been relocated for that area.
- Once site boundaries are demarcated, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- Depending on growth form this material should be appropriately removed from its locality and immediately relocated where it may be required elsewhere or into adjacent areas of similar habitat that will not be disturbed by construction.
- Small trees and shrubs (<1 m in height), where possible will be rescued and planted temporarily in potting bags for later use.
- Wherever possible, any seed-bearing material will be collected immediately and stored for later use, particularly species that occur in low numbers or those that will be well-suited for rehabilitation.

- Protected plant species will be removed from the site prior to development taking place. A suitable timeframe must be allowed before construction commences (1 month) to undertake the plant rescue and relocation operation. Search and Rescue is best undertaken during Spring/Summer.
- Should site construction occur in a phased manner, then clearing activities should take place also in a phased manner, ahead of construction work.
- Rescued plants will be replanted directly into a suitable adjacent area and will include some non-protected succulent species that will help support the protected species.
- Succulent and geophytic species can be temporarily stored for at least 2 weeks in a suitable shaded area before replanting. The contractor will be responsible for periodic watering of the replanted flora until they become acclimatised and some rain occurs.

4.2 Rehabilitation and Landscaping Plan

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This shall be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This must be done in conjunction with the ECO.
- Final rehabilitation must comply with the requirements mention in the Rehabilitation Plan.

4.3 Open Space Management/Conservation Plan

None are applicable for this project.

4.4 Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of services including pipelines and infrastructure, for maintenance/replacement of defective components and leak repair as well as ongoing replacement of trees. All measures of this report, including the EMPr should be adhered for any maintenance requirements. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report.

5 Organizational Capacity and Competency

Successful Implementation will be in part be dependent on the organisational capacity and competency of the applicant and any implementing agents. The following aspects are likely to pose risk to the successful mitigation of the project:

- Budget constraints – budget allocated for environmental management tends to be inadequate for construction projects.
- Organisational Structure – implementing agents may or may not have adequate capacity and competency to ensure appropriate and adequate environmental management.

6 Emergency Preparedness and Response

Emergency Preparedness Plan must be included in the EMPr and should address specific measures relating to the following emergency risks:

- Fire management and response
- Spill management and incident response
- Waste management and incident response
- Response to emergency site shutdown, including labour and protest actions.

7 Stakeholder Engagement

Possible Stakeholders relating to Biodiversity could include the following key groups:

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities

No Stakeholder Engagement was conducted specifically by the Specialist. Stakeholder Engagement will be undertaken by the EAP as part of the environment application public participatory process. Any comments raised relating to Biodiversity will be addressed by the specialist in the final report.

8 Monitoring and Review

Key monitoring activities should include the following:

1. Pre-construction
 - a) Ensure flora and fauna permits are in place timeously (PNCO, NFA, ToPS) – allow at least 1 or 2 months before commencement.
 - b) Commence and complete Flora and Fauna Search and Rescue at least 1 week before, but no more than 2 weeks before construction will commence.
 - c) Environmental Awareness and training (EAT) – Ensure all labour are informed and plant operators are aware of risks, issues, do's and don'ts and no-go areas.
2. Bush clearing
 - a) Check no go areas are adequately delineated
 - b) Ensure working plant has no oil or hydraulic leaks
 - c) Check delineated footprints area not exceeded
3. Construction
 - a) Regular checks on trenches for trapped animals and possible drowning risks
 - b) Regular checks of fences for snares
4. Rehabilitation
 - a) Check quality of topsoil and weed free
 - b) Check for weed regrowth and manage timeously (before seed is set)
5. Operation monitoring
 - a) Weed management on ongoing basis
 - b) Erosion to be addressed on ongoing basis

9 Appendices

9.1 Appendix A: References

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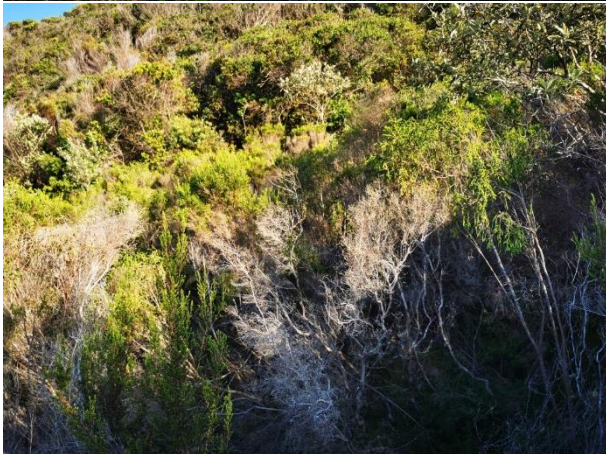
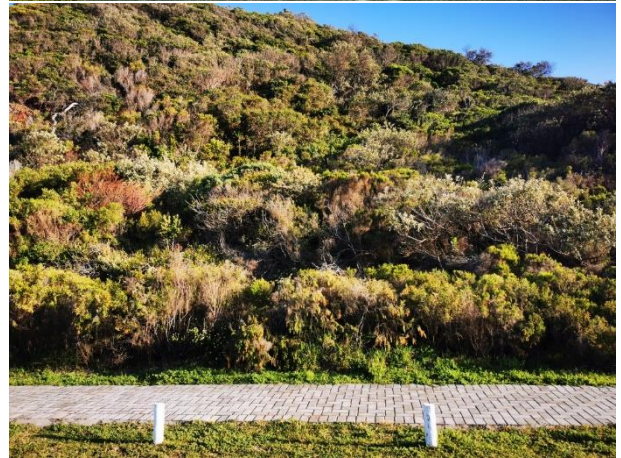
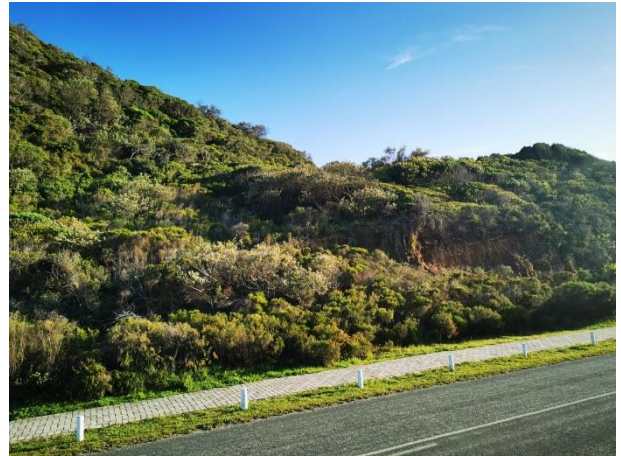
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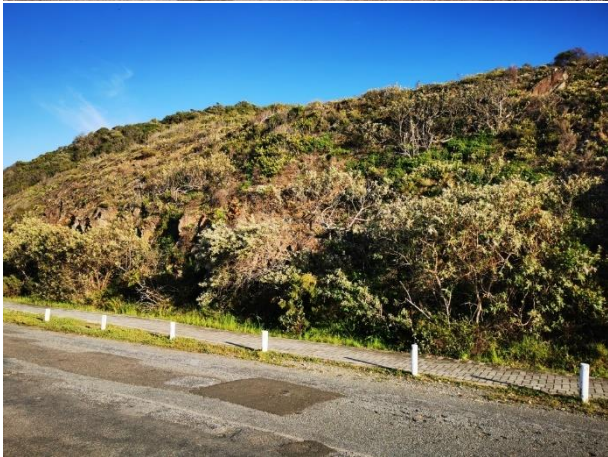
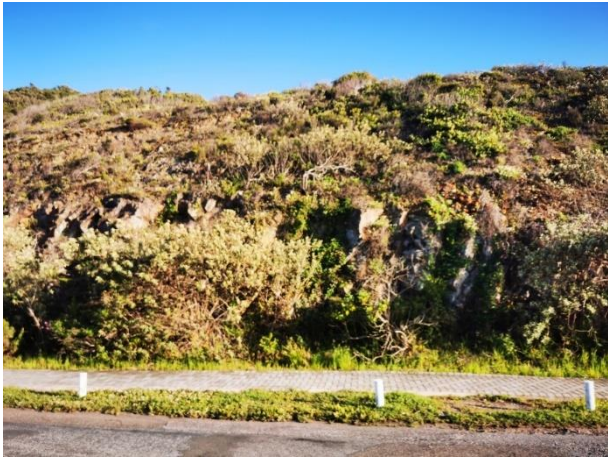
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- Plants of Southern Africa: <http://newposa.sanbi.org>
- South African National Biodiversity Institute (SANBI) Redlist: <http://redlist.sanbi.org>
- South African Bird Atlas Project: <http://sabap2.birdmap.africa>
- The South African Bat Assessment Association (SABAA): <http://www.sabaa.org.za/>
- United Nations Environment Programme (UNEP), *A to Z Areas of Biodiversity Importance*: <http://www.biodiversitya-z.org>
- United Nations Environment Programme (UNEP), *World Database on Protected Areas*, *Protected Planet*: <http://www.protectedplanet.net>
- World Resources Institute (WRI): <https://www.wri.org>

9.2 Appendix B: Site Photographic Record









9.3 Appendix C: Flora and Fauna Species Lists

9.3.1 Flora

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal themes**, the proclamation notes that *‘the requirements of these protocols will apply from the date of publication, except where the applicant provides proof to the competent authority that the specialist assessment affected by these protocols had been commissioned by the date of the publication of these protocols in the Government gazette, in which case Appendix 6 of the Environmental Impact Assessment Regulations, 2014, as amended will apply to such applications’*. In this regard and with reference to the appointment letter provided in Section 9.7 (Appendix G), these protocols have not been adopted as the appointment was before commencement of the regulations. However, due diligence regarding their presence has still been undertaken.

SCIENTIFIC NAME ¹⁸	FAMILY	STATUS ¹⁹	COMMENT/PRESENCE
<i>Acacia cyclops</i>	Fabaceae	CARA	Few clusters present
<i>Acmadenia alternifolia</i>	Rutaceae	Vu, Medium (ST), End	NOT RECORDED Knysna to Plettenberg Bay, possibly extending as far as Nature's Valley. South Outeniqua Sandstone Fynbos, Garden Route Shale Fynbos, Goukamma Dune Thicket. Coastal headlands and steep slopes, exposed positions on dry coastal cliffs.
<i>Acrolophia cochlearis</i>	Orchidaceae	LC, PNCO	May be present in surrounding landscape
<i>Acrolophia lunata</i>	Orchidaceae	EN, End, PNCO	NOT PRESENT
<i>Afrocarpus falcatus</i>		NFA	NOT PRESENT
<i>Agathosma pulchella</i>	Rutaceae	VU, Ind; End	Not recorded
<i>Andropogon appendiculatus</i>	Poaceae	LC	Not recorded
<i>Angraecum sacciferum</i>	Orchidaceae	LC, PNCO	Not recorded
<i>Aspalathus asparagoides</i>	Fabaceae	LC, End	Not recorded
<i>Aspalathus hystrix</i>	Fabaceae	LC, End	Not recorded
<i>Aspalathus spinosa</i>	Fabaceae	LC, End	Not recorded
<i>Asparagus aethiopicus</i>	Asparagaceae	LC	Not recorded
<i>Azima tetraantha</i>		LC	PRESENT
<i>Calodendrum capense</i>		LC	NOT PRESENT
<i>Carex distincta</i>	Cyperaceae	LC	South Africa (Free State, KwaZulu-Natal), Lesotho, Not recorded, Not recorded
<i>Carissa bispinosa</i>		LC	PRESENT
<i>Carpobrotus acinaciformis</i>		LC	PRESENT
<i>Cassine peragua</i>		LC	PRESENT
<i>Celtis africana</i>		LC	PRESENT
<i>Chaenostoma integrifolium</i>	Scrophulariaceae	LC, End	Not recorded
<i>Cheilanthes hirta</i>	Pteridaceae	LC	PRESENT
<i>Chenolea diffusa</i>	Amaranthaceae	LC	South Africa, Namibia, Mozambique, Not recorded, Not recorded
<i>Cliffortia schlechteri</i>	Rosaceae	NT, Ind	Not recorded
<i>Cliffortia strobilifera</i>	Rosaceae	LC	Not recorded
<i>Cotyledon orbiculata</i>		End	Not recorded
<i>Crassula nudicaulis</i>		End	Not recorded
<i>Cussonia thyrsoflora</i>		End	Not recorded
<i>Cyclosorus interruptus</i>	Thelypteridaceae	LC	Not recorded
<i>Cymbopogon marginatus</i>	Poaceae	LC	Not recorded
<i>Cynanchum africanum</i>	Apocynaceae	LC, End	Not recorded
<i>Cynanchum ellipticum</i>		LC	PRESENT

¹⁸ Species indicated in green are listed in the [DEA screening tool](#), those in brown are from various other database and literature sources that are [known from the general area](#).

¹⁹ PNCO - Provincial Nature Conservation Ordinance (1974); ToPS – Threatened or Protected Species; RD – Recent Discovery; ST – DEA Screening Tool listed

SCIENTIFIC NAME ¹⁸	FAMILY	STATUS ¹⁹	COMMENT/PRESENCE
<i>Cynanchum viminalis</i>		LC	PRESENT
<i>Delairea odorata</i>	Asteraceae	LC	Not recorded
<i>Delosperma brevipetalum</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Delosperma litorale</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Delosperma pageanum</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Delosperma sp.</i>	Aizoaceae	LC, PNCO	Not recorded
<i>Digitaria natalensis</i>	Poaceae	LC	Not recorded
<i>Dioscorea mundii</i>	Dioscoreaceae	NT, Ind	Not recorded
<i>Disa bracteata</i>	Orchidaceae	LC, PNCO	May be present in surrounding landscape
<i>Disa cornuta</i>	Orchidaceae	LC, PNCO	May be present in surrounding landscape
<i>Disa cornuta</i>	Orchidaceae	LC, PNCO	Not recorded
<i>Disa hallackii</i>	Orchidaceae	EN, PNCO	May be present in surrounding landscape
<i>Drosanthemum sp.</i>	Aizoaceae	LC, PNCO	Not recorded
<i>Ehrharta bulbosa</i>	Poaceae	LC, End	Not recorded
<i>Ehrharta calycina</i>	Poaceae	LC	Not recorded
<i>Ehrharta ramosa</i>	Poaceae	LC, End	Not recorded
<i>Ekebergia capensis</i>		LC	PRESENT
<i>Eragrostis capensis</i>	Poaceae	LC	Not recorded
<i>Erica densifolia</i>	Ericaceae	LC, End, PNCO	PRESENT
<i>Erica glandulosa</i>	Ericaceae	VU, PNCO	Not recorded
<i>Erica glandulosa subsp. fourcadei</i>	Ericaceae	Vu, Medium (ST), End, PNCO	NOT RECORDED, noted in general area in particular slightly inland Mossel Bay (George) to Cape St Francis (Stormsriver). Groot Brak Dune Strandveld, Kouga Grassy Sandstone Fynbos, Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Southern Cape Dune Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Hartenbos Strandveld, Goukamma Dune Thicket. Coastal fynbos
<i>Erica glumiflora</i>	Ericaceae	Vu, Medium (ST), PNCO	NOT RECORDED EOO <6740 km ² , known from six locations. Although it is conserved in four nature reserves, these are all within the western portion of the range. In the eastern part of the range, coastal development and alien plant invasion are causing continuing declines to subpopulations. Wilderness to East London and extending inland around Grahamstown. South Eastern Coastal Thornveld, Groot Brak Dune Strandveld, Algoa Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Suurberg Quartzite Fynbos, Southern Cape Dune Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Nanaga Savanna Thicket, Kasouga Dune Thicket, Goukamma Dune Thicket. Sandy coastal flats and dunes and low coastal hills.
<i>Erica nevillei</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Erica newdigateae</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Erica onusta</i>	Ericaceae	CR, End, PNCO	
<i>Erica sparsa</i>	Ericaceae	LC, End, PNCO	Not recorded
<i>Eriocephalus paniculatus</i>		LC	Not recorded
<i>Eriospermum capense</i>	Ruscaceae	LC	PRESENT
<i>Euchaetis sp.</i>	Rutaceae	LC	Not recorded
<i>Euclea racemosa</i>		LC	PRESENT
<i>Eulophia platypetala</i>	Orchidaceae	VU, Ind	Not recorded

SCIENTIFIC NAME ¹⁸	FAMILY	STATUS ¹⁹	COMMENT/PRESENCE
<i>Euphorbia muirii</i>		LC	Not recorded
<i>Euphorbia silenifolia</i>	Euphorbiaceae	LC, End	South Africa (Western and Eastern Cape), Not recorded
<i>Exomis microphylla</i>	Amaranthaceae	LC	PRESENT
<i>Felicia aethiopica</i>	Asteraceae	LC, End	Not recorded
<i>Felicia echinata</i>		LC	PRESENT
<i>Ficinia fascicularis</i>	Cyperaceae	LC, End	Not recorded
<i>Fissidens rufescens</i>	Fissidentaceae	LC	Not recorded
<i>Gasteria acinacifolia</i>		LC	Not recorded
<i>Geissorhiza bracteata</i>	Iridaceae	LC, PNCO	Not recorded
<i>Gladiolus gueinzii</i>	Iridaceae	LC, PNCO	Not recorded
<i>Grewia occidentalis</i>		LC	PRESENT
<i>Gymnosporia capitata</i>		End	PRESENT
<i>Helichrysum anomalum</i>	Asteraceae	LC	Not recorded
<i>Helichrysum patulum</i>		LC	PRESENT
<i>Helichrysum teretifolium</i>	Asteraceae	LC, End	Not recorded
<i>Holothrix parviflora</i>	Orchidaceae	LC, PNCO	May be present in surrounding landscape
<i>Holothrix parviflora</i>	Orchidaceae	LC, PNCO	Not recorded
<i>Indigofera erecta</i>		End	Not recorded
<i>Indigofera erecta</i>		End	Not recorded
<i>Indigofera hispida</i>	Fabaceae	VU, Ind; End	Not recorded
<i>Isoglossa ciliata</i>	Acanthaceae	LC	South Africa, Swaziland, Mozambique, Not recorded
<i>Isoglossa woodii</i>	Acanthaceae	LC, End, PNCO	South Africa (Eastern Cape, KwaZulu-Natal), Not recorded
<i>Lachenalia youngii</i>	Hyacinthaceae	LC, PNCO	South Africa (Western and Eastern Cape), Not recorded
<i>Lampranthus pauciflorus</i>	Aizoaceae	En, Medium (ST), PNCO	NOT RECORDED EOO 1270 km ² , four known locations remain after most of this species' habitat has been transformed for coastal development. Habitat loss continues, especially around Plettenberg Bay, Mossel Bay and Knysna. Cape Infanta to Plettenberg Bay. Groot Brak Dune Strandveld, Blombos Strandveld, Overberg Dune Strandveld, Potberg Sandstone Fynbos, Garden Route Granite Fynbos, Albertinia Sand Fynbos, Knysna Sand Fynbos, Hartenbos Strandveld, Goukamma Dune Thicket Rocky coastal slopes and clayish hills.
<i>Lantana camara</i>	Verbenaceae	Not Ind; Nat	S America, Not recorded
<i>Lauridia tetragona</i>		LC	PRESENT
<i>Leucadendron eucalyptifolium</i>	Proteaceae	LC, End	South Africa (Western Cape), Not recorded
<i>Leucospermum cuneiforme</i>	Proteaceae	LC, End	South Africa (Western and Eastern Cape), Not recorded
<i>Leucospermum glabrum</i>	Proteaceae	En, Medium (ST)	NOT RECORDED EOO 1005 km ² , AOO 54 km ² , 14 severely fragmented subpopulations continue to decline due to alien plant invasion, afforestation and fire break maintenance. Fire-related population fluctuations occur in small subpopulations, only three subpopulations have more than 100 plants. Total population is less than 1000 mature individuals. Dormant subpopulations are easily missed in vegetation surveys and EIAs. Outeniqua and Tsitsikamma Mountains. Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, Garden Route Shale Fynbos, Garden Route Granite Fynbos. Wet south slopes in sandstone fynbos. Mature individuals are killed by fires, and only seeds survive. Seeds are released after ripening, and

SCIENTIFIC NAME ¹⁸	FAMILY	STATUS ¹⁹	COMMENT/PRESENCE
			dispersed by ants to their underground nests, where they are protected from predation and fire. It is pollinated by birds. George inland and Kurland inland
<i>Leucospermum glabrum</i>	Proteaceae	EN, End	South Africa (Western Cape), Not recorded
<i>Lichtensteinia interrupta</i>	Apiaceae	LC, End	Not recorded
<i>Limonium scabrum</i>	Plumbaginaceae	NE, Ind	Not recorded
<i>Limonium scabrum</i>	Plumbaginaceae	LC	PRESENT
<i>Linum gracile</i>	Linaceae	LC, End	Not recorded
<i>Lithospermum papillosum</i>	Boraginaceae	LC	Not recorded
<i>Lobelia neglecta</i>	Lobeliaceae	LC, End	South Africa (Western and Eastern Cape), Not recorded
<i>Maytenus acuminata</i>	Celastraceae	LC	Not recorded
<i>Maytenus procumbens</i>		LC	PRESENT
<i>Mesembryanthemum cordifolium</i>	Aizoaceae	LC, PNCO	South Africa (Eastern Cape, KwaZulu-Natal), Not recorded
<i>Metalasia muricata</i>		LC, End	PRESENT
<i>Mohria caffrorum</i>	Anemiaceae	LC, End	Not recorded
<i>Moraea bellendenii</i>	Iridaceae	LC, PNCO	Not recorded
<i>Morella cordifolia</i>		End	Not recorded
<i>Muraltia knysnaensis</i>		End	Not recorded
<i>Muraltia knysnaensis</i>	Polygalaceae	EN, End	
<i>Muraltia knysnaensis</i>	Polygalaceae	En, Medium (ST)	NOT RECORDED EOO 2046 km ² , between three and eight severely fragmented subpopulations remain on remnants of natural habitat after most of this species' habitat has been transformed for crop cultivation, forestry plantations and coastal development around Knysna and Plettenberg Bay. It continues to decline due to ongoing habitat degradation as a result of fire exclusion on small fragments. Coastal lowlands between Mossel Bay and the Keurbooms River. Fynbos, on dry flats and hills. ALBERTINIA TO PLETT
<i>Muraltia spinosa</i>		LC	Not recorded
<i>Mystacidium capense</i>	Orchidaceae	LC, PNCO	May be present in surrounding landscape
<i>Mystroxydon aethiopicum</i>		LC	PRESENT
<i>Oedera calycina</i>	Asteraceae	LC	South Africa (Western Cape), Not recorded
<i>Olea capensis</i>		LC	PRESENT
<i>Olea exasperata</i>		LC	PRESENT
<i>Osteospermum moniliferum</i>		LC	Not recorded
<i>Osteospermum scabrum</i>	Asteraceae	LC	South Africa (Western and Eastern Cape), Not recorded
<i>Otholobium fruticans</i>	Fabaceae	LC, End	Not recorded
<i>Otholobium virgatum</i>	Fabaceae	LC, End	Not recorded
<i>Othonna parviflora</i>	Asteraceae	LC, End	Not recorded
<i>Oxalis duriuscula</i>	Oxalidaceae	NT, Ind; End, PNCO	Not recorded
<i>Panicum deustum</i>	Poaceae	LC	Not recorded
<i>Passerina rigida</i>		End	PRESENT
<i>Pelargonium auritum</i>	Geraniaceae	LC	PRESENT

SCIENTIFIC NAME ¹⁸	FAMILY	STATUS ¹⁹	COMMENT/PRESENCE
<i>Pennisetum macrourum</i>	Poaceae	LC	Not recorded
<i>Pentameris ampla</i>	Poaceae	LC	Not recorded
<i>Pentameris argentea</i>	Poaceae	LC	Not recorded
<i>Pentameris thurarii</i>	Poaceae	LC, End	Not recorded
<i>Phalaris arundinacea</i>	Poaceae	NE, Not Ind; Nat	Europe, Asia, northern Africa and North America, Not recorded
<i>Podalyria buxifolia</i>	Fabaceae	LC	South Africa (Western and Eastern Cape), Not recorded
<i>Podalyria myrtilifolia</i>	Fabaceae	LC, End	South Africa (Western and Eastern Cape), Not recorded
<i>Polygala microlopha</i>	Polygalaceae	LC, End	Not recorded
<i>Polygala peduncularis</i>	Polygalaceae	LC, End	Not recorded
<i>Polygala triquetra</i>	Polygalaceae	LC, End	Not recorded
<i>Polypogon viridis</i>	Poaceae	NE, Not Ind; Nat	Not recorded
<i>Prionium serratum</i>	Thurniaceae	LC, End	Not recorded
<i>Pseudocrossidium crinitum</i>	Pottiaceae	LC	Not recorded
<i>Psoralea laxa</i>	Fabaceae	LC, End	Not recorded
<i>Ptaeroxylon obliquum</i>		LC	Not recorded
<i>Pterocelastrus tricuspidatus</i>		LC	PRESENT
<i>Pterygodium cleistogamum</i>	Orchidaceae	Vu, Medium (ST), PNCO	NOT RECORDED Knysna to Grahamstown, George Knysna area NB. Tsitsikamma Sandstone Fynbos, South Outeniqua Sandstone Fynbos, North Outeniqua Sandstone Fynbos, Suurberg Quartzite Fynbos, Knysna Sand Fynbos. Fynbos, stony slopes in sandstone derived soils, from sea-level to 340 m.
<i>Pterygodium newdigateae</i>	Orchidaceae	CR, End, PNCO	
<i>Putterlickia pyracantha</i>	Celastraceae	LC, End	PRESENT
<i>Restio eleocharis</i>		LC	Not recorded
<i>Rhoicissus digitata</i>		LC	PRESENT
<i>Robsonodendron maritimum</i>		End	Not recorded
<i>Ruschia duthiae</i>	Aizoaceae	Vu, End, Very High, High (ST), PNCO	NOT RECORDED A highly range restricted (EOO 191 km ²), but locally still fairly common species. It is known from fewer than 10 locations and continues to decline due to ongoing habitat loss and degradation., Sedgfield to Nature's Valley. Natures Valley, Knysna-Sedgfield, Tsitsikamma Sandstone Fynbos, Garden Route Shale Fynbos, Knysna Sand Fynbos. Gentle north-facing sandstone or shale slopes with grassy fynbos. coastal fynbos habitat. Fairly common around Sedgfield
<i>Salvia africana-lutea</i>		LC	Not recorded
<i>Satyrium stenopetalum</i>	Orchidaceae	LC, End, PNCO	Not recorded
<i>Schizaea pectinata</i>	Schizaeaceae	LC	Not recorded
<i>Schotia afra</i>		LC	PRESENT
<i>Scolopia mundii</i>	Salicaceae	LC	PRESENT
<i>Scutia myrtina</i>		LC	PRESENT
<i>Searsia chirensensis</i>		LC	Not recorded
<i>Searsia crenata</i>		LC	PRESENT

SCIENTIFIC NAME ¹⁸	FAMILY	STATUS ¹⁹	COMMENT/PRESENCE
<i>Searsia glauca</i>		LC	PRESENT
<i>Searsia lucida</i>		LC	PRESENT
<i>Searsia pentheri</i>	Anacardiaceae	LC	PRESENT
<i>Searsia pterota</i>		End	PRESENT
<i>Sebaea stricta</i>	Gentianaceae	LC, End	Not recorded
<i>Selago burchellii</i>		End	Not recorded
<i>Selago glomerata</i>	Scrophulariaceae	LC, End	Not recorded
<i>Senecio elegans</i>	Asteraceae	LC, End	Not recorded
<i>Senecio ilicifolius</i>	Asteraceae	LC, End	Not recorded
<i>Sensitive species 273, Dioscorea burchellii Baker</i>	Dioscoreaceae	Vu, Medium (ST)	NOT RECORDED George to Humansdorp. Tsitsikamma Sandstone Fynbos, Garden Route Shale Fynbos, Knysna Sand Fynbos. Damp sandstone slopes in coastal fynbos.
<i>Sensitive species 287, Disa hallackii Rolfe</i>	Orchidaceae	En, Medium (ST), PNCO	NOT RECORDED A coastal lowland species that has lost most historical locations to urban expansion and crop cultivation. Known from between eight and 11 remaining subpopulations, the total population is estimated to number fewer than 1000 mature individuals and no subpopulation has more than 150 individuals. Declining due to ongoing habitat loss and degradation as a result of coastal development, alien plant invasion, grazing and road verge clearing. Cape Flats to Port Elizabeth. Overberg Dune Strandveld, Agulhas Limestone Fynbos, Garden Route Granite Fynbos, Hangklip Sand Fynbos, Cape Flats Sand Fynbos, Atlantis Sand Fynbos, Knysna Sand Fynbos, St Francis Dune Thicket, Hartenbos Strandveld, Goukamma Dune Thicket. Lowland sandy flats, stabilised dunes and coastal rock promontories.
<i>Seriphium plumosum</i>	Asteraceae	LC	Not recorded
<i>Sideroxylon inerme</i>		LC, NFA	PRESENT
<i>Solanum africanum</i>		LC	PRESENT
<i>Spartina sp.</i>	Poaceae	LC	Not recorded
<i>Sporobolus africanus</i>	Poaceae	LC	Not recorded
<i>Sporobolus virginicus</i>	Poaceae	LC	Not recorded
<i>Stenotaphrum secundatum</i>		LC	PRESENT
<i>Stipa dregeana</i>	Poaceae	LC, End	Not recorded
<i>Strelitzia alba</i>	Strelitziaceae	LC, End	Not recorded
<i>Struthiola martiana</i>	Thymelaeaceae	LC, End	Not recorded
<i>Tarchonanthus littoralis</i>		LC	PRESENT
<i>Teedia lucida</i>	Scrophulariaceae	LC	Not recorded
<i>Tephrosia capensis</i>	Fabaceae	LC	Not recorded
<i>Tetragonia decumbens</i>	Aizoaceae	LC, PNCO	Not recorded
<i>Tetragonia fruticosa</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Tetragonia sarcophylla</i>	Aizoaceae	LC, End, PNCO	Not recorded
<i>Tetragonia sp.</i>	Aizoaceae	LC, PNCO	Not recorded
<i>Thamnochortus glaber</i>	Restionaceae	LC, End	Not recorded
<i>Thamnochortus insignis</i>		End	Not recorded
<i>Themeda triandra</i>	Poaceae	LC	Not recorded

SCIENTIFIC NAME ¹⁸	FAMILY	STATUS ¹⁹	COMMENT/PRESENCE
<i>Thesium ericaefolium</i>	Santalaceae	LC, End	Not recorded
<i>Thesium frisea</i>	Santalaceae	DD, End	Not recorded
<i>Tribolium uniolae</i>	Poaceae	LC, End	Not recorded
<i>Triquetrella tristicha</i>	Pottiaceae	LC	Not recorded
<i>Ursinia heterodonta</i>	Asteraceae	LC, End	Not recorded
<i>Viscum capense</i>	Santalaceae	LC	South Africa, Namibia, Not recorded
<i>Viscum obscurum</i>	Santalaceae	LC	Not recorded
<i>Zanthoxylum capense</i>		LC	Not recorded
<i>Zygophyllum morgsana</i>		LC	PRESENT

9.3.2 Fauna

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

The Red Data Category is based on the latest IUCN red data category (International Union for Conservation of Nature and Natural Resources). Where species are Not Listed (NL), the South African red data listing is provided (R = Rare; EN = Endangered; VU = Vulnerable; LC = Least Concern).

In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal themes**, the proclamation notes that *'the requirements of these protocols will apply from the date of publication, except where the applicant provides proof to the competent authority that the specialist assessment affected by these protocols had been commissioned by the date of the publication of these protocols in the Government gazette, in which case Appendix 6 of the Environmental Impact Assessment Regulations, 2014, as amended will apply to such applications'*. In this regard and with reference to the appointment letter provided in Section 9.7 (Appendix G), these protocols have not been adopted as the appointment was before commencement of the regulations. However, due diligence regarding their presence has still been undertaken.

SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
MAMMALS				
<i>Acomys (Subacomys) subspinosus</i>	Cape Spiny Mouse	Muridae	Lc	May be present in surrounding landscape as a transient visitor
<i>Aepyceros melampus</i>	Impala	Bovidae	Lc	Absent
<i>Antidorcas marsupialis</i>	Springbok	Bovidae	Lc (2016)	Absent
<i>Anyx capensis</i>	African Clawless Otter	Mustelidae	NT (2016)	May be present in surrounding landscape as a transient visitor
<i>Atilax paludinosus</i>	Marsh Mongoose	Herpestidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Caracal caracal</i>	Caracal	Felidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	Cercopithecidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Chlorocebus pygerythrus pygerythrus</i>	Vervet Monkey (subspecies pygerythrus)	Cercopithecidae	Lc (2008)	May be present in surrounding landscape as a transient visitor
<i>Connochaetes gnou</i>	Black Wildebeest	Bovidae	Lc (2016)	Absent
<i>Connochaetes taurinus taurinus</i>		Bovidae	Lc (2016)	Absent
<i>Crociodura cyanea</i>	Reddish-gray Musk Shrew	Soricidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Damaliscus pygargus pygargus</i>	Bontebok	Bovidae	Vu (2016)	Absent
<i>Dendromus mesomelas</i>	Brants's African Climbing Mouse	Nesomyidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted Fruit Bat	Pteropodidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Equus quagga</i>	Plains Zebra	Equidae	Lc (2016)	Absent
<i>Felis silvestris</i>	Wildcat	Felidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Genetta genetta</i>	Common Genet	Viverridae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Genetta tigrina</i>	Cape Genet (Cape Large-spotted Genet)	Viverridae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Giraffa giraffa giraffa</i>	South African Giraffe	Giraffidae	Lc (2016)	Absent
<i>Grammomys dolichurus</i>	Common Grammomys	Muridae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Herpestes ichneumon</i>	Egyptian Mongoose	Herpestidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Herpestes pulverulentus</i>	Cape Gray Mongoose	Herpestidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Hystrix africaeaustralis</i>	Cape Porcupine	Hystriidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Kobus ellipsiprymnus</i>	Waterbuck	Bovidae	Lc (ver 3.1, 2016)	Absent
<i>Leptailurus serval</i>	Serval	Felidae	NT (2016)	May be present in surrounding landscape as a transient visitor
<i>Loxodonta africana</i>	African Bush Elephant	Elephantidae	Vu A2a (2008)	Absent
<i>Mastomys natalensis</i>	Natal Mastomys	Muridae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Mellivora capensis</i>	Honey Badger	Mustelidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Mus (Nannomys) minutoides</i>	Southern African Pygmy Mouse	Muridae	Lc	May be present in surrounding landscape as a transient visitor
<i>Mus musculus musculus</i>		Muridae	Lc	May be present in surrounding landscape as a transient visitor
<i>Myomyscus verreauxi</i>	Verreaux's Mouse	Muridae	Lc	May be present in surrounding landscape as a transient visitor

²⁰ Species indicated in green are listed in the [DEA screening tool](#), those in brown are from various other database and literature sources that are [known from the general area](#).

²¹ PNCO - Provincial Nature Conservation Ordinance (1974); ToPS – Threatened or Protected Species; RD – Recent Discovery

SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
<i>Myosorex varius</i>	Forest Shrew	Soricidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Otomys irroratus</i>	Southern African Vlei Rat (Fynbos type)	Muridae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Panthera pardus</i>	Leopard	Felidae	Vu (2016)	May be present in surrounding landscape as a transient visitor
<i>Papio ursinus</i>	Chacma Baboon	Cercopithecidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Philantomba monticola</i>	Blue Duiker	Bovidae	Vu (2016)	May be present in surrounding landscape as a transient visitor
<i>Potamochoerus porcus</i>	Red River Hog	Suidae		Absent
<i>Procavia capensis</i>	Cape Rock Hyrax	Procaviidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Raphicerus melanotis</i>	Cape Grysbok	Bovidae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat	Muridae	Lc (2016)	May be present in surrounding landscape as a transient visitor
<i>Rousettus (Rousettus) aegyptiacus</i>	Egyptian Rousette	Pteropodidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Sciurus carolinensis</i>	Eastern Grey Squirrel	Sciuridae	Lc (IUCN 3.1)	May be present in surrounding landscape as a transient visitor
<i>Syncerus caffer</i>	African Buffalo	Bovidae	Lc (2008)	Absent
<i>Tragelaphus scriptus</i>	Bushbuck	Bovidae	Lc	May be present in surrounding landscape as a transient visitor
AVIFAUNA (BIRDS)				
<i>Alcedo cristata</i>	Malachite Kingfisher	Alcedinidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Alopochen aegyptiacus</i>	Egyptian Goose	Anatidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Anas capensis</i>	Cape Teal	Anatidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Anthreptes [Hedydipna] collaris</i>	Collared Sunbird	Nectariniidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Anthropoides paradiseus</i>	Blue Crane	Gruidae	Global: VU; BLSA: NT	May be present in surrounding landscape as a transient visitor
<i>Apalis thoracica</i>	Bar-throated Apalis	Cisticolidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Apaloderma narina</i>	Narina Trogon	Trogonidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Apus barbatus</i>	African Black (Black) Swift	Apodidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Ardea melanocephala</i>	Black-headed Heron	Ardeidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Batis capensis</i>	Cape Batis	Malaconotidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Buteo [augur] rufofuscus</i>	Jackal Buzzard	Accipitridae		May be present in surrounding landscape as a transient visitor
<i>Buteo trizonatus</i>	Forest Buzzard	Accipitridae	NT D1 (IUCN, 2017)	May be present in surrounding landscape as a transient visitor
<i>Calidris ferruginea</i>	Curlew Sandpiper	Scolopacidae	Global: NT; BLSA: LC	May be present in surrounding landscape as a transient visitor
<i>Campethera notata</i>	Knysna Woodpecker	Picidae	Global: NT; BLSA: NT	May be present in surrounding landscape as a transient visitor
<i>Charadrius marginatus</i>	White-fronted Plover	Charadriidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Chrysococcyx caprius</i>	Dideric (Diederik) Cuckoo	Cuculidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Circus maurus</i>	Black Harrier		High (ST)	May be present in surrounding landscape as a transient visitor, unlikely to be affected by scope of proposed development
<i>Cisticola fulvicapillus [fulvicapilla]</i>	Neddicky (Piping Cisticola)	Cisticolidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Colius striatus</i>	Speckled Mousebird	Coliidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Columba arquatrix</i>	African Olive- (Rameron) Pigeon	Columbidae	Lc	May be present in surrounding landscape as a transient visitor

SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
<i>Columba guinea</i>	Speckled (Rock) Pigeon	Columbidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Corvus albicollis</i>	White-necked Raven	Corvidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Cossypha caffra</i>	Cape Robin-chat	Muscicapidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Cygnus atratus</i>	Black Swan	Anatidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Dendrocygna bicolor</i>	Fulvous (Whistling) Duck	Dendrocygnidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	Dicruridae	Lc	May be present in surrounding landscape as a transient visitor
<i>Estrilda [Coccygia] melanotis</i>	Swee (Black-faced) Waxbill (Swee)	Estrildidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Estrilda astrild</i>	Common Waxbill	Estrildidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Falco concolor</i>	Sooty Falcon	Falconidae	Global: NT; BLSA: NA	May be present in surrounding landscape as a transient visitor
<i>Gallinula chloropus</i>	Common Moorhen	Rallidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Geocolaptes olivaceus</i>	Ground Woodpecker	Picidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Gypohierax angolensis</i>	Palm-nut Vulture	Accipitridae	Lc	May be present in surrounding landscape as a transient visitor
<i>Haematopus moquini</i>	African Black Oystercatcher	Haematopodidae	Global: NT; BLSA: NA	May be present in surrounding landscape as a transient visitor
<i>Hirundo cucullata</i>	Greater Striped-Swallow	Hirundinidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Hirundo rustica</i>	Barn (European) Swallow	Hirundinidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Laniarius ferrugineus</i>	Southern Boubou	Malaconotidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Larus dominicanus (incl vetula)</i>	Kelp Gull	Laridae	Lc	May be present in surrounding landscape as a transient visitor
<i>Lophaetus occipitalis</i>	Long-crested Eagle	Accipitridae	Lc	May be present in surrounding landscape as a transient visitor
<i>Lybius torquatus</i>	Black-collared Barbet	Lybiidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Monticola rupestris</i>	Cape Rock-thrush	Muscicapidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Motacilla capensis</i>	Cape Wagtail	Motacillidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Muscicapa striata</i>	Spotted Flycatcher	Muscicapidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Nectarinia [Anthobaphes] violacea</i>	Orange-breasted Sunbird	Nectariniidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Nectarinia [Chalcomitra] amethystina</i>	Amethyst (Black) Sunbird	Nectariniidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Nectarinia [Cinnyris] afra</i>	Greater Double-collared Sunbird	Nectariniidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Nectarinia [Cinnyris] famosa</i>	Malachite Sunbird	Nectariniidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Nectarinia [Cinnyris] veroxii</i>	Grey (Mouse-coloured) Sunbird	Nectariniidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Numenius arquata</i>	Eurasian (Curlew) Curlew	Scolopacidae	Global: NT; BLSA: NT	May be present in surrounding landscape as a transient visitor
<i>Numenius phaeopus</i>	Common (Whimbrel) Whimbrel	Scolopacidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Onychognathus morio</i>	Red-winged Starling	Sturnidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Oriolus larvatus</i>	Black-headed (Eastern) Oriole	Oriolidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Phalacrocorax lucidus</i>	White-breasted (Great) Cormorant	Phalacrocoracidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Ploceus capensis</i>	Cape Weaver	Ploceidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Ploceus capensis</i>	Cape Weaver	Ploceidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Ploceus rubiginosus</i>	Chestnut Weaver	Ploceidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Prinia maculosa</i>	Karoo Prinia (split)	Cisticolidae	Lc	May be present in surrounding landscape as a transient visitor

SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
<i>Promerops cafer</i>	Cape Sugarbird	Promeropidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Pternistis afer</i>	Red-necked Spurfowl (Francolin)	Phasianidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Pycnonotus capensis</i>	Cape Bulbul	Pycnonotidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Serinus gularis</i>	Streaky-headed Seedeater (Canary)	Fringillidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Serinus scotops</i>	Forest Canary	Fringillidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Sigelus silens</i>	Fiscal Flycatcher	Muscicapidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Sterna bergii</i>	Swift (Great Crested) Tern	Laridae	Lc	May be present in surrounding landscape as a transient visitor
<i>Streptopelia capicola</i>	Cape Turtle (Ring-necked) Dove	Columbidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Streptopelia semitorquata</i>	Red-eyed Dove	Columbidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Streptopelia turtur</i>	European Turtle-Dove	Columbidae	Global: VU; BLSA: NA	May be present in surrounding landscape as a transient visitor
<i>Tauraco corythaix</i>	Knysna Turaco (split)	Musophagidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Trochocercus cyanomelas</i>	Blue-mantled Crested-Flycatcher	Monarchidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Turdus olivaceus</i>	Olive Thrush (split)	Turdidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Vanellus armatus</i>	Blacksmith Lapwing (Plover)	Charadriidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Vidua macroura</i>	Pin-tailed Whydah	Viduidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Zosterops virens</i>	Cape White-eye (split)	Zosteropidae	Lc	May be present in surrounding landscape as a transient visitor
REPTILES				
<i>Acontias meleagris</i>	Cape Legless Skink	Scincidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Afrogecko porphyreus</i>	Marbled Leaf-toed Gecko	Gekkonidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Agama atra</i>	Southern Rock Agama	Agamidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Amplorhinus multimaculatus</i>	Many-spotted Snake	Lamprophiidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Bitis arietans arietans</i>	Puff Adder	Viperidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Boaedon capensis</i>	Brown House Snake	Lamprophiidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Bradypodion damaranum</i>	Knysna Dwarf Chameleon	Chamaeleonidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Bradypodion sp. (barbatulum)</i>	Beardless Dwarf Chameleon	Chamaeleonidae	Not Evaluated	May be present in surrounding landscape as a transient visitor
<i>Causus rhombeatus</i>	Rhombic Night Adder	Viperidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Chamaesaura anguina anguina</i>	Cape Grass Lizard	Cordylidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Cordylus cordylus</i>	Cape Girdled Lizard	Cordylidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Colubridae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Dispholidus typus typus</i>	Boomslang	Colubridae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Duberria lutrix lutrix</i>	South African Slug-eater	Lamprophiidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Homopus areolatus</i>	Parrot-beaked Tortoise	Testudinidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Hydrophis platurus</i>	Yellow-bellied Sea Snake	Elapidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Lamprophis guttatus</i>	Spotted House Snake	Lamprophiidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Lycodonomorphus inornatus</i>	Olive House Snake	Lamprophiidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Lycodonomorphus rufulus</i>	Brown Water Snake	Lamprophiidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Ninurta coeruleopunctatus</i>	Blue-spotted Girdled Lizard	Cordylidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Philothamnus hoplogaster</i>	South Eastern Green Snake	Colubridae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor

SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
<i>Philothamnus occidentalis</i>	Western Natal Green Snake	Colubridae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Psammodromus rufus</i>	Spotted Grass Snake	Lamprophiidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Pseudocordylus microlepidotus microlepidotus</i>	Cape Crag Lizard	Cordylidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	Typhlopidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Tetradactylus fitzsimonsi</i>	Fitzsimons' Long-tailed Seps	Gerrhosauridae	Lc, Medium (SC)	May be present in surrounding landscape as a transient visitor
<i>Tetradactylus tetradactylus</i>	Cape Long-tailed Seps	Gerrhosauridae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Trachylepis homalocephala</i>	Red-sided Skink	Scincidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Tropidosaura gularis</i>	Cape Mountain Lizard	Lacertidae	Lc (SARCA 2014)	May be present in surrounding landscape as a transient visitor
<i>Tropidosaura montana montana</i>	Common Mountain Lizard	Lacertidae		May be present in surrounding landscape as a transient visitor
AMPHIBIANS				
<i>Afrixalus knysna</i>	Knysna Spiny Reed Frog	Hyperoliidae	Medium (ST), En B1ab(i,ii,iii,v) +2ab(i,ii,iii,v) (2016)	May be present, suitable habitat, unconfirmed. Wilderness, George inland. Groenvlei (3422BB) in the west to Covie (3323DC) in the east and is confined to the coastal region by the Outeniqua and Tsitsikamma mountains. Coastal mosaic of Mountain Fynbos and Afromontane Forest.
<i>Amietia delalandii</i>	Delalande's River Frog	Pyxicephalidae	Lc (2017)	May be present in surrounding landscape as a transient visitor
<i>Amietia fuscigula</i>	Cape River Frog	Pyxicephalidae	Lc (2017)	May be present in surrounding landscape as a transient visitor
<i>Breviceps fuscus</i>	Plain Rain Frog	Brevicipitidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Cacosternum boettgeri</i>	Common Caco	Pyxicephalidae	Lc (2013)	May be present in surrounding landscape as a transient visitor
<i>Cacosternum nanum</i>	Bronze Caco	Pyxicephalidae	Lc (2013)	May be present in surrounding landscape as a transient visitor
<i>Capensibufo tradouwi</i>	Tradouw Toadlet	Bufonidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Heleophryne regis</i>	Southern Ghost Frog	Heleophrynidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Hyperolius marmoratus</i>	Painted Reed Frog	Hyperoliidae	Lc (IUCN ver 3.1, 2013)	May be present in surrounding landscape as a transient visitor
<i>Poyntonophrynus vertebralis</i>	Southern Pygmy Toad	Bufonidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Sclerophrys capensis</i>	Raucous Toad	Bufonidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Semnodactylus wealii</i>	Rattling Frog	Hyperoliidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Strongylopus fasciatus</i>	Striped Stream Frog	Pyxicephalidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Strongylopus grayii</i>	Clicking Stream Frog	Pyxicephalidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Xenopus laevis</i>	Common Platanna	Pipidae	Lc	May be present in surrounding landscape as a transient visitor
INVERTEBRATES				
LEPIDOPTERA (BUTTERFLIES)				
<i>Acraea horta</i>	Garden acraea	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Acraea neobule neobule</i>	Wandering donkey acraea	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Aeropetes tulbaghia</i>	Table mountain beauty	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Afrogegenes letterstedti</i>	Brown dodger	Hesperiidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Afrogegenes ocra</i>	Yellow dodger	Hesperiidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Afrogegenes sp.</i>		Hesperiidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Aloeides almeida</i>	Plain russet	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Aloeides aranda</i>	Yellow russet	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor

SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
<i>Aloeides pallida juno</i>	Giant Copper		Medium (ST)	May be present, suitable habitat, unconfirmed. Fynbos. The larvae of subspecies <i>A. p. pallida</i> and <i>A. p. jonathani</i> feed on <i>Aspalathus</i> species. The larvae of subspecies <i>A. p. grandis</i> are fed by trophallaxis by <i>Lepisiota capensis</i> ants. They also feed on the eggs of these ants.
<i>Aloeides pallida littoralis</i>	Giant russet	Lycaenidae	Data Deficient (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Aloeides pierus</i>	Veined russet	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Aloeides quickelbergei</i>	Outeniqua russet	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Aloeides thyra orientis</i>	Red Copper		Medium (SC)	May be present, suitable habitat, unconfirmed. The larvae of subspecies <i>A. p. pallida</i> and <i>A. p. jonathani</i> feed on <i>Aspalathus</i> species. The larvae of subspecies <i>A. p. grandis</i> are fed by trophallaxis by <i>Lepisiota capensis</i> ants. They also feed on the eggs of these ants.
<i>Amauris echeria echeria</i>	Chief	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Anthene definita definita</i>	Steel-blue-ciliate blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Belenois aurota</i>	Pioneer caper white	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Belenois creona severina</i>	African caper white	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Belenois gidica abyssinica</i>	African veined white	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Belenois zochalia zochalia</i>	Forest caper white	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Bicyclus safitza safitza</i>	Black-haired bush brown	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Cacyreus fracta fracta</i>	Water geranium bronze	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Cacyreus lingeus</i>	Bush bronze	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Cacyreus marshalli</i>	Common geranium bronze	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Capys alpheus alpheus</i>	Orange banded protea	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Cassionympha cassius</i>	Rainforest dull brown	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Cassionympha detecta</i>	Cape dull brown	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Catopsilia florella</i>	African migrant	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Charaxes brutus natalensis</i>	White-barred charaxes	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Charaxes varanes varanes</i>	Pearl charaxes	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Charaxes xiphares xiphares</i>	Forest-king charaxes	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Chrysothrix palmus margueritae</i>	Water opal	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Colias electo electo</i>	African clouded yellow	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Colotis euipe omphale</i>	Southern round-winged orange tip	Pieridae	Lc (LC)	May be present in surrounding landscape as a transient visitor
<i>Cupidopsis cissus cissus</i>	Meadow blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Cyligramma latona</i>		Erebidae	NL	May be present in surrounding landscape as a transient visitor
<i>Cymothoe alcimeda alcimeda</i>	Battling glider	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Danaus chrysippus orientis</i>	African plain tiger	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Dira clytus clytus</i>	Cape autumn widow	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Dixeia charina charina</i>	African ant-heap white	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor

SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
<i>Durbaniella clarki jenniferae</i>	Little rocksitter	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Eagris nottoana knysna</i>	Rufous-winged elfin	Hesperiidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Eicochrysops messapus messapus</i>	Cupreous ash blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Eretis umbra umbra</i>	Small marbled elf	Hesperiidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Eurytela hiarbas angustata</i>	Pied piper	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Gomalia elma elma</i>	Green-marbled skipper	Hesperiidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Grammodes stolida</i>		Erebidae	NL	May be present in surrounding landscape as a transient visitor
<i>Hypolimnas misippus</i>	Common diadem	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Junonia hierta cebrene</i>	Yellow pansy	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Junonia oenone oenone</i>	Dark blue pansy	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Junonia orithya madagascariensis</i>	African blue pansy	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Lampides boeticus</i>	Pea blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Leptomyrina lara</i>	Cape black-eye	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Leptotes brevidentatus</i>	Short-toothed zebra blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Leptotes pirthous pirthous</i>	Common zebra blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Leptotes sp.</i>		Lycaenidae		May be present in surrounding landscape as a transient visitor
<i>Metisella metis paris</i>	Gold-spotted sylph	Hesperiidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Mylothris agathina agathina</i>	Eastern dotted border	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Myrina silenus ficedula</i>	Common fig tree blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Nepheronia buquetii buquetii</i>	Buquet's vagrant	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Oraidium barberae</i>	Dwarf blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Papilio dardanus cenea</i>	Mocker swallowtail	Papilionidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Papilio demodocus demodocus</i>	Citrus swallowtail	Papilionidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Papilio nireus lyaeus</i>	Narrow green-banded swallowtail	Papilionidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Pelopidas mathias</i>	Black-branded swift	Hesperiidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Pelopidas thrax</i>	White-branded swift	Hesperiidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Pieris brassicae</i>	Cabbage white	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Pontia helice helice</i>	Southern meadow white	Pieridae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Precis archesia archesia</i>	Garden inspector	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Pseudonympha magus</i>	Silver-bottom brown	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Sensitive species 1</i>			Medium (SC)	Outside of known distribution range, unlikely to be present
<i>Sensitive species 6</i>			Medium (SC)	May be present, suitable habitat, unconfirmed. George/Oudshoorn area. and to the east of, the Eastern Heads, which may have been close to Trimen's original locality. extending eastwards to the Pezula Golf Estate. Also found along the coast close to sea level from Coney Glen beach for about 1km eastwards.
<i>Sommeria spilosoma</i>		Noctuidae	NL	May be present in surrounding landscape as a transient visitor
<i>Spoladea sp.</i>		Crambidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Tarucus thespis</i>	Vivid pierrot	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor

SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
<i>Telchinia rahira rahira</i>	Marsh telchinia	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Thestor murrayi</i>	Garden route skolly	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Thyretes hippotes</i>		Erebidae	NL	May be present in surrounding landscape as a transient visitor
<i>Trimenia argyroplaga argyroplaga</i>	Large silver-spotted copper	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Vanessa cardui</i>	Painted lady	Nymphalidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Zizeeria knysna knysna</i>	African grass blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
<i>Zizula hylax</i>	Tiny grass blue	Lycaenidae	Lc (SABCA 2013)	May be present in surrounding landscape as a transient visitor
ODONATA (DRAGONFLIES)				
<i>Africallagma glaucum</i>	Swamp Bluet	Coenagrionidae	LC	May be present in surrounding landscape as a transient visitor
<i>Agriocnemis falcifera</i>	White-masked Wisp	Coenagrionidae	LC	May be present in surrounding landscape as a transient visitor
<i>Allocnemis leucosticta</i>	Goldtail	Platycnemididae	LC	May be present in surrounding landscape as a transient visitor
<i>Anaciaeschna triangulifera</i>	Evening Hawker	Aeshnidae	LC	May be present in surrounding landscape as a transient visitor
<i>Anax imperator</i>	Blue Emperor	Aeshnidae	LC	May be present in surrounding landscape as a transient visitor
<i>Anax speratus</i>	(Eastern) Orange Emperor	Aeshnidae	LC	May be present in surrounding landscape as a transient visitor
<i>Ceratogomphus pictus</i>	Common Thorntail	Gomphidae	LC	May be present in surrounding landscape as a transient visitor
<i>Ceratogomphus triceraticus</i>	Cape Thorntail	Gomphidae	NT	May be present in surrounding landscape as a transient visitor
<i>Ceriagrion glabrum</i>	Common Citril	Coenagrionidae	LC	May be present in surrounding landscape as a transient visitor
<i>Ceriagrion sp.</i>	citrls	Coenagrionidae		May be present in surrounding landscape as a transient visitor
<i>Chlorolestes conspicuus</i>	Conspicuous Malachite	Synlestidae	LC	May be present in surrounding landscape as a transient visitor
<i>Chlorolestes tessellatus</i>	Forest Malachite	Synlestidae	LC	May be present in surrounding landscape as a transient visitor
<i>Chlorolestes umbratus</i>	White Malachite	Synlestidae	LC	May be present in surrounding landscape as a transient visitor
<i>Crocothemis erythraea</i>	Broad Scarlet	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Crocothemis sanguinolenta</i>	Little Scarlet	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Diplacodes lefebvrii</i>	Black Percher	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Ecchlorolestes nylephtha</i>	Queen Malachite	Synlestidae	NT	May be present in surrounding landscape as a transient visitor
<i>Elattonaura frenulata</i>	Sooty Threadtail	Platycnemididae	LC	May be present in surrounding landscape as a transient visitor
<i>Elattonaura glauca</i>	Common Threadtail	Platycnemididae	LC	May be present in surrounding landscape as a transient visitor
<i>Elattonaura sp.</i>	African threadtails	Platycnemididae		May be present in surrounding landscape as a transient visitor
<i>Ischnura senegalensis</i>	Tropical Bluetail	Coenagrionidae	LC	May be present in surrounding landscape as a transient visitor
<i>Lestes tridens</i>	Spotted Spreadwing	Lestidae	LC	May be present in surrounding landscape as a transient visitor
<i>Lestes virgatus</i>	Smoky Spreadwing	Lestidae	LC	May be present in surrounding landscape as a transient visitor
<i>Nesciothemis farinosa</i>	Eastern Blacktail	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Orthetrum capicola</i>	Cape Skimmer	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Orthetrum julia</i>	Julia Skimmer	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Orthetrum sp.</i>		Libellulidae		May be present in surrounding landscape as a transient visitor
<i>Pantala flavescens</i>	Wandering Glider	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Pinheyschna subpupillata</i>	Stream Hawker	Aeshnidae	LC	May be present in surrounding landscape as a transient visitor
<i>Platycypha fitzsimonsi</i>	Boulder Jewel	Chlorocyphidae	LC	May be present in surrounding landscape as a transient visitor
<i>Pseudagrion draconis</i>	Mountain Sprite	Coenagrionidae	LC	May be present in surrounding landscape as a transient visitor

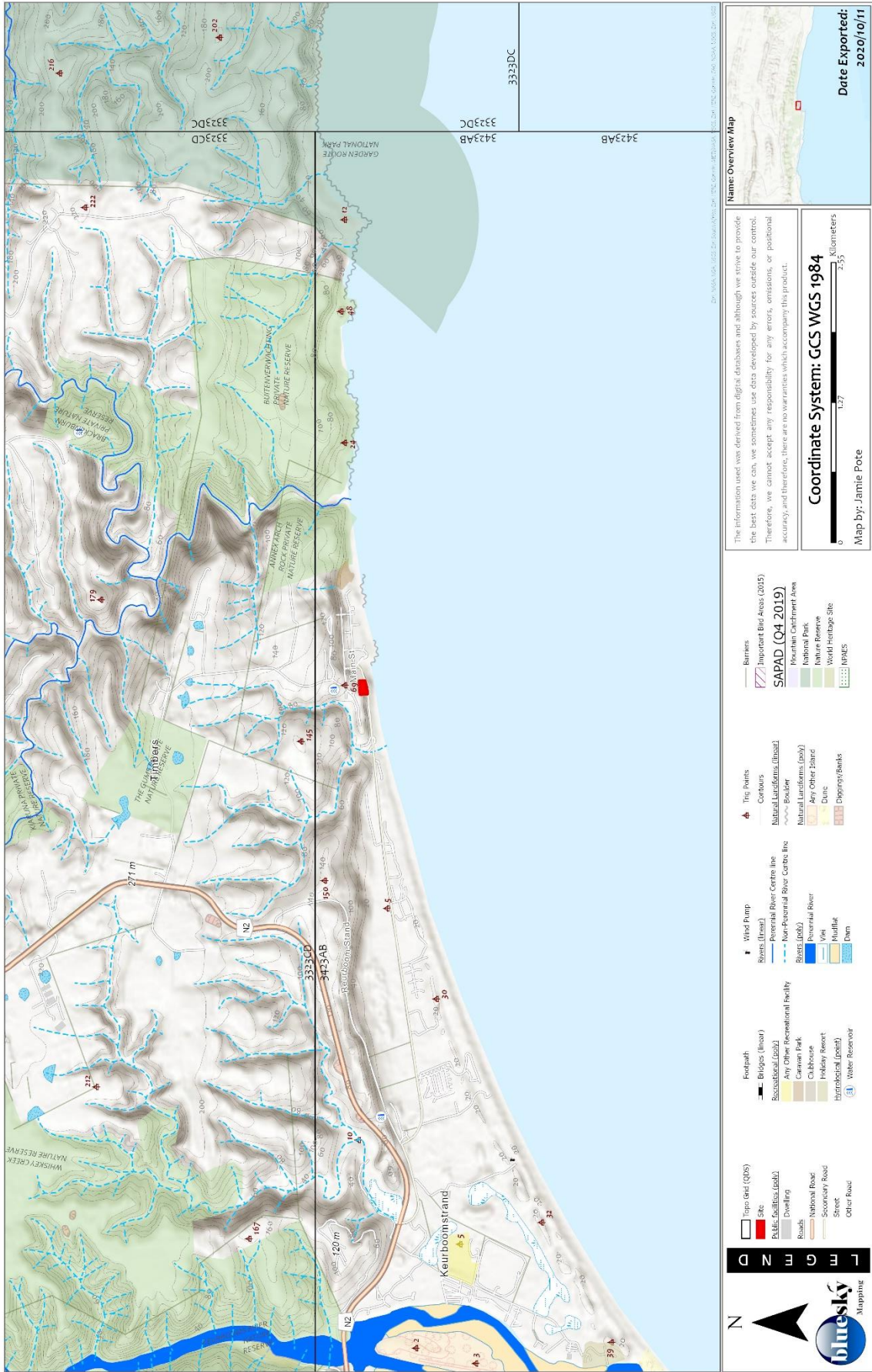
SCIENTIFIC NAME ²⁰	COMMON NAME	FAMILY	STATUS ²¹	COMMENT/PRESENCE
<i>Pseudagrion furcigerum</i>	Palmiet Sprite	Coenagrionidae	NT	May be present in surrounding landscape as a transient visitor
<i>Pseudagrion hageni</i>	Painted Sprite	Coenagrionidae	LC	May be present in surrounding landscape as a transient visitor
<i>Pseudagrion kersteni</i>	Powder-faced Sprite	Coenagrionidae	LC	May be present in surrounding landscape as a transient visitor
<i>Pseudagrion massaicum</i>	Masai Sprite	Coenagrionidae	LC	May be present in surrounding landscape as a transient visitor
<i>Pseudagrion sp.</i>		Coenagrionidae		May be present in surrounding landscape as a transient visitor
<i>Rhyothemis semihyalina</i>	Phantom Flutterer	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Sympetrum fonscolombii</i>	Red-veined Darter or Nomad	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Tramea limbata</i>	Ferruginous Glider	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Trithemis arteriosa</i>	Red-veined Dropwing	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Trithemis furva</i>	Navy Dropwing	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Trithemis kirbyi</i>	Orange-winged Dropwing	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Trithemis pluvialis</i>	Russet Dropwing	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Trithemis stictica</i>	Jaunty Dropwing	Libellulidae	LC	May be present in surrounding landscape as a transient visitor
<i>Zosterateschna minuscula</i>	Friendly Hawker	Aeshnidae	LC	May be present in surrounding landscape as a transient visitor
SCORPIONS				
<i>Opisthacanthus capensis</i>		Hormuridae	Lc , TOPS	May be present in surrounding landscape as a transient visitor
<i>Opisthacanthus diremptus</i>		Hormuridae	Lc , TOPS	May be present in surrounding landscape as a transient visitor
<i>Opisththalmus macer</i>		Scorpionidae	Lc , TOPS	May be present in surrounding landscape as a transient visitor
<i>Parabuthus planicauda</i>		Buthidae	Lc , TOPS	May be present in surrounding landscape as a transient visitor
<i>Uroplectes lineatus</i>		Buthidae	Lc , TOPS	May be present in surrounding landscape as a transient visitor
SPIDERS				
<i>Ceratogyrus sp.</i>		Theraphosidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Harpactira dictator</i>		Theraphosidae	Lc , TOPS	May be present in surrounding landscape as a transient visitor
<i>Harpactira sp.</i>		Theraphosidae	Lc , TOPS	May be present in surrounding landscape as a transient visitor
<i>Hersilia sp.</i>	Long-spinnered bark spiders	Hersiliidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Idiothele nigrofulva</i>		Theraphosidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Nephila fenestrata</i>	Black legged golden orb-web spider	Araneidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Pactactes sp.</i>	crab spiders	Thomisidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Palystes sp.</i>	Rain spiders	Sparassidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Platyoides walteri</i>	Common scorpion spiders	Trochanteriidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Tetragnatha sp.</i>	Long-jawed water orb-web spiders	Tetragnathidae	Lc	May be present in surrounding landscape as a transient visitor
<i>Thomisus sp.</i>	Flower crab spiders	Thomisidae	Lc	May be present in surrounding landscape as a transient visitor

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Project : Keurboomstrand Erf 155

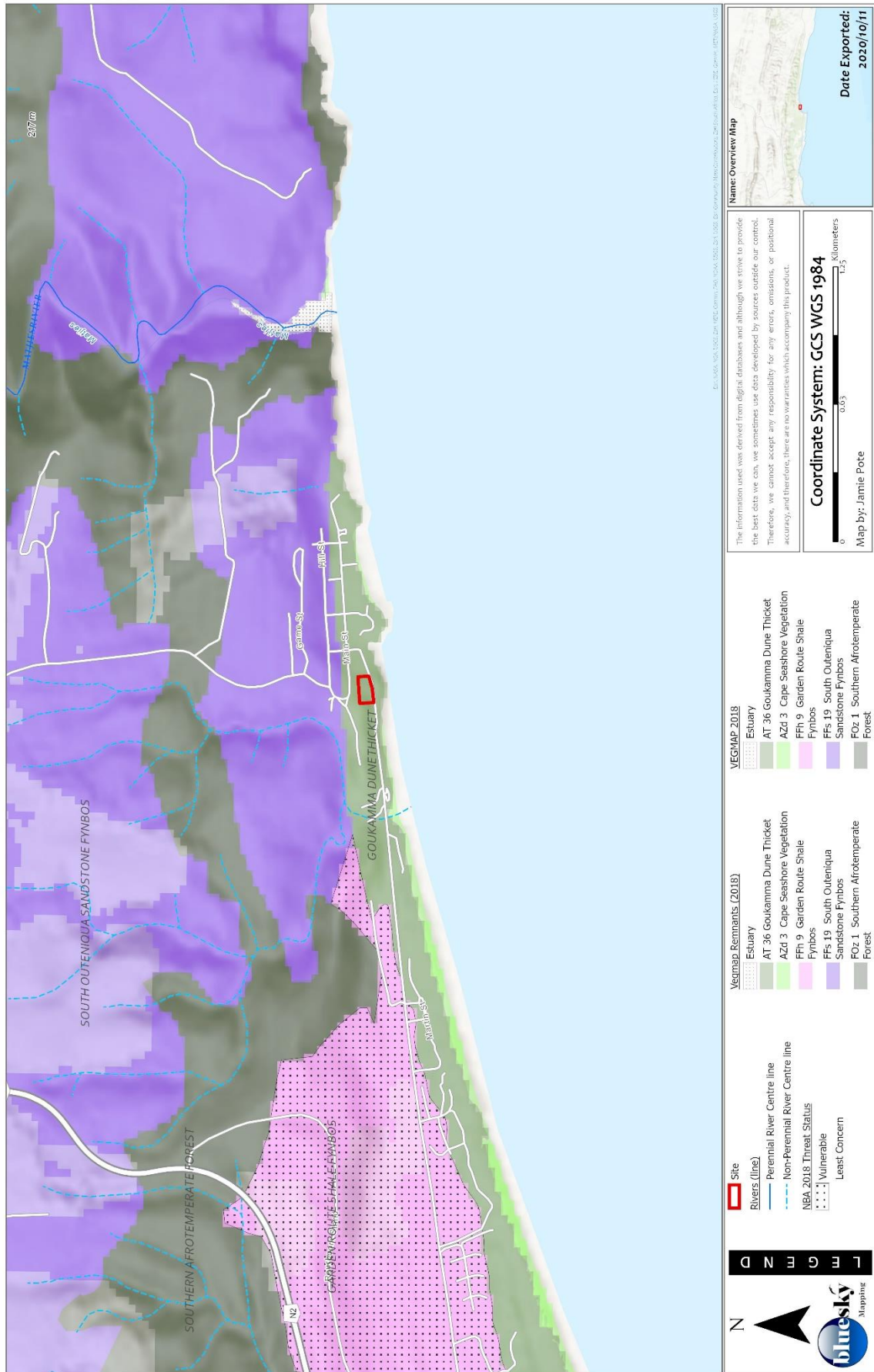
Layout - Topographic Locality Map



Map 1: Locality Map

Project : Keurboomstrand Erf 155

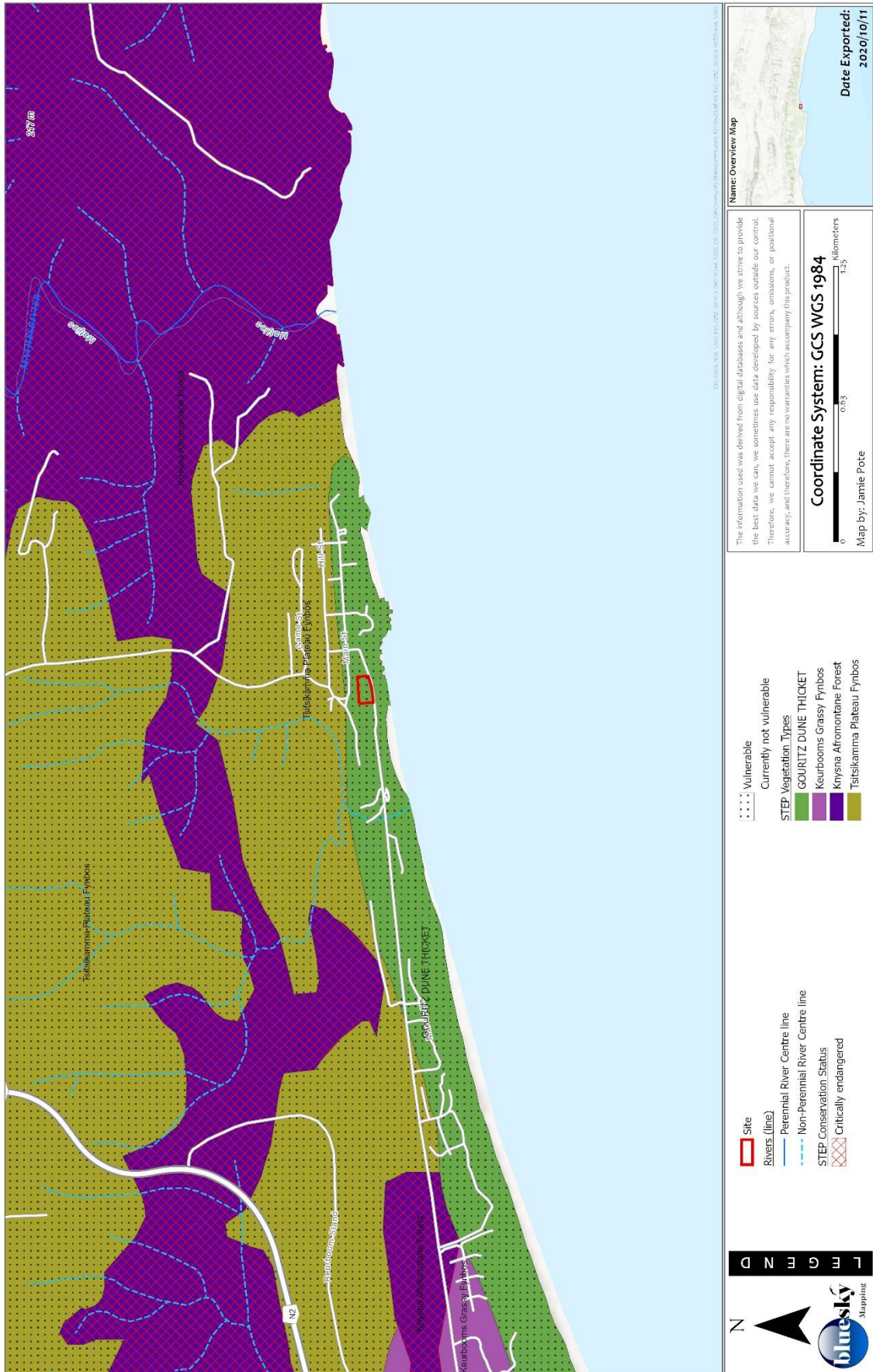
Layout - Vegetation & Status (National)



Map 2: Vegetation of Southern Africa (National)

Project : Keurboomstrand Erf 155

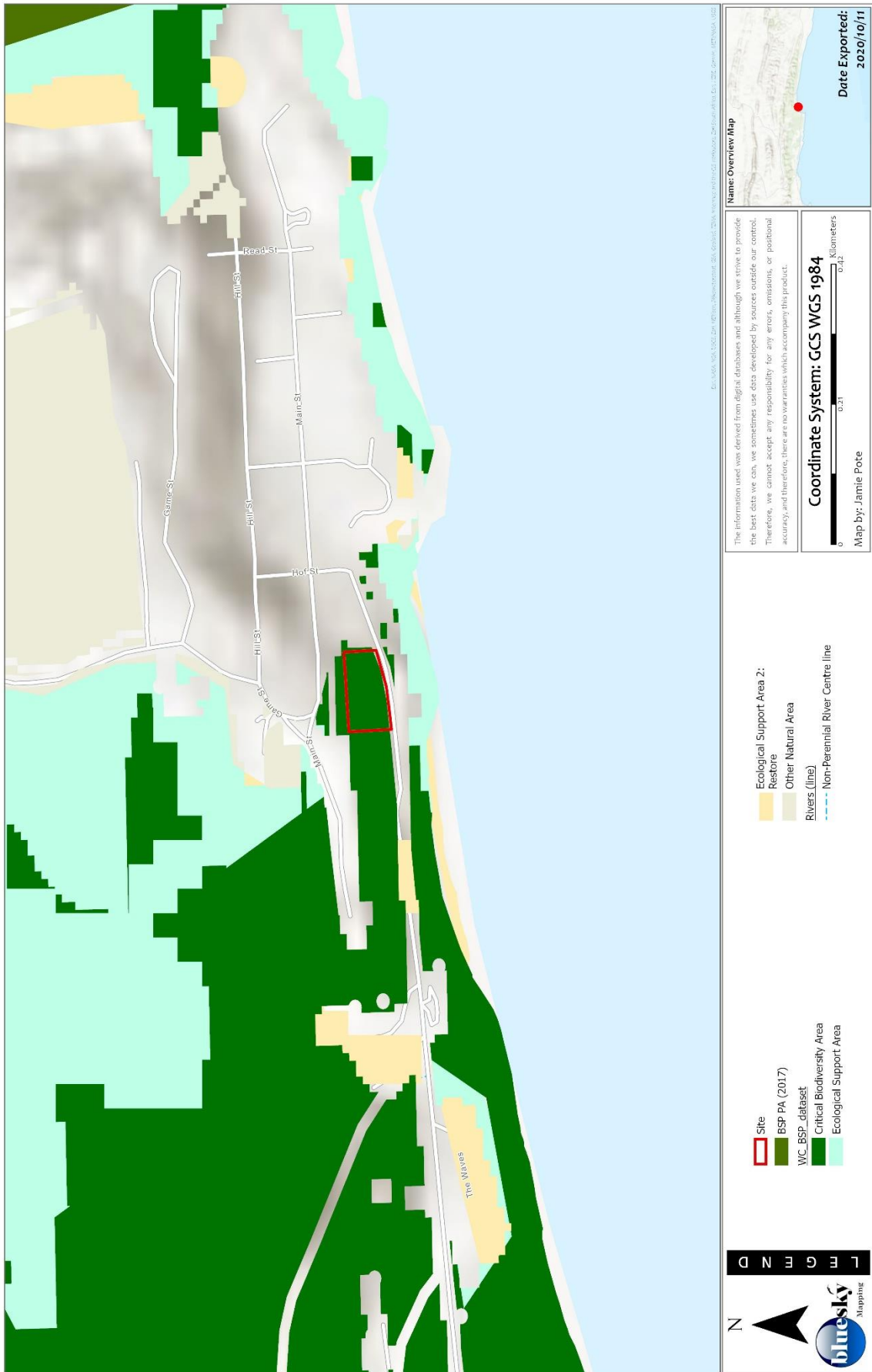
Layout - Regional Biodiversity Planning (STEP)



Map 3: Subtropical Ecosystem Planning (Regional) vegetation units and corridors

Project : Keurboomstrand Erf 155

Layout - Regional Biodiversity Planning (WCBSP)



Map 4: Critical Biodiversity and Protected Areas (WCBSP, 2017)

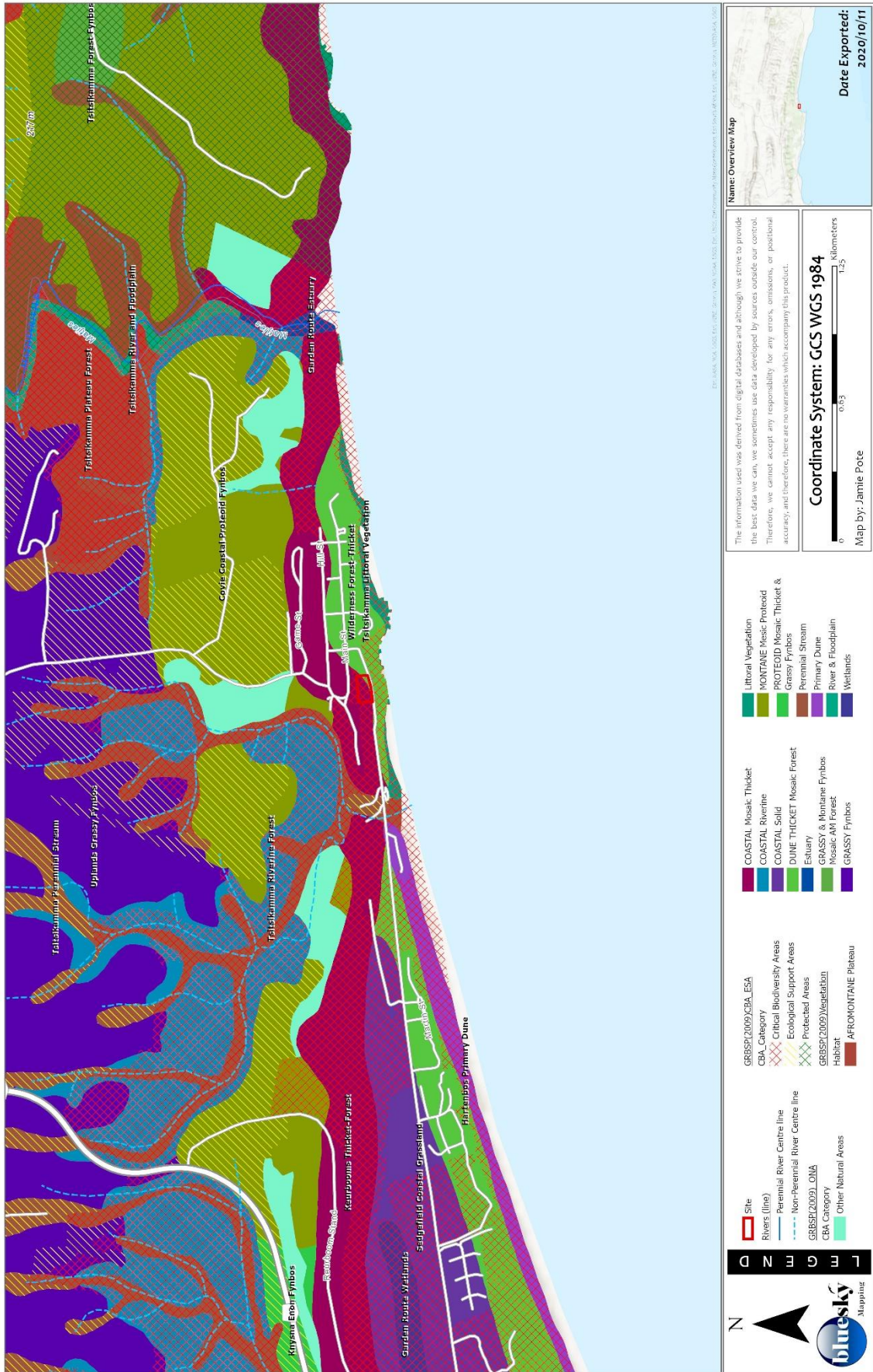
Project : Keurboomstrand Erf 155

Layout - Regional Biodiversity Planning (WCBSP)



Map 5: Land Cover (WCBSP, 2017)

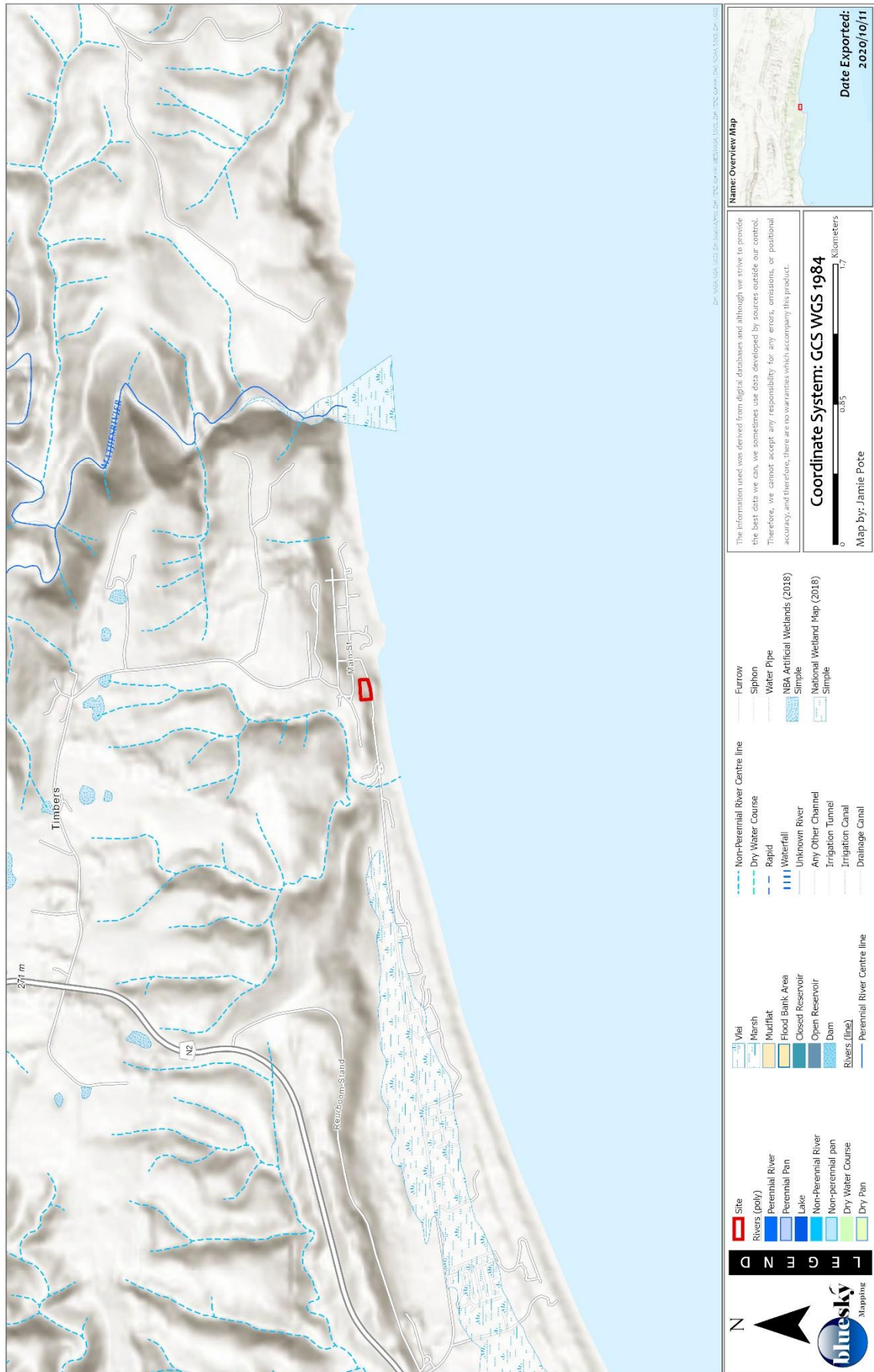
Project : Keurboomstrand Erf 155 Layout - Regional Biodiversity Planning (GRBSP)



Map 6: Critical Biodiversity Areas (Garden Route BSP, 2010)

Project : Keurboomstrand Erf 155

Layout - Rivers & Wetlands Map



Map 7: Rivers and Wetlands

Project : Keurboomstrand Erf 155

Layout - Aerial Photo Map



Map 8: Aerial Photograph of site

Project : Keurboomstrand Erf 155

Layout -Vegetation & Sensitivity



Map 9: Site Vegetation and Sensitivity

Project : Keurboomstrand Erf 155

Layout -Vegetation & Sensitivity



Map 10: Site Development Plan and Site sensitivity

9.5 Appendix E: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included in the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures, and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed in 3.4 will be managed / controlled as set out under mitigating measures (3.4) and as detailed in this section for the more significant impacts during the operational phase.

9.5.1 Protection of Flora and Fauna

The following actions must be implemented at construction phase.

- Search and rescue operations for Species of Conservation Concern must be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation should be temporarily stored during operations and to be used later to stabilise slopes. This excludes exotic invasive species.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and must not be disturbed, upset, or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.
- Rehabilitation of vegetation of the site must be done as described in the Rehabilitation Plans.

Flora search and Rescue

The following flora relocation plan is recommended:

- Once the final layout has been determined the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required and once species of special concern have been relocated for that area.
- Once site clearing is to commence, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a protected area.

9.5.2 Alien and Invasive Plant Management Plan

The following mitigation measures have been identified in order to ensure that the introduction and spread of alien invasive vegetation is minimised:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.
- A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase.
- Weeds and alien species must be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.
- After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner.

9.5.3 Fires

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers should also be informed or otherwise involved.
- Enclosed areas for food preparation should be provided and the Contractor must strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making must be strictly prohibited.
- The Contractor should take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the ECO.
- The Contractor must ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor must supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores, and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and “hot work” must be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area must be away from flammable stores. All events must be under management’s supervision and a fire extinguisher will be immediately available. “Low-smoke” fuels must be used (e.g. charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor must take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested, and approved fire extinguisher immediately at hand and the use of welding curtains.

9.5.4 Soil Aspects

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the botanist and horticulturalist prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.

- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

9.5.5 Dust

- To manage complaints relation to impacts on the nearby communities, a dust register will be developed.
- If required, water spray vehicles will be used to control wind cause by strong winds during activities on the works.
- No over-watering of the site or road surfaces.
- Wind screens should be used to reduce wind and dust in open areas.

9.5.6 Infrastructural Requirements

Topsoil

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The use of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth.

Stormwater and Erosion Control

- Stormwater Management Plans must be developed for the site and should include the following:
 - The management of stormwater during construction.
 - The installation of stormwater and erosion control infrastructure.
 - The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater must be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes should be profiled at a maximum 1:3 gradient.
- Diversion channels should be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation must be retained as far as possible to minimise erosion problems.
- It is importation that the rehabilitation of site is planned and completed in such a way that the runoff water will not cause erosion.
- Visual inspections will be done on a regular basis with regard to the stability of water control structure, erosion, and siltation.
- Sediment-laden runoff from cleared areas must be prevented from entering rivers and streams.

- No river or surface water may be affected by silt emanating from the site.

Site Office / Camp Sites

- No site offices or camp sites will be constructed on the site under current operating conditions, existing structures will be used.

Operating Procedures in the Site

- Construction shall only take place within the approved demarcated site.
- Construction may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment or adapted grass / vegetation will be re-established on completion of construction activities, where applicable.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity, or the access road.

Excavations

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previously stored topsoil shall be returned to its original depth over the area.
- The area shall be fertilised if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

Rehabilitation of Processing and Excavation Areas

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This *shall* be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects

on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This must be done in conjunction with the ECO.

- Final rehabilitation must comply with the requirements mention in the Rehabilitation Plan.

9.5.7 Rehabilitation Plan

Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the activity whilst maximizing the future utilization of the property. Significant aspects to be borne in mind in this regard is visibility of any pipeline scar, revegetation of the footprint and stability and environmental risk. The depression and immediate area of the working must also be free of alien vegetation. Additional broad rehabilitation strategies / objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant, and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble, and tyres, will be removed entirely from the site, and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped separately from any pipeline trench. The topsoil and subsoil removed from the initial cut will be stockpiled separately and only used in rehabilitation work towards the end of the operation. This is in contract to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked-out areas where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

Revegetation

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. The following grass seed that is commonly available and suitable.

Botanical name	Common name	Approx seed mixture /Ha
<i>Cynodon dactylon</i>	Kweek	12 kg/ Ha
<i>Eragrostis curvula</i>	Weeping Love Grass	6 kg/ Ha
<i>Eragrostis tef</i>	Teff	2 kg/ Ha
<i>Digitaria eriantha</i>	Smuts Grass	4 kg/ Ha
Other indigenous veld grasses can be added to the seed mix		± 4 kg/Ha

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site
- Stabilise disturbed soil and rock faces
- Minimize surface erosion and consequent siltation of natural water course located on site
- Control wind-blown dust problems
- Enhance the physical properties of the soil
- Re-establish nutrient cycling
- Re-establish a stable ecological system

Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

Drainage and Erosion Control

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where any pipeline installation is completed should be rehabilitated immediately.
- Areas to be disturbed in future activities will be kept as small as possible (i.e. conducting the operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation
- Existing vegetation will be retained as far as possible to minimize erosion problems.

Visual Impacts Amelioration

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas

9.5.8 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained.

To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

9.5.9 Closure objectives and extent of alignment to pre-construction environment

Closure Objectives

The closure of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and rehabilitating all prepared surfaces.

9.6 Appendix F: General Impact Rating Scale

To ensure a direct comparison between various specialist studies, six standard rating scales are defined and used to assess and quantify the identified impacts. This is necessary since impacts have several parameters that need to be assessed.

These scales are:

1. The Severity/ Benefit Scale, which assesses the importance of the impact from a purely technical perspective.
2. The Spatial Impact Scale, which assesses the extent or magnitude of the impact (the area that will be affected by the impact).
3. The Temporal Impact Scale, which assesses how long the impact will be felt. Some impacts are of a short duration, whereas others are permanent.
4. The Degree of Certainty Scale, which provides a measure of how confident the author feels about their prediction.
5. The Likelihood Scale, which provides an indication of the risk or chance of an impact taking place.
6. The Environmental Significance Scale, which assesses the importance of the impact in the overall context of the affected system or party.

To ensure integration of social and ecological impacts, to facilitate specialist assessment of impact significance, and to reduce reliance on value judgments, the severity of the impact within the scientific field in which it takes place (e.g. vegetation, fauna etc.) was assessed first. Thereafter, each impact was assessed within the context of time and space, and the probability of the impact occurring was quantified using the degree of certainty scale.

The impact was then assessed in the context of the whole environment to establish the “environmental significance” of the impact to the flora and vegetation.

The scales are described in detail below.

9.6.1 The Severity/ Beneficial Scale

The *severity scale* was used to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on an affected system (for ecological impacts) or an affected party. This methodology attempts to remove any value judgments from the assessment, although it relies on the professional judgment of the specialist.

NEGATIVE IMPACT	POSITIVE IMPACT
<p><u>Very severe</u> An irreversible and permanent change to the affected system(s) which cannot be mitigated. For example, change in topography resulting from a quarry.</p>	<p><u>Very Beneficiary</u> A permanent and very substantial benefit to the affected system(s) with no alternative to achieve this benefit.</p>
<p><u>Severe</u> Long-term impacts on the affected system(s) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.</p>	<p><u>Beneficial</u> A long-term impact and substantial benefit to the affected system(s). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.</p>
<p><u>Moderately severe</u> Medium- to long-term impact on the affected system(s) that could be mitigated.</p>	<p><u>Moderately beneficial</u> A medium- to long-term impact of real benefit to the affected system(s) Other ways of optimising are equally difficult, expensive and time</p>

NEGATIVE IMPACT	POSITIVE IMPACT
	consuming (or a combination of these), as achieving them in this way.
<u>Slight</u> Medium- to short term impacts on the affected system(s) Mitigation is very easy, cheap, less time consuming or not necessary.	<u>Slightly beneficial</u> A short- to medium-term impact and negligible benefit to the affected system(s) Other ways of optimising the beneficial effects are easier, cheaper, and quicker, or some combination of these.
<u>No effect</u> The system(s) is not affected by the proposed development.	<u>Do not know/Cannot know</u> In certain cases, it may not be possible to determine the severity of the impact.

The severity of impacts can be evaluated with and without mitigation order to demonstrate how serious the impact is when nothing is done about it. For beneficial impacts, optimisation means anything that can enhance the benefits. However, mitigation or optimisation must be practical, technically feasible and economically viable.

9.6.2 Spatial and Temporal Scales

Two additional factors were considered when assessing the impacts, namely the relationship of the impact to Spatial and Temporal Scales.

The *spatial scale* (shown in italics) defines the impact at the following scales.

SPATIAL SCALE	EXPLANATION
Localised	at a localised scale (i.e. few hectares in extent). The specific area to which this scale refers is defined for the impact to which it refers.
Study Area	the site, some effects to surrounding area (~10 km)
District	the site, some effects to wider surrounding area (~100 km)
Regional	the site, some effects to surrounding area (+250 km)
National	Impacts will affect at a country level
International	Impacts extend beyond country boundary

The *temporal scale* (shown in italics) defines the impact at the following scales.

TEMPORAL SCALE	EXPLANATION
Short Term	Less than 5 years. Many construction phase impacts will be of a short duration
Medium Term	Between 5 and 20 years
Long Term	Between 20 and 40 years, and from a human perspective essentially permanent.
Permanent	Over 40 years and resulting in a permanent and lasting change.

9.6.3 The Degree of Certainty and the Likelihood Scale

It is also for each specialist to state the degree of certainty or the confidence attached to their prediction of significance. For this reason, a 'degree of certainty' scale (shown in bold) must be used.

DEGREE	DESCRIPTION
Definite:	More than 90% sure of fact. To use this one will need to substantial supportive data.
Probable:	Between 70% and 90% sure of fact.
Possible:	Between 40% and 70% sure of fact.
Unsure:	Less than 40% sure of fact.

The risk or likelihood (shown in normal font) of impacts being manifested differs. There is no doubt that some impacts would occur, but certain other (usually secondary data) impacts are not as likely and may or may not result. Although these impacts maybe severe, the likelihood of them occurring may affect their overall significance and must therefore be considered. It is therefore necessary for the author to state his estimate of the likelihood of an impact occurring, using the following likelihood scale:

DEGREE	DESCRIPTION
Very unlikely	The chance of these impacts occurring is extremely slim, e.g. natural forces destroying a dam wall.
Unlikely	The risk of these impacts occurring is slight.
May occur	The risk of these impacts is more likely, although it is not definite.
Very Likely	Slight chance that this impact will not occur.
Definite	There is no chance that this impact will not occur.

9.6.4 The Environmental Significance Scale

The environmental significance scale is an attempt to evaluate the significance of an impact, the severity or benefit of which has already been assessed. This evaluation needs to be assessed in the relevant context, as an impact can either be ecological or social, or both. Since the severity of impacts with and without mitigation will already have been assessed, significance was only evaluated after mitigation. In many cases, this mitigation will take place, as it has been incorporated into project design. A six-point significance scale is applied as follows:

SIGNIFICANCE	DESCRIPTION
Very High (6)	Impacts considered to have a major and permanent change to natural environment and are rate as VERY HIGH, usually resulting to severe or very severe/ beneficial to highly beneficial effects.
High (5)	Long term change and are rated as HIGH resulting to severe or moderately severe effects/ beneficial to moderately beneficial.
Moderate (4)	Medium to long-term effects. Impacts are rated as MODERATE with moderately severe or moderately beneficial effects.
Low (3)	Medium to short term effects. Impacts are rated as MODERATE resulting in moderately severe or moderately beneficial effects.
Insignificant (2)	Short term effects are present. Impacts are rated as SLIGHT resulting in SLIGHTLY BENEFICIAL effects. Residual effects are present but are of no consequence.
No Significance (1)	No primary or secondary effects, resulting in NO SIGNIFICANT impact.
Do not Know (0)	Not possible to determine the significance of impacts

9.6.5 Absence of Data

In certain instances, an assessment must be produced in the absence of all the relevant and necessary data, due to paucity or lack of scientific information on the study area. It is more important to identify all the likely environmental impacts than to precisely evaluate the more obvious impacts. It is important to be on the conservative side in reporting likely environmental impacts. Because assessing impacts with a lack of data is more dependent on scientific judgment, the rating on the certainty scale cannot be too high. It is for these reasons that a degree of certainty scale has been provided, as well as the categories DON'T KNOW or CAN'T KNOW.

9.7 Appendix G: Declaration, Specialist Profile, Appointment Letter and Professional Registration Certificate

8.4 THE SPECIALIST

Note: Duplicate this section where there is more than one specialist.

I Mr Jamie Pote, as the appointed specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
 - other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
 - am not independent, but another specialist that meets the general requirements set out in Regulation 13 have been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- in terms of the remainder of the general requirements for a specialist, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- have disclosed/will disclose, to the applicant, the Department and interested and affected parties, all material information that have or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application;
- have ensured/will ensure that information containing all relevant facts in respect of the application was/will be distributed or was/will be made available to interested and affected parties and the public and that participation by interested and affected parties was/will be facilitated in such a manner that all interested and affected parties were/will be provided with a reasonable opportunity to participate and to provide comments;
- have ensured/will ensure that the comments of all interested and affected parties were/will be considered, recorded and submitted to the Department in respect of the application;
- have ensured/will ensure the inclusion of inputs and recommendations from the specialist reports in respect of the application, where relevant;
- have kept/will keep a register of all interested and affected parties that participate/d in the public participation process; and
- am aware that a false declaration is an offence in terms of regulation 48 of the 2014 NEMA EIA Regulations.

Note: The terms of reference of the review specialist must be attached.

Signature of the specialist:

N/A

Name of company:

06 November 2020

Date:



08 October 2020

Mr Jamie Pote
PostNet Suite 57
Private Bag 13130, Humewood, Port Elizabeth, 6013
076 888 9890 (m)

Dear Jamie

Letter of Appointment

Thanks for the quotation dated 08 October 2020.

Please accept this letter of formal appointment, accepting your quotation.

Thank you,

A handwritten signature in black ink, appearing to read "Jonathan Kingwill".

Jonathan Kingwill

Email: jonathan@bluepebble.biz
Tel: +27 (82) 777 0705

Web: www.bluepebble.biz
Email: contact@bluepebble.biz
Fax: 086 553 8837

Bluepebble Independent Environmental Agency
T/A Bluepebble Sustainability Solution
CC Registration Number 2009/189352/23
Members: JM Kingwill







Postnet Suite 41, Private Bag X31
Knysna, 6570,
South Africa



Jamie Pote

SENIOR ECOLOGIST AND ENVIRONMENTAL
SCIENTIST

CONTACT

-  (+27) 76 888 9890
-  jamiepote@live.co.za
-  Port Elizabeth, South Africa
-  [Linkedin.com](https://www.linkedin.com)
-  JamiePote
-  [Bluesky-SA](https://bluesky.com)

EDUCATION

- Bachelor of Science
Rhodes University
2001 (Botany & Environmental Science)
- Bachelor of Science (Honours)
Rhodes University
2002 (Botany)
- Professional Natural Scientist
SACNASP
2016

SERVICES

- Terrestrial Biodiversity/Ecological Assessments*
- Environmental & Ecological Risk-Assessments*
- Bioremediation, Restoration & Rehabilitation Plans*
- Environmental Management Plans & Programmes*
- GIS Mapping & Analysis & Web maps*
- Alien Invasive Management (Terrestrial)*
- Environmental Auditing & Monitoring (ECO)*
- Flora Search & Rescue & Relocation*
- Independent Environmental & Ecological review*
- Permit and License applications*
- Environmental & Mining Applications*

ABOUT ME

16 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 220 projects in southern, western and central Africa. Senior Environmental Consultant and EAP on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. GIS mapping and analytics.

EXPERIENCE AND CLIENTS

Key Sectors

- *Wind, Solar Energy Facilities*
- *Infrastructure and Housing*
- *Agriculture and Forestry*
- *Mining and Industrial*

Key Projects

- *Over 220 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.*
- *Mining applications and construction auditing on over 40 projects and more than 300 gravel borrow pits for the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape.*
- *South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Construction monitoring.*
- *Coega Development Corporation IDZ projects – Ecological assessments, Flora search & rescue and Construction monitoring.*
- *Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing for various clients including the Department of Transport and SANRAL.*
- *Various agricultural expansion and infrastructure projects.*
- *Various wind and solar energy and associated infrastructure projects.*
- *Numerous infrastructure projects including electrical, water and roads.*
- *Various Environmental Management and Rehabilitation Plans.*



herewith certifies that
Jamie Robert Claude Pote
Registration Number: 115233
is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)
Ecological Science (Professional Natural Scientist)

Effective **20 July 2016**

Expires **31 March 2021**



Handwritten signature of the Chairperson in black ink.

Chairperson

Handwritten signature of the Chief Executive Officer in black ink.

Chief Executive Officer



To verify this certificate scan this code

MR JAMIE POTE BSC (HONS) PR.SCI.NAT.

PROJECT EXPERIENCE

PERFORMANCE STANDARD BIODIVERSITY AND CRITICAL HABITAT ASSESSMENTS

- Critical Habitat & Biodiversity Assessment - Roggeveld Wind Energy Project 2020
- Biodiversity Assessment for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008

WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE PROJECTS

- Ecological Assessment for Windcurrent Wind Farm, Eastern Cape 2012
- Ecological Assessment for Universal Windfarm, NMB 2011
- Ecological Assessment for Inca Energy Windfarm, Northern Cape 2011
- Ecological Assessment for Broadlands Photovoltaic Farm, Eastern Cape 2011
- Botanical Assessment for Electrawinds Windfarm Coega, NMB 2010
- Botanical Assessment and Open Space Management Plan for Mainstream WEF Phase 2, Eastern Cape 2010

SPECIALISED ECOLOGICAL REPORTS

- Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMBM 2015
- Section 24G Assessment and Rehabilitation Plan for Bingo Farm, Eastern Cape 2014
- Mapping and Ecological services for Congo Agriculture, Republic of Congo 2013
- Rehabilitation Plan for Nieu Bethesda, Eastern Cape 2011
- Mapping of pipeline for Kenton Water Board, Eastern Cape 2010
- Rehabilitation Plan for N2 Upgrade - Coega to Colchester, NMB 2010
- Representative for landowner group for Seaview burial Park, NMB 2010
- Botanical Sensitivity Analysis for LSDF, Greenbushes-Hunters Retreat, NMB 2008
- Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation, Eastern Cape 2007
- Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif, Northern Cape 2006
- Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER, Eastern Cape 2003

GENERAL INFRASTRUCTURE DEVELOPMENT PROJECTS

- Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse), Eastern Cape 2020
- Ecological Assessment for Amalinda crossing, BCM, Eastern Cape 2019
- Ecological Assessment for Cookhouse Bridge rehabilitation and temporary deviation, Eastern Cape 2019
- Ecological Assessment for Nelson Mandela University Access Road, NMB 2019
- Botanical Assessment for Zachtevlei Dam (Lady Grey), Eastern Cape 2017
- Botanical Assessment for Gcebula River bridge (Peddie), Eastern Cape 2017
- Botanical Assessment for Kouga Dam wall upgrade, Eastern Cape 2012
- Botanical Assessment for Jansenville Cemetery, Eastern Cape 2009
- Botanical Assessment for Radar Mast construction for South African Weather Service – BCM & NMB 2008
- Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course, BCM, Eastern Cape 2007
- Botanical Assessment for PE Airport Extension, NMB 2006
- Botanical Assessment for Kidd's Beach Desalination Plant, BCM, Eastern Cape 2006

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

- Ecological Assessment for CDC IDZ Mn Terminal, conveyor and railway line, NMB 2013

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- Ecological Assessment Review for Penhoek Road widening, Eastern Cape 2012
- Ecological Assessment for R61 road widening, Eastern Cape 2012
- Botanical Assessment for Chelsea RD - Walker Drive Ext., NMB 2010
- Botanical Assessment for Motherwell - Blue Water Bay Road, NMB 2010
- Ecological Assessment for Port St John Road, Eastern Cape 2010
- Botanical Basic Assessment for Bholani Village Rd, Port St Johns, Eastern Cape 2009
- Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade, NMB 2009
- Botanical Assessment for Manganese Conveyor Screening Report, NMB 2008
- Ecological Assessment for Road Layout for Whiskey Creek- Kenton, Eastern Cape 2006

MINING PROJECTS

- Ecological Assessment for Bochum Borrow Pits, Limpopo 2013
- Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project, Limpopo (3 proposed Mines) 2013
- Ecological Assessment for Thulwe Road Borrow Pits, Limpopo 2013
- Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining, Ghana 2010
- Botanical Assessment for Zwartbosch Quarry, Eastern Cape 2008
- Botanical description & map production for Quarry - Rudman Quarry, Eastern Cape 2008
- Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie, Eastern Cape 2008
- Botanical Assessment & Maps for Sandman Sand Gravel Mine, Eastern Cape 2008
- Botanical Assessment & GIS maps for Shamwari Borrow Pit, Eastern Cape 2008
- Detailed Botanical Assessment, EMP and Rehab Plan for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Cala, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route, Eastern Cape 2008
- Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart, Eastern Cape 2008
- Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting, Eastern Cape 2008
- Regional Botanical Map for mining prospecting permit, Welkom 2008
- Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Jeffreys Bay, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms river/Kareedouw, Eastern Cape 2007
- Biophysical Assessment for Humansdorp Quarry, Eastern Cape 2006
- Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East, Eastern Cape 2006
- Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry, NMB 2006
- GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers, Eastern Cape 2006
- Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter, Limpopo 2006
- Application for Mining Permit for Bruce Howarth Quarry, Eastern Cape 2006

POWERLINE INFRASTRUCTURE PROJECTS

- Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment, Kouga LM 2016
- Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline, Kouga LM 2016
- Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline 2015
- Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab, Eastern Cape 2013
- Ecological Assessment for Dieprivier Karreedouw 132kV Powerline, Eastern Cape 2012

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• Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline, NMB	2012
• Botanical Assessment for Dedisa-Grassridge Powerline, Eastern Cape	2010
• Ecological Assessment for Grahamstown-Kowie Powerline, Eastern Cape	2010
• Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline, NMB	2009
• Botanical Assessment for Eskom Powerline - Albany-Kowie, Eastern Cape	2009
• Botanical Assessment for Eskom 132 kV Dedisa Grassridge Power line-Coega, NMB	2006
• Botanical Assessment for Eskom Power line – Tylara-Wilo, Eastern Cape	2006
• Botanical Assessment for Steynsburg - Teebus 132 kV powerline, Eastern Cape	2004

PIPELINE INFRASTRUCTURE PROJECTS

• Terrestrial Biodiversity Assessment for Thornhill Phase 2 Sanitation Link, Ndlambe, Eastern Cape	2020
• Botanical Assessment for Ngqamakhwe Regional Water Supply Scheme (Phase 3)	2018
• Ecological Assessment for Butterworth Emergency Bulk Water Supply Scheme	2017
• Ecological Assessment for Karringmelkspruit Emergency Bulk Water Supply (Lady Grey)	2017
• Ecological Assessment for Wanhoop-Willowmore Bulk Water Supply, Eastern Cape	2016
• Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 4)	2013
• Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)	2013
• Detailed Ecological Assessment for Suikerbos Pipeline, Gauteng	2012
• Basic Botanical Assessment for Wanhoop farm pipeline, Eastern Cape	2010
• Basic Botanical Assessment for Chatty Sewer, NMB	2010
• Species of Special Concern Mapping for Seaview Pipeline, NMB	2009
• Species of Special Concern Mapping for Chelsea Bulk Water Pipeline, NMB	2009
• Map Production for Russell Rd Stormwater, NMB	2008
• Basic Botanical Assessment for Albany Pipeline, Eastern Cape	2008
• Environmental Risk Assessment for Elands River pipeline, Eastern Cape	2007
• Detailed Botanical Assessment for Motherwell Pipeline, NMB	2007
• Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline, Eastern Cape	2007
• Botanical & Floristic Report for Hankey pipeline, Eastern Cape	2006
• Detailed Botanical Assessment for Port Alfred water pipeline, Eastern Cape	2004

HOUSING DEVELOPMENT PROJECTS

• Terrestrial Biodiversity Assessment for Erf 1820 Mthatha, KSDM, Eastern Cape	2020
• Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay	2019
• Ecological Assessment for erf 14, Kabega, Port Elizabeth	2017
• Ecological Assessment for Fairwest Rental Housing, Port Elizabeth	2017
• Ecological Assessment for Hankey Housing, Kouga District Municipality	2015
• Ecological Assessment for Lebowakgoma Housing, Limpopo	2013
• Ecological Assessment for Giyani Development, Limpopo	2013
• Ecological Assessment for Palmietfontein Development, Limpopo	2013
• Ecological Assessment for Seshego Development, Limpopo	2013
• Botanical Assessment for Sheerness Road, BCM, Eastern Cape	2013
• Ecological Assessment for Ethembeni Housing, NMB	2012
• Ecological Assessment for Pelana Housing, Limpopo	2012
• Flora Search and Rescue Plan for Kwanobuhle Housing, Western Cape	2011
• Botanical Assessment for The Craggs 288/03, Western Cape	2010
• Ecological Assessment Revision Report for Fairview Housing, NMB	2010
• Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development, Western Cape	2010
• Botanical Assessment for Little Ladywood, Western Cape	2010
• Botanical Assessment and Open Space Management Plan for Motherwell NU31, NMB	2010
• Botanical Assessment and Open Space Management Plan for Plett 443/07, Western Cape	2010

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• Botanical Assessment for Willow Tree Farm, NMB	2010
• Botanical Assessment for Kouga RDP Housing, Eastern Cape	2009
• Botanical Assessment for Fairview Erf 1226 (Wonderwonings), NMB	2009
• Species List Compilation for Zeekoerivier Humansdorp, Eastern Cape	2009
• Botanical Assessment for Woodlands Golf Estate (Farm 858), BCM, Eastern Cape	2009
• Botanical Assessment for Plettenberg Bay - 438/4, Western Cape	2009
• Vegetation Assessment for Kwanokuthula RDP housing project, Western Cape	2008
• Site screening assessment for Greenbushes Site screening, NMB	2008
• Botanical Assessment for Fairfax development, Eastern Cape	2008
• Botanical Assessment for Plettenberg Bay Brakkloof 50&51, Western Cape	2008
• Botanical Assessment, GIS mapping for Theescombe Erf 325, NMB	2008
• Site Screening for Mount Road, NMB	2008
• Botanical Assessment for Greenbushes Farm 40 Swinburne 404, NMB	2008
• Botanical Assessment for Greenbushes 130, NMB	2008
• Botanical Assessment for Greenbushes Kuyga no. 10, NMB	2008
• Botanical Assessment for Plettenberg Bay - 438/24, Western Cape	2007
• Botanical Assessment for Plettenberg Bay - Olive Hills 438/7, Western Cape	2007
• Botanical Assessment for Gonubie Portion 809/9, BCM, Eastern Cape	2006
• Botanical Assessment for Glengariff Farm 723, BCM, Eastern Cape	2006
• Botanical Assessment for Gonubie Portion 809/10, BCM, Eastern Cape	2006
• Botanical Assessment for Gonubie Portion 809/4 & 5, BCM, Eastern Cape	2006
• Botanical Assessment for Plettenberg bay - Ladywood 438/1&3, Western Cape	2006
• Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant, BCM	2006
• Botanical Assessment for Bosch Hoogte, NMB	2006
• Botanical Assessment for Plettenberg bay Farm 444/38, Western Cape	2006
• Botanical Assessment for Plettenberg Bay - 444/27, Western Cape	2006
• Botanical Assessment for Leisure Homes, BCM, Eastern Cape	2006
• Botanical Basic Assessment for Trailees Wetland Assessment, Eastern Cape	2005
• Botanical Assessment and Rehab Plan for Arlington Racecourse - PE, NMB	2005
• Botanical Assessment for Smart Stone, NMB	2005
• Botanical Assessment for Peninsular Farm (Port Alfred), Eastern Cape	2005
• Botanical Assessment for Mount Pleasant - Bathurst, Eastern Cape	2005
• Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside), NMB	2005
• Basic Botanical Assessment for Parsonsvelei 3/4, Eastern Cape	2005
• Botanical Assessment for Bridgemed – Malabar PE, NMB	2004

AGRICULTURAL PROJECTS

• Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015
• Ecological Assessment for Doornkraal Pivot (Hankey), Eastern Cape	2014
• Ecological Assessment for Citrus expansion on Farm 960, Patensie	2014
• Ecological Assessment for Tzaneen Chicken Farm, Limpopo	2013
• Botanical Assessment and Open Space Management Plan for Kudukloof, NMB	2010
• Botanical Assessment and Open Space Management Plan for Landros Veeplaats, NMB	2010
• Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, NMB	2006

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

• Species List& Comments Report for Kidds Beach Golf Course, BCM, Eastern Cape	2009
• Botanical Assessment for Plettenberg Bay -Farm 288/03, Western Cape	2009
• Botanical Assessment for Rockcliff Golf Course, BCM, Eastern Cape	2008
• Botanical Assessment for Rockcliff Resort Development, BCM, Eastern Cape	2007
• Botanical Assessment, EMP and Rehabilitation Plan for Tiffendel Ski Resort, Eastern Cape	2006

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MIXED USE DEVELOPMENT PROJECTS

- Ecological Assessment for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018
- Botanical Assessment, EMP and Open Space Management Plan for Bay West City, NMB 2010
- Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082, NMB 2009
- Botanical Assessment and GIS maps for Utopia Estate PE, NMB 2008
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage, NMB 2007

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

- Ecological Assessment for Parsonsvei Erf 984 & 1134 Parsonsvei, NMB 2020
- Ecological Assessment for Walmer Erf 11667 - Bidfood Warehousing Development, NMB 2020
- Ecological Assessment for Portion 87 of the Farm Little Chelsea No 10, NMB 2020
- Ecological Assessment for Bay West City ENGEN Service Station, NMB 2015
- Ecological Assessment for Green Star grading for SANRAL, NMB 2014
- Ecological Assessment for OTGC Tank Farm, NMB 2012
- Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ, NMB 2010
- Botanical Assessment for Bluewater Bay Erf 805, NMB 2009
- Ecological Assessment for Bay West City, NMB 2007
- Botanical Assessment for Kenton Petrol Station, Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Petrol Station, NMB 2005

ECO-ESTATE DEVELOPMENT PROJECTS

- Botanical Re-Assessment of Swanlake Eco Estate, Aston Bay, Eastern Cape 2018
- Detailed Botanical Assessment and Open Space Management Plan for Olive Hills, Western Cape 2010
- Botanical Assessment and EMP for Zwartbosch Road, Eastern Cape 2010
- Botanical Assessment - Poultry Farm for Coega Kammaskloof Farm 191, NMB 2008
- Botanical Assessment - Housing development for Coega Ridge, NMB 2008
- Botanical Assessment, Rehabilitation Plan, EMP and GIS maps for Amanzi Estate, NMB, 2008
- Botanical Assessment for Roydon Game farm, Queenstown, Eastern Cape 2007
- Botanical Assessment for Winterstrand Estate (Farm 1008), BCM, Eastern Cape 2007
- Botanical Assessment for Homeleigh Farm 820, BCM, Eastern Cape 2007
- Botanical Basic Assessment, Rehab Plan & Maps for Candlewood, Tsitsikamma, Western Cape 2007
- Botanical Assessment, EMP and Rehab Plan for Carpe Diem Eco development, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Seaview Eco-estate, NMB 2006
- Botanical Assessment for Kidd's Beach portion 1076, BCM, Eastern Cape 2006
- Botanical Assessment for Palm Springs, Kidds Beach East London, BCM, Eastern Cape 2006
- Botanical Assessment for Nahoon Farm 29082, BCM, Eastern Cape 2006
- Botanical Assessment for Rosehill Farm, Eastern Cape 2005
- Botanical Assessment for Resolution Game Farm, Eastern Cape 2005
- Botanical Assessment for Gonubie Portion 809/11, BCM, Eastern Cape 2005
- Botanical Assessment for Kidd's Beach portion 1075, BCM, Eastern Cape 2005

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

- Flora Search and Rescue for Nelson Mandela University Phase 2 & 3 Residences, Eastern Cape 2020
- Flora Search and Rescue for Fairwest Housing Estate, Nelson Mandela Bay, Eastern Cape 2019
- Flora Search and Rescue for Utopia Estate, Nelson Mandela Bay, Eastern Cape 2019
- Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape 2018
- Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape 2018
- Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017

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• Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)	2016
• Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2016
• Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW, Eastern Cape (Phase 4)	2015
• Flora and Fauna Search and Rescue for Riversbend Citrus Farm, NMB	2014
• Flora and Fauna Search and Rescue for Mainstream Windfarm, Eastern Cape	2013
• Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 1, 2 & 3)	2013
• Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ, NMB	2013
• Flora and Fauna Search and Rescue for Jeffreys Bay School, Eastern Cape	2013
• Flora Search and Rescue Plan for Red Cap Wind Farm, Eastern Cape	2012
• Flora Relocation for Disco Poultry Farm, NMB	2010
• Flora Relocation for Mainstream Windfarm, Eastern Cape	2010

ENVIRONMENTAL MANAGEMENT PLANS

• Final Environmental Management Programme (EMPr) and Maintenance Management Plan for South End Precinct Mixed Use Zone, Nelson Mandela Bay Municipality	2020
• Final Environmental Management Programme (EMPr) for Coega Land-Based Aquaculture Development Zone (ADZ), Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality	2019
• Basic Botanical Assessment for Kromensee EMP (Jeffries Bay), Eastern Cape	2010
• Wetland Management Plan for NMB Portnet, NMB	2010
• Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA, Western Cape	2009
• Biodiversity & Ecological Processes for Bathurst-Commonage, Eastern Cape	2006
• EMP for Kromensee EMP (Jeffries Bay), Eastern Cape	2006
• Floral Survey for Mbotyi Conservation Assessment, Eastern Cape	2005
• Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve, Eastern Cape	2005

ENVIRONMENTAL MANAGEMENT, AUDITING, COMPLIANCE AND MONITORING PROJECTS

• ECO for DRPW IRM Road Maintenance projects, Baviaans LM	2019
• ECO for DRPW IRM Road Maintenance projects, Senqu LM	2019
• ECO for DRPW IRM Road Maintenance projects, Kouga/Koukamma LM	2019
• ECO for DRPW IRM Road Maintenance projects, Sakhisizwe/Engcobo LM	2019
• ECO for DRPW IRM Road Maintenance projects, Elundini LM	2019
• ECO for DRPW IRM Road Maintenance projects, Emalahleni/Intsika Yethu LM	2019
• ECO for Construction of Fairwest Village Housing Project	2019
• ECO for Construction of Utopia Estate	2019
• ECO for Construction of NMU West End Student Residences Phases 1 & 3	2019
• ECO for DRPW IRM Road Maintenance projects, Raymond Mahlaba LM	2018
• ECO for DRPW IRM Road Maintenance projects, Inkwanca (Enoch Mgijima) LM	2018
• ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2017
• ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
• DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts	2017
• ECO for SANRAL RRP Road Maintenance projects, Mbizana LM	2017
• ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus Farm (km 42.2) to N10 (km 85.0) (SANRAL)	2016
• Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour	2016
• ECO for SANRAL RRP Road Maintenance projects, Mbashe LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Nkonkobe LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Mbizana LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Senqu LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Elundini LM	2016

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• ECO and Environmental Management for closure of Bushmans River Landfill site	2016
• ECO for DRPW IRM Road Maintenance projects, Amahlathi Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Makana/Ndlambe Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Mbashe/Mqume Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Port St Johns, Mbizana, Ingquza Hill LM's	2015
• ECO for Riversbend Citrus Farm, NMB	2014
• ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073, Eastern Cape - MSBA	2014
• ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba	2014
• EMP and ECO for Utopia Estate, NMB	2013
• Final EMP submission for Seaview Garden Estate, NMB	2012
• ECO audits for NMB Road surfacing, NMB (multiple contacts)	2011
• EMP submission and ECO for Seaview Garden Estate, NMB	2010
• ECO for Mainstream Windfarm wind monitoring mast installation, Eastern Cape	2010
• EMP and ECO for Sinati Golf Estate EMP, BCM, Eastern Cape	2009
• Flora Relocation Plan and Permit application for Wildemans Plaas, NMB	2006

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

• Basic Assessment Application for Parsonsvei Erf 984 & 1134 Parsonsvei	2020
• Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse)	2020
• Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development	2020
• Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10	2020
• Basic Assessment Application for Nelson Mandela University Access Road, NMB	2019
• Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay	2019
• Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation	2019
• Basic Assessment Application for Erf 14 Kabega, NMBM	2017
• Basic Assessment Application for Hankey Housing, Kouga District Municipality	2017
• Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay	2017
• Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015
• Basic Assessment Application for Hankey Housing, Kouga District Municipality	2015
• Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery)	2014
• Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018	

ENVIRONMENTAL SCREENING PROJECTS

• Environmental Screening Report for Proposed Life Hospital parking expansion, NMB	2019
• Environmental Screening Report for Erf 984 & 1134 development, Parsonsvei, NMB	2019
• Environmental Screening Report for proposed Khayaletu School, Buffalo City	2018
• Environmental Screening Report for Proposed Housing Development of Erf 8700, Kabega Park, NMB	2017
• Environmental Screening Report for Proposed Housing Development of Erf 14, Kabega Park, NMB	2017
• Environmental Screening Report for Proposed Fairwest Social Housing project, Fairview, NMB	2016
• Environmental Screening Report for Development of Little Chelsea No 25, NMB	2016
• Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood)	2015
• Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth	2015
• Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe	2015
• Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth	2015
• Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate	2015
• Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB	2015

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MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

• Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)	2019
• Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape– (SANRAL)	2018
• Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL)	2017
• Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Inkwanca (Enoch Mgiijima) LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Mbashe LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW)	2016
• Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW)	2016
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW)	2015
• Mining BAR/EMP's for Chris Hani DM Borrow Pits – Intsika Yethu and Emalahleni (DRPW)	2015
• Mining BAR/EMP's for Joe Gqabi DM Borrow Pits – Senqu (DRPW)	2015
• Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits – Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Amahlathi LM Borrow Pits – Amatole (DRPW)	2015
• Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits – Amatole (DRPW)	2015
• Mining BAR/EMP's for Sundays River Valley LM Borrow Pits – Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Kouga LM Borrow Pits – Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW)	2014
• Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW)	2014
• Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 – Matatiele (DRPW)	

SECTION 24G APPLICATIONS

• 12 000 ML Dam constructed on farm 960, Patensie (MGM Trust)	2015
• Illegal clearing of 20 Ha of lands on Hitgeheim Farm, Sunland, Eastern Cape	2015

GIS AND IT DEVELOPMENT

• Development of iAuditor Environmental Audit templates (DRPW audits)	2014
• Landsat Image classification and analysis (Congo Agriculture)	2010
• Development of GIS databases and mapping tools for Manifold GIS software	2008

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CONFERENCES AND PUBLICATIONS

- Pote, J., Shackleton, C.M., Cocks, M. & Lubke, R. 2006. Fuelwood harvesting and selection in Valley Thicket, South Africa. *Journal of Arid Environments*, 67: 270-287.
- Pote, J., Cocks, M., Dold, T., Lubke, R.A. and Shackleton, C. 2004. The homegarden cultivation of indigenous medicinal plants in the Eastern Cape. *Indigenous Plant Use Forum*, 5 - 8 July 2004, Augsburg Agricultural School, Clanwilliam, Western Cape.
- Pote, J. & Lubke, R.A. 2003. The selection of indigenous species suitable for use as fuelwood and building materials as a replacement of invasive species that are currently used by the under-privileged in the Grahamstown commonage. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch. Poster presentation.
- Pote, J. & Lubke, R.A. 2003. The screening of indigenous pioneer species for use as a substitute cover crop for rehabilitation after removal of woody alien species by WfW in the grassy fynbos biome in the Eastern Cape. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch, South Africa.

OTHER RESEARCH EXPERIENCE

- Resource assessment of bark stripped trees in indigenous forests in Weza/Kokstad area (June 2000; Dr C. Geldenhuis & Mr. M. Kaplin).
- Working for Water research project for indigenous trees for woodlots (December 2000/January 2001; Prof R.A. Lubke, Rhodes University).
- Project coordinator and leader of the REFYN project – A BP conservation gold award: Conservation and Restoration of Grassy-Fynbos. A multidisciplinary project focusing on management, restoration and public awareness/education (2001 – 2002).
- Conservation Project Management Training Workshops: Royal Geographical Society, London 2001 – Fieldwork Techniques, Habitat Assessment, Biological Surveys, Project Planning, Public Relations and Communications, Risk Assessment, Conservation Education
- Selection and availability of wood in Crossroads village, Eastern Cape, South Africa. Honours Research Project 2002. Supervisors: Prof. R.A. Lubke & Prof. C. Shackleton.
- Floral Morphology, Pollination and Reproduction in *Cyphia* (LOBELIACEAE). Honours Research Project 2002. Supervisor: Mr. P. Phillipson.
- Forestry resource assessment of bark-stripped species in Amatola District (December 2002; Prof R.A. Lubke).
- Homegarden Cultivation of Medicinal Plants in the Amathole area. Postgraduate Research Project (2003-2005; Prof R.A. Lubke, Prof C.M. Shackleton and Ms C.M., Cocks).

9.8 Appendix H: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

SCOPE

This protocol (*Procedures 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, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).*) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulation²².

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (<https://screening.environment.gov.za/screeningtool>). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute²³.

SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

2.1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

2.2. The site sensitivity verification must be undertaken through the use of:

- (a) a desk top analysis, using satellite imagery,
- (b) a preliminary on-site inspection; and
- (c) any other available and relevant information.

2.3. The outcome of the site sensitivity verification must be recorded in the form of a report that:

- (a) confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool;
- (b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
- (c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	<u>General Information</u>	-

²² The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

²³ The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on their screening tool).

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "very high sensitivity" for terrestrial biodiversity, must submit a <u>Terrestrial Biodiversity Specialist Assessment</u> .	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being 'low sensitivity' for terrestrial biodiversity, must submit a <u>Terrestrial Biodiversity Compliance Statement</u> .	✗
1.3	However, where the information gathered from the site sensitivity verification <u>differs</u> from the designation of 'very high' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a 'low' sensitivity, then a <u>Terrestrial Biodiversity Compliance Statement</u> must be submitted.	✗
1.4	Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a 'low' terrestrial biodiversity sensitivity on the screening tool, a <u>Terrestrial Biodiversity Specialist Assessment</u> must be conducted.	✗
1.5	If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, <u>can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies</u> . Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any are that will be disturbed.	✓
	VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features	
2	Terrestrial Biodiversity Specialist Assessment	✓
2.1	The assessment must be prepared by a <u>specialist registered with the South African Council for Natural Scientific Professionals (SACNASP)</u> with expertise in the field of terrestrial biodiversity.	Section 9.7
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	✓
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	✓
2.3.1	a <u>description of the ecological drivers or processes</u> of the system and how the proposed development with impact these;	Section 2.4
2.3.2	<u>ecological functioning and ecological processes</u> (e.g. fire, migration, pollination, etc.) that operate within the preferred site;	Section 2.4
2.3.3	the <u>ecological corridors</u> that the proposed development would impede including migration and movement of flora and fauna;	Section 2.4
2.3.4	the description of any <u>significant terrestrial landscape features</u> (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments);	Section 3.1.3
2.3.5	a description of terrestrial biodiversity and ecosystems on the preferred site, including:	Section 3.1
(a)	<u>main vegetation types</u> ;	Section 3.1.3
(b)	<u>threatened ecosystems</u> , including fisted ecosystems as well as locally important habitat types identified;	Section 3.1
(c)	<u>ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats</u> ; and	Section 3.1.5
(d)	<u>species, distribution, important habitats</u> (e.g. feeding grounds, nesting sites, etc.) and <u>movement patterns</u> identified;	Section 3.1

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
2.3.6	the assessment <u>must identify any alternative development footprints within the preferred site which would be of 'low' sensitivity</u> as identified by the screening tool and verified through the site sensitivity verification; and	Section 3.2.4
2.3.7	the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	✓
2.3.7.1	terrestrial critical biodiversity areas (CBAs) , including:	
(a)	the <u>reasons why an area has been identified as a CBA</u> ;	Sections 2.3, 2.4 & 3
(b)	an indication of <u>whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state</u> or in achieving the goal of rehabilitation;	Sections 2.3, 2.4 & 3
(c)	the <u>impact on species composition and structure of vegetation</u> with an indication of the extent of clearing activities in proportion to remaining extent of the ecosystem type(s);	Sections 2.3, 2.4 & 3
(d)	the <u>impact on ecosystem threat status</u> ;	Section 2.3.5
(e)	the <u>impact on explicit subtypes in the vegetation</u> ;	Section 3.1.3
(f)	the <u>impact on overall species and ecosystem diversity</u> of the site; and	Section 3.1.8
(g)	the <u>impact on any changes to threat status of populations of species of conservation concern</u> in the CBA;	Section 3.1.8
2.3.7.2	terrestrial ecological support areas (ESAs) , including:	
(a)	the <u>impact on the ecological processes</u> that operate within or across the site;	Section 2.3.6
(b)	the <u>extent the proposed development will impact on the functionality</u> of the ESA; and	Section 2.3.6
(c)	<u>loss of ecological connectivity</u> (on site, and in relation to the broader landscape) due to the <u>degradation and severing of ecological corridors or introducing barriers that impede migration and movement</u> of flora and fauna;	Section 2.3.6
2.3.7.3	protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including	✓
(a)	an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;	Section 0
2.3.7.4	priority areas for protected area expansion , including-	✓
(a)	the way in which in which the proposed development will compromise or contribute to the expansion of the protected area I network;	Section 0
2.3.7.5	Strategic Water Source Areas (SWSAs) including:	✓
(a)	the <u>impact(s) on the terrestrial habitat of SWSA</u> ; and	Section 2.3.10
(b)	the impacts of the proposed development <u>on the SWSA water quality and quantity</u> (e.g. describing potential increased runoff leading to increased sediment load in water courses),	Section 2.3.10
2.3.7.6	FEPA sub catchments , including-	✓
(a)	the <u>impacts of the proposed development on habitat condition and species</u> in the FEPA sub catchment;	Section 2.3.11
2.3.7.7	indigenous forests , including:	(if applicable)
(a)	impact on the <u>ecological integrity of the forest</u> and	Section 3.1.3
(b)	<u>percentage of natural or near natural indigenous forest area lost</u> and a <u>statement on the implications in relation to the remaining areas</u> .	Section 3.1.3
2.4	The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report	✓
3	Terrestrial Biodiversity Specialist Assessment Report	✓
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	✓

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
3.1.1	<u>contact details of the specialist</u> , their SACNASP registration number, their field of expertise and a curriculum vitae;	Section 9.7
3.1.2	a <u>signed statement of independence</u> by the specialist;	Section 9.7
3.1.3	a <u>statement on the duration, date and season of the site inspection</u> and the relevance of the season to the outcome of the assessment,	Section 1.2.1
3.1.4	<u>description of the methodology used</u> to undertake the site verification and impact assessment and site inspection, including equipment and modeling used, where relevant;	Section 1.2
3.1.5	a <u>description of the assumptions made</u> and any uncertainties or gaps in knowledge or data as well as a statement of the <u>timing and intensity of site inspection</u> observations;	Section 1.2.3
3.1.6	a <u>location of the areas not suitable for development</u> , which are to be avoided during construction and operation (where relevant);	Section 3.2.2
3.1.7	<u>additional environmental impacts</u> expected from the proposed development;	Section 3.3
3.1.8	any <u>direct, indirect and cumulative impacts</u> of the proposed development;	Section 3.3
3.1.9	the <u>degree to which impacts, and risks can be mitigated</u> ;	Section 3.4.2 Table 11
3.1.10	the <u>degree to which the impacts and risks can be reversed</u> ;	Section 0
3.1.11	the <u>degree to which the impacts and risks can cause loss of irreplaceable resources</u> ;	Section 3.4.4
3.1.12	proposed <u>impact management actions</u> and <u>impact management outcomes</u> proposed by the specialist for inclusion in the Environmental Management Programme (EMPr),	Section 4 Section 9.5
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 <u>having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate</u> ,	✗
3.1.14	a substantiated statement based on the findings of the specialist assessment, <u>regarding the acceptability, or not, of the proposed development if it should receive approval a not</u> ; and	Section 7
3.1.15	<u>any conditions to which this statement is subjected</u> .	Section 7
3.2	The <u>findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report</u> , including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	EAP
3.3	A <u>signed copy of the assessment</u> must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	EAP
LOW SENSITIVITY RATING – for terrestrial biodiversity features		
4	Terrestrial Biodiversity Compliance Statement	∨
4.1	The compliance statement <u>must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences</u> .	Section 9.7
4.2	The compliance statement must:	∨
4.2.1	<u>be applicable to the preferred site</u> and proposed development footprint;	✓
4.2.2	<u>confirm that the site is of 'low' sensitivity for terrestrial biodiversity</u> ; and	Section 3.2
4.2.3	indicate <u>whether or not the proposed development will have any impact on the biodiversity feature</u> .	Section 3.3.2
4.3	The <u>compliance statement must contain, as a minimum</u> , the following information:	∨
4.3.1	the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Section 9.7
4.3.2	a <u>signed statement of independence</u> by the specialist;	Section 9.7
4.3.3	a <u>statement on the duration, date and season</u> of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1.2.1

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
4.3.4	a <u>baseline profile description</u> of biodiversity and ecosystems of the site;	Section 3.1
4.3.5	the <u>methodology used to verify the sensitivities</u> of the terrestrial biodiversity features on the site, including equipment and modeling used, where relevant;	Section 3.2
4.3.6	in the case of a linear activity, <u>confirmation from the terrestrial biodiversity specialist</u> that, in their opinion, based on the mitigation and remedial measures propped, <u>the land can be returned to the current state within two years of completion of the construction phase</u> ;	✘
4.3.7	where required, <u>proposed impact management outcomes or any monitoring requirements</u> for inclusion in the EMPr;	Section 4 Section 8
4.3.8	a <u>description of the assumptions made and any uncertainties or gaps in knowledge or data</u> ; and	Section 1.2.3
4.3.9	any <u>conditions to which this statement is subjected</u> .	EAP
4.4	A <u>signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report</u> .	EAP

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