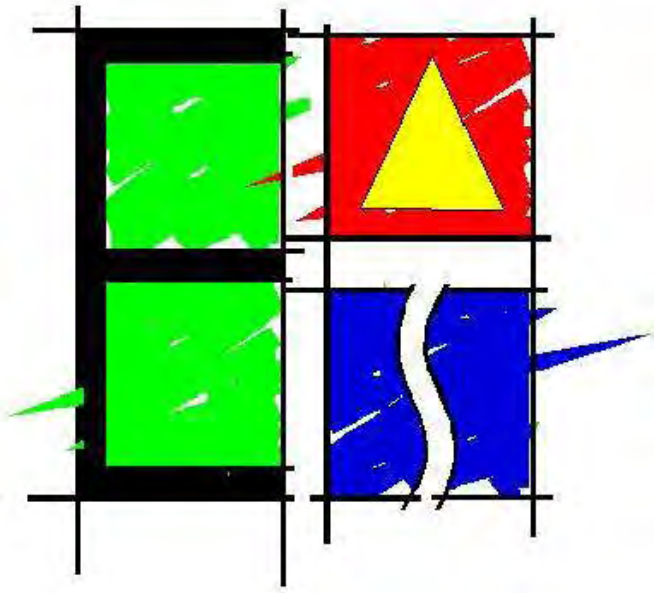
Swanlake Eco-Estate Botanical Review Report



Report Prepared by:
Engineering Advice & Services (Pty) Ltd

EAS Project Number: 1550

11 October 2018

Swanlake Eco-Estate Botanical Review Report

For:
Cape EA Prac

By: Engineering Advice & Services (Pty) Ltd
73 Heugh Road, Walmer, Port Elizabeth, 6013
Tel: +27 (0) 41 581 2421, Fax: +27 (0) 86 683 9899

EAS Project Number: 1550

11 October 2018

This Report has been prepared by Engineering Advice and Services, with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our standard terms and conditions of business and taking into account the resources devoted to it by agreement with the client. EAS disclaims any responsibility to the client and others in respect of any matters outside of the scope of the above.

This report is exclusive to the client and the described project. EAS accepts no responsibility of whatsoever nature to third parties to whom this Report, or any part thereof, is made known. Any such persons or parties rely on the report at their own risk.

Compiled by:

Name	Company	Email
Mr Jamie Pote	Engineering Advice & Services (Botanical)	jamiep@easpe.co.za
Mr Daniel Schroeder	Engineering Advice & Services (GIS)	daniels@easpe.co.za

EAS Ref: F:\1500-1599\1550\Environmental\Reports\Biophysical Reports\1550 - Swanlake Eco Estate Ecological Review Report - 11102018.docx

Table of Contents

List of Figures

List of Tables

Abbreviations

CARA	Conservation of Agricultural Resources Act 43 of 1983
CBA	Critical Biodiversity Area
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
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
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act 107 of 1998
NFA	National Forests Act
NEMBA	National Environmental Management: Biodiversity Act 10 of 2004
NFA	National Forest 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

Corridors:	Have important functions as strips of a particular type of 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 "stepping stones" that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.
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.
Ecological Processes:	Ecological processes typically only function well where natural vegetation remains, and in particular 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.
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.
Ecosystem:	All of the organisms of a particular habitat, such as a lake or forest, together with the physical environment in which they live.
Endangered:	Endangered terrestrial ecosystems have lost significant amounts (more than **60 % lost**) of their original natural habitat, so their functioning is compromised.
Endemic:	A plant or animal species, or a vegetation type, which is naturally restricted to a particular defined region. It is often confused with indigenous, which means 'native, occurring naturally in a defined area'.
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.
Exotic:	Non-indigenous; introduced from elsewhere, may also be a *weed* or alien *invasive* species. Exotic species may be invasive or non-invasive.
Fragmentation (habitat):	Causes land transformation, an important current process in landscapes as more and more development occurs.
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.
Indigenous:	Native; occurring naturally in a defined area.

Least threatened terrestrial ecosystems:	These ecosystems 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).
Riparian:	Pertaining to, situated on or associated with a river bank.
River corridors:	River corridors perform a number of 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.
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/ Drainage line:	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:	Vulnerable terrestrial ecosystems 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.
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.
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.

1 Introduction & Background

Engineering Advice and Services has been appointed by Cape-EAPrac to undertake a botanical re-assessment of the original approved development that was undertaken in 2008/2009 for the development of proposed Swanlake Eco-Estate in Aston Bay (Figure 1). An amendment application for the proposed development is being submitted, and a botanical review is required in order to bring the original assessment in line with current legislation. The Botanical assessment and report has been undertaken by Mr Jamie Pote.

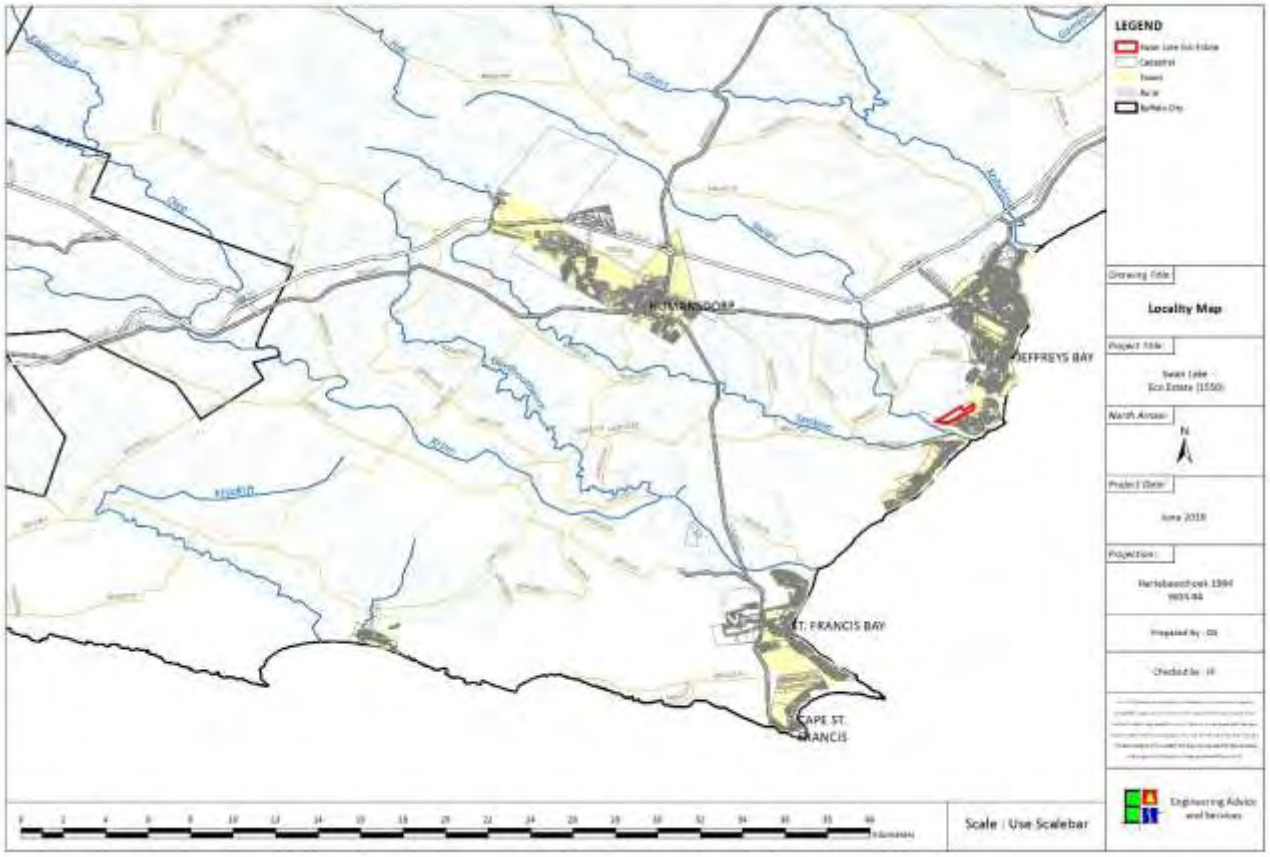


Figure 1: Site Locality

1.1 Project Description

The proposed amended and approved layout plan is indicated in Figure 2. The total site area is 38.5 ha, but the development footprint will be limited to approximately 7 Ha (**approximately 18 – 20 % of the site**) and comprised of the following:

- 35 x 400 m^2 footprints with 250 m^2 developable area. Minor configuration change has been implemented to accommodate the powerline servitude.
- 3 m wide access roads with passing lanes
- 84 x minimum 600 m^2 residential erven. No significant changes affecting ecological impact.
- 6 m wide access roads
- Ecological Zone – the remainder of the site (**approximately 80 % of the site**) and includes:
  a. *High sensitivity vegetation* as depicted in Fig 4.2 of the Addendum Environmental Report (2009)
  b. *Ecological Zone* as depicted in Fig 6.3 of the Addendum Environmental Report (2009)
  c. *Area of Species of Special Concern* or protected as identified by Dr D. McDonald (2017)

Services

A services servitude includes a 6 m side strip on the inside of erven 1580/1579 (against the existing township erven) as well as a strip outside the development footprint where services will be installed to link the two development nodes. This strip will also accommodate a single jeep track (tweespoorpaadjie) for maintenance purposes. All services are otherwise accommodated within the development nodes.

Sewage:

Previously the Client was going to install an onsite sewage package plant, however the Municipality has indicated that it should rather connect to their WWTW. The Environmental Authorisation also contains a condition limiting the release of treated effluent into the environment, therefore the option of an onsite package plant was not viable.

Exclusions:

Note that erven 1580/1579 (previously included with the Environmental Authorisation) has been excluded from this application for an extension of the Environmental Authorisation. They will not be incorporated into the open space areas as they already have sub-divisional rights.

Figure 2: Proposed revised layout plan (Revision 8).

1.2 Terms of Reference

- The development has an approved Environmental Authorisation;
- The Environmental Authorisation has been extended and remains valid until the outcome the Amendment Application;
- The footprint is limited to the 42.3 ha area indicated on the layout plan and kmz;
- The re-assessment must either confirm the original findings, or highlight any new constraints/mitigations to be considered;

- The re-assessment must reflect on the attached map as the preferred layout to ensure that any potential changes (to the layout) can be coordinated from the same source;
- The re-assessment must be undertaken ito all the latest and applicable policies, regulations and legislation to ensure that it complies;
- The re-assessment report must be submitted as an impact assessment report that must comply with the Specialist Report Requirements as stipulated in the 2014 Environmental Regulations (as per Government Notice 326 Appendix 6);
- The re-assessment must include a statement of Independence from the Author and include the Authors CV.

1.3 Methodology and Approach

The proposed methodology and approach is outlined below:

1) Conduct a comprehensive desktop study and identify new potential risks relating to vegetation and flora of the site and surrounding area, incorporating the latest applicable Regional Planning frameworks and legislation;
2) Conduct a detailed site visit to assess the following:
   a) Field survey of vegetation, habitats and flora present and confirm previous findings;
   b) Review mapping of the habitat units if required, including an 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.
   c) Description and review of the habitat units and site sensitivities;
   d) A habitat/sensitivity map will be compiled, indicting the sensitivities as described above;
   e) A map indicating development plan and open space areas in order to accommodate Regional Planning framework and/or ecological process requirements;
   f) Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks and legislation;
3) Reporting will be comprised of a single draft and Final Report, addressing any comments raised during the comments phase. This specific report is for the public consultation phase and will be amended to address any comments if required.
   a) Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans;
   b) A comprehensive EMPr for inclusion in the reports and EMP with specific management actions for construction and Operation.

1.4 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2017), the following listing notices have bearing on the development:

Listing Notice 1: Activity 27: The clearance of an area of 1 hectares 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.:~~

Listing Notice 2 Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding 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.~~

Listing Notice 3: Activity 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.
(a) Eastern 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. Outside urban areas, within 100 metres inland from an estuarine functional zone; or~~
~~v. 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.~~

In terms of recent EIA regulations, Listing Notice 3: Activity 12 is triggered for the *'clearing of 300 square metres or more of indigenous vegetation within critical biodiversity areas identified in bioregional plans'*.

Other relevant legislation includes the following:

- National Forests Act 84 of 1998 with Amendments: Lists Protected trees, requiring permits for removal Department of Agriculture, Forestry and Fisheries).
- Conservation of Agricultural Resources Act 43 of 1993: Lists Alien invasive species requiring removal.
- Eastern Cape Provincial Nature 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.

1.5 Systematic Planning Frameworks

The original botanical assessment refers only to the Sub Tropical Ecosystem Planning (STEP, 2004) Regional Plan. Subsequent to the STEP systematic conservation framework, more recent planning frameworks have been developed and are applicable, including the following:

- Vegetation of Southern Africa (VEGMAP, 2005)
- Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007)
- National Biodiversity Assessment (NEMBA, 2011)
- The Garden Route Biodiversity Sector Plan for the southern regions of the Kouga and Koukamma Municipalities (GRBSP, 2010) – fine scale plan

The section below summarises and evaluates the consequence of the updated systematic planning frameworks. A summary of the above Systematic Planning Frameworks for the region is summarised in Table 1 below, and includes the following aspects:

- Critically Endangered and Endangered Ecosystems

- Critical Biodiversity Areas
- Ecological Support Areas
- Vulnerable Ecosystems
- Protected Areas
- 100 m of Rivers and Wetlands

Table 1: Summary of -Biodiversity features.

Feature	Description	Implications/Comment
Affected Vegetation Types (VEGMAP)	Gamtoos Thicket (*Least Threatened*)	Solid Gamtoos Thicket is present on site as a mozaic with a Coastal Grassy Fynbos.
	Humansdorp Shale Renosterveld (*Endangered*)	The grassy/fynbos on site may have elements of these units, but appears to be more similar to Algoa Dune Strandveld,, being present on a sandy soil with calcrete in places rather than the inland Humansdorp Shale Renosterveld.
	Algoa Dune Strandveld (Least *Threatened*)	
Affected Vegetation Types (GRBSP)	Kabeljous Valley Thicket (Valley Thicket)	Solid Thicket units present on site
	Zeekoei Limestone Strandveld (Dune Mozaic Sand Fynbos)	Sand Fynbos present on old aeolian deposits which will constitute the fynbos mozaic within the thicket on site.
	Osbosch Thicket-Renosterveld (Mesic Mozaic Valley Thicket)	Present in surrounding areas to the north (inland) and south (coastal) of the site
	St Francis Strandveld (Dune Mozaic Sand Fynbos)	
Critically Endangered and Endangered Ecosystems	Humansdorp Shale Renosterveld	Located inland north of the site, not likely to be present on the aeolian sands
Vulnerable Ecosystems	None	N/A
Critical Biodiversity Areas (ECBCP)	The site is designated as CBA 2 and CBA 3 as per the ECBCP. Furthermore a portion along the western side is designated CBA as per the GRBSP and bounds on a CBA associated with the Swart and Seekoei Rivers.	CBA 2 and 3 areas are lower priority and the proposed development plan with substantial intact open space, will serve to retin natural vegetation.
Ecological Support Areas	The site is designated and Ecological Support are in the GRBSP	The GRBSP recommends maintaining this area as it is an important supporting area for maintaining corridors, linkages and ecological processes. The proposed development plan will retain a significant portion of open space, which will achieve this objective.

Feature	Description	Implications/Comment
Protected Areas in vicinity	Seekoei River Nature Reserve is located to the west.	Proposed development will not impact directly on the Nature Reserve. Furthermore, the development will include a substantial Open Space, which will provide an ecological corridor to the nature reserve.
Within 100 m of River, watercourse or Wetland	No River, watercourse or Wetland within 100 m of the proposed development	The Swart and Seekoei river estuaries are located to the west (plus 400 m) and a drainage line (plus 100 m and dam (plus 400 m) to the north. Proposed development is unlikely to impact on these directly
Surrounding Land Uses	Natural, agriculture and residential	Residential development to the south, the site borders on natural land to the west and degraded/transformed agricultural land to the north and east.

***NOTE**: Refer to Figure 3 to* Figure 8

1.5.1 Vegetation of Southern Africa

A single vegetation unit (Figure 4) is indicated as being present on the site as per Vegmap, which is Gamtoos Thicket. Surrounding the site are two Fynbos vegetation types including Humansdorp Shale Renosterveld (inland) and Algoa Dune Strandveld (coastal). Since there are Fynbos elements present on site, these will be considered in this assessment report. Gamtoos Thicket and Algoa Dune Strandveld both have a *Least Threatened* in terms of the National Biodiversity Assessment, whilst Humansdorp Shale Renosterveld is classified as being *Endangered*.

A general description of the three vegetation units is provided below (as per Mucina & Rutherford, 2006) and an assessment of the site is addressed in Section 2 of this report:

Gamtoos Thicket

Distribution Eastern Cape Province: Coastal basin of the Gamtoos River Valley, south of the Baviaanskloof Mountains and along some smaller river valleys such as that of the Kromme River. Also found north of the Baviaanskloof Mountains in more xeric conditions on some low ridges south and southeast of Steytlerville. Altitude 0–700 m.
Vegetation & Landscape Features On the low mountain slopes in steeply sloping areas and on low ridges. Tall, dense thicket, where both the trees and shrubs and the succulent component are well represented. Few distinct strata can be differentiated within much of the vegetation, as the lower and upper canopy species are intertwined, often together with a wide variety of liana species linking the understorey species with the canopy. Occurs mostly as a fragmented community with large, dense stands restricted to south- and southwest-facing slopes that are protected against fires. The structure of the dense stands of Gamtoos Thicket is similar to that of the Sundays Thicket, but it differs in the dominant species.
Geology & Soils Mostly restricted to rocky, sandy-loamy soils derived from shale and sandstone of the Bokkeveld Group (Ceres and Tarka Subgroups) and Table Mountain Group (Nardouw Subgroup) as well as the Jurassic Enon conglomerates. Also found are fairly shallow clayey soils derived from the Gamtoos Group

limestone, phyllite and arenite of the Kaan and Klein River Formations (Namibian Erathem). Fc land type covers half of the area, followed by Ae and Ib.

Climate Nonseasonal rainfall with slight optima in March and November. MAP ranges from about 180 mm in the northwest inland areas to 850 mm in the southeast coastal sites. The coefficient of variation in MAP is 32% for the unit, but varies from 22% at the coast to 38% inland. The mean daily maximum temperatures for January are 24°C at the coast and 31°C inland and the mean daily minimum temperatures for July are 3°C inland and 9°C at the coast. The incidence of frost is 7 days, but ranging widely from 3 days at the coast to more than 25 days of frost per year inland. See also climate diagram for AT 4 Gamtoos Thicket (Figure 10.4).

Important Taxa Succulent Trees: *Euphorbia triangularis* (d), *Aloe africana*, *A. speciosa*, *Euphorbia grandidens*. Small Trees: *Apodytes dimidiata*, *Canthium spinosum*, *Cussonia spicata*, *C. thyrsiflora*, *Maytenus undata*, *Pappea capensis*, *Ptaeroxylon obliquum*, *Schotia afra* var. *afra*, *Sideroxylon inerme*, *Vepris lanceolata*. Tall Shrubs: *Allophylus decipiens*, *Azima tetracantha*, *Carissa bispinosa* subsp. *bispinosa*, *Crotalaria capensis*, *Ehretia rigida*, *Elytropappus rhinocerotis*, *Euclea racemosa*, *E. undulata*, *Grewia occidentalis*, *Gymnosporia capitata*, *G. heterophylla*, *G. polyacantha*, *Hippobromus pauciflorus*, *Maerua cafra*, *Mystroxylon aethiopicum*, *Nylandtia spinosa*, *Olea europaea* subsp. *africana*, *Pterocelastrus tricuspidatus*, *Putterlickia pyracantha*, *Rhus glauca*, *R. incisa*, *R. longispina*, *R. lucida*, *R. pterota*, *R. refracta*, *Scolopia zeyheri*, *Scutia myrtina*. Low Shrubs: *Felicia muricata* (d), *Anthospermum aethiopicum*, *Asparagus striatus*, *Chaetacanthus setiger*, *Eriocephalus africanus*, *E. algoensis, E. spathaceus, Jamesbrittenia microphylla*, *Lauridia tetragona*, *Oedera genistifolia*, *Phyllanthus maderaspatensis*, *Pteronia incana*, *Senecio linifolius*. Succulent Shrubs: *Portulacaria afra* (d), *Exomis microphylla* var. *axyrioides*, *Cotyledon campanulata*, *C. orbiculata* var. *oblonga*, *C. tomentosa* subsp. *tomentosa*, *Crassula cultrata*, *Delosperma ecklonis*, *Euphorbia mauritanica*, *E. polygona*, *Glottiphyllum linguiforme*, *Senecio oxyodontus*, *Tylecodon striatus, Zygophyllum debile*. Semiparasitic Shrub: *Osyris compressa*. Semiparasitic Epiphytic Shrub: *Viscum rotundifolium.* Woody Climbers: *Capparis sepiaria* var. *citrifolia* (d), *Rhoicissus digitata* (d), *Asparagus aethiopicus*, *A. racemosus*, *Jasminum angulare*, *Plumbago auriculata*, *Rhoiacarpos capensis*. Woody Succulent Climber: *Sarcostemma viminale*. Herbaceous Climbers: *Cynanchum ellipticum*, *Senecio deltoideus*. Graminoids: *Ehrharta calycina* (d), *E. erecta* (d), *Panicum deustum* (d), *Setaria sphacelata* (d), *Aristida congesta*, *Cenchrus ciliaris*, *Cynodon dactylon*, *Digitaria natalensis*, *Enneapogon desvauxii*, *E. scoparius*, *Eragrostis obtusa*, *Eustachys paspaloides*, *Ficinia indica*, *F. nodosa*, *Heteropogon contortus*, *Karroochloa curva*, *Leptochloa fusca*, *Melica racemosa*, *Panicum maximum*, *P. stapfianum*, *Pycreus polystachyos* var. *laxiflorus*, *Sporobolus africanus*, *S. fimbriatus*, *Stipa dregeana*, *Themeda triandra*, *Tribolium hispidum*. Succulent Herbs: *Crassula expansa*, *C. muscosa*, *C. orbicularis*, *Plectranthus grandidentatus*, *P. madagascariensis, Senecio radicans*. Geophytic Herbs: *Asplenium cordatum*, *Bonatea speciosa* var. *antennifera*, *Bulbine alooides*, *B. frutescens*, *Chasmanthe aethiopica, Ornithogalum longibracteatum*, *Oxalis obtusa, Pelargonium pulverulentum, Sansevieria hyacinthoides*. Herbs: *Hypoestes aristata* (d), *Abutilon sonneratianum*, *Acalypha ecklonii*, *Blepharis integrifolia* var. *clarkei*, *Hibiscus pusillus*, *Indigastrum costatum* subsp. *macrum*, *Indigofera hedyantha*, *Peristrophe cernua*, *Stachys aethiopica*.

Endemic Taxa Small Tree: *Cussonia gamtoosensis*. Succulent Herbs: *Huernia bayeri*, *Gasteria pulchra*. Geophytic Herb: *Lachenalia latimerae.*

Conservation Least threatened. Target 19%. A total of 6% of this vegetation unit is protected in statutory conservation areas: Baviaanskloof Conservation Area, Guerna and Berg Plaatz Wilderness Areas as well as Stinkhoutsberg, Kabeljousrivier, Loerie Dam and Seekoeirivier Nature Reserves. Private conservation areas (Hankey Forest Reserve No. 1, Monteaux Game Ranch, Lombardini Game Farm, Kabeljous River Natural Heritage Site, and Kromme River Mouth, Eastcot and Loerie Dam Nature Reserves) also protect some patches of this vegetation type. Some 12% of Gamtoos Thicket has been altered by cultivation and 1% by urbanisation. The alien *Atriplex lindleyi* subsp. *inflata* has invaded many degraded arid thicket areas, especially on soils with a high clay content. Erosion is variable.

Remarks The structural characteristics and species present within the Gamtoos Thicket are intermediate between those of the Sundays River Thicket and Gouritz River Thicket (*sensu* Vlok & Euston-Brown 2002).

However, the composition of the dominant species differs and there are several endemic species present in the Gamtoos Thicket, especially in the matrix vegetation, that only occur as fragmented clumps. The flora that occur along its boundaries is shared and has been enriched by the species typical of the adjacent units (Cowling 1983), e.g. Sundays Thicket. To a degree this is also true for the Baviaanskloof mountain zone, especially where the Gamtoos Thicket unit abuts the boundaries of the Groot Thicket units. Many species typical of both these major regions may co-occur along these overlapping areas, presenting rather diffuse patterns in species gradients (Vlok & Euston-Brown 2002).

References Acocks (1953, 1988), Cowling & Campbell (1983), Cowling (1984), Pierce & Cowling (1984), Everard (1987), Midgley & Cowling (1993), Vlok & Euston-Brown (2002), Vlok et al. (2003), Kamineth (2004).

The Thicket present on site falls within the Gamtoos thicket Vegetation type.

Humansdorp Shale Renosterveld

Distribution Eastern Cape Province: Three swathes: from Jeffreys Bay and Marina Glades near the coast inland past Humansdorp to the lower reaches of the Dieprivier near Two Streams; the Mondplaas/Mondhoek area near the mouth of the Gamtoos River stretching inland in a series of patches south of the Gamtoos River to west of Patensie; between thicket and fynbos types from Burghley Hills to Rocklands and the Dell to Nooitgedacht southwest of Uitenhage. Coastal forelands from Humansdorp to Port Elizabeth. Altitude 20–360 m.

Vegetation & Landscape Features Moderately undulating plains and undulating hills supporting vegetation composed of low, medium dense graminoid, dense cupressoid-leaved shrubland, dominated by renosterbos. There are both grassland and shrubland forms of the renosterveld present, probably depending on grazing and fire regimes. In wetter areas (> 550 mm) it grades into FFt 2 Loerie Conglomerate Fynbos. Thicket patches are common on termitaria (heuweltjies are absent) and in fire-safe enclaves, especially in the east. It is dominated by *Aspalathus nivea* in the post-fire, early seral stages.

Geology & Soils Clays and loams derived from the Ceres Subgroup of the Bokkeveld Group shales. Plinthic catenas prominent. Land types mainly Ca and Bb.

Climate MAP 500–850 mm (mean: 630 mm), peaking slightly in March, but otherwise even. Mean daily maximum and minimum temperatures 25.1°C and 7.5°C for February and July, respectively. Frost incidence about 3 days per year. See also climate diagram for FRs 19 Humansdorp Shale Renosterveld (Figure 4.101).

Important Taxa ([W]Wetlands) Succulent Tree: *Aloe africana*. Tall Shrubs: *Cliffortia strobilifera*, *Metalasia densa*, *Morella serrata*. Low Shrubs: *Elytropappus rhinocerotis* (d), *Helichrysum anomalum* (d), *Oedera genistifolia*, (d), *Anthospermum galioides* subsp. *galioides*, *Barleria pungens, Chaetacanthus setiger*, *Clutia rubricaulis*, *Euryops munitus, Felicia filifolia* subsp. *filifolia*, *Hermannia flammea*, *Indigofera denudata*, *I. heterophylla*, *Lotononis acuminata*, *Metalasia aurea, Muraltia alopecuroides*, *Passerina rubra*, *Pelargonium sidoides, Tephrosia capensis*. Herbaceous Climber: *Thunbergia capensis.* Herbs: *Arctotis acaulis*, *Berkheya heterophylla* var. *radiata*, *Centella asiatica*[W], *Gazania linearis*, *Gerbera piloselloides*, *Helichrysum nudifolium*, *Hibiscus pusillus*, *Senecio othonniflorus*. Geophytic Herbs: *Bobartia orientalis*, *Geissorhiza heterostyla*, *Ledebouria cooperi, Oxalis punctata*, *O. smithiana*, *Satyrium membranaceum*. Graminoids: *Eustachys paspaloides* (d), *Themeda triandra* (d), *Aristida junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Cymbopogon marginatus*, *Cynodon dactylon*, *Eragrostis capensis*, *E. curvula*, *Ficinia nigrescens*, *F. tristachya, Merxmuellera disticha*, *Paspalum dilatatum*, *Pentaschistis pallida, Restio tetragonus*, *Sporobolus africanus*, *Tribolium hispidum*, *Tristachya leucothrix*.

Endemic Taxa Succulent Shrubs: *Delosperma patersoniae*, *Trichodiadema fourcadei*. Geophytic Herb: *Cyrtanthus wellandii*.

Conservation Endangered. Target 29%. None conserved in statutory conservation areas and only 6% enjoys protection on private land (Thaba Manzi and Lombardini Game Farms). Some 61% already transformed (cultivation). Erosion very low and low.

Remark Locally, thicket is burnt and converted to renosterveld for grazing.

The Fynbos present on site is not Humansdorp Shale Renosterveld Vegetation type, which is not present on aeolian sands.

Algoa Dune Strandveld

VT 34a Dense Strandveld Scrub p.p. (Acocks 1953). *Pterocelastrus tricuspidatus* Bushclumps, Dune Woodland (Taylor & Morris 1981). Subtropical Transitional Thicket p.p., C*assine aethiopica-Cussonia thyrsiflora* South-East Dune Thicket (Cowling 1984). Dune Scrub and Thicket p.p. (Lubke & Van Wijk 1988). LR 4 Dune Thicket p.p. (Low & Rebelo 1996). STEP Algoa Dune Thicket, STEP Colcester Strandveld (Vlok & Euston-Brown 2002, Vlok et al. 2003).

Distribution Eastern Cape Province: Narrow coastal strip along the Indian Ocean seaboard from the mouth of the Tsitsikamma River to the Sundays River mouth.

Vegetation & Landscape Features Tall (up to 5 m) dense thickets on dunes mainly outside the influence of salt spray, dominated by stunted trees, shrubs (often armed with spines and thorns), abundant lianas and sparse herbaceous and grassy undergrowth.

Geology, Soils & Hydrology Aeolian dune sands of the Schelm Hoek Formation of the Algoa Group.

Climate Nonseasonal precipitation regime, with MAP approximately 680 mm, of which about 300 mm falls in summer (October–March) and 350 mm in winter (April–September). The mean daily maximum and minimum temperatures are 25.1°Cand 8.3°C for February and July, respectively. See also climate diagram for AZs 1 Algoa Dune Strandveld (Figure 14.3).

Important Taxa ([S]Stunted shrubby forms of trees) Succulent Tree: *Aloe africana* (d). Succulent Shrubs: *Cotyledon velutina*, *Lycium cinereum*, *Zygophyllum morgsana*. Tall Shrubs: *Azima tetracantha* (d), *Brachylaena discolor*[S] (d), *Chrysanthemoides monilifera* (d), *Cussonia thyrsiflora*[S] (d), *Euclea racemosa* subsp. *racemosa*[S] (d), *Maytenus procumbens* (d), *Mystroxylon aethiopicum*[S] (d), *Pterocelastrus tricuspidatus*[S] (d), *Rhus crenata* (d), *Schotia afra* var. *afra*[S] (d), *Scutia myrtina*[S] (d), *Sideroxylon inerme*[S] (d), *Tarchonanthus littoralis*[S] (d), *Canthium spinosum*[S], *Cassine peragua*[S], *Dovyalis rotundifolia*[S], *Euclea natalensis*[S], *E. racemosa* subsp. *macrophylla*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *G. capitata*, *Nylandtia spinosa*, *Olea exasperata*, *Putterlickia pyracantha*, *Rhus glauca*, *R. pterota*, *Zanthoxylum capense*[S]. Low Shrubs: *Carissa bispinosa* (d), *Dimorphotheca fruticosa, Pelargonium suburbanum* subsp. *suburbanum*, *Robsonodendron maritimum*. Succulent Woody Climber: *Sarcostemma viminale*. Woody Climbers: *Rhoicissus digitata* (d), *Asparagus retrofractus*, *Solanum africanum*. Herbaceous Climbers: *Cynanchum natalitium* (d), *C. ellipticum*, *C. obtusifolium*, *Secamone alpini*. Succulent Herb: *Sansevieria hyacinthoides*. Graminoids: *Brachiaria chusqueoides* (d), *Panicum deustum*.

Endemic Taxa Succulent Shrub: *Cotyledon adscendens*. Tall Shrubs: *Gymnosporia elliptica*, *Rapanea gilliana*. Herb: *Lobelia zwartkopensis*. Geophytic Herb: *Brunsvigia litoralis*.

Conservation Least threatened. Target 20%. About 4% statutorily conserved in the Greater Addo Elephant National Park, Cape Recife, Sardinia Bay, The Island, Kromme River Mouth, Gamtoos River Mouth, Huisklip, Cape St Francis and Seal Point Nature Reserves as well as in the private Upe and Rebelsrus Nature Reserves, Thyspunt Natural Heritage Site and in the Seaview Game Park. More than 10% already transformed for cultivation, urban development and road building. Some of the dune systems suffer heavy infestation by *Acacia cyclops* and *A. saligna*, which are now being removed by the local Working for Water activities. Erosion very low (63%) and moderate (10%).

Remarks The structure and dynamics of this vegetation unit are similar to those of the thickets of FS 9 Groot Brak Dune Strandveld (see chapter on Fynbos in this book). However, the present unit differs from the latter in having a richer assemblage of woody species. It is somewhat surprising that forest vegetation is not dominant in this seemingly suitable climatic regime. This is probably because the substrate consists of aeolian quaternary

sands, salt-laden winds are prevalent in this region and because fires may periodically occur here (Vlok & Euston-Brown 2002).

The Fynbos present on site is located on Aeolian dune sands of the Schelm Hoek Formation and is most likely associated with the Algoa Dune Strandveld vegetation type.

1.6 Vegetation and Ecological Processes

The Eastern Cape Province has highly diverse vegetation since it occupies an area where the biomes of South Africa converge (Rutherford and Westfall, 1994). As a result, the Eastern Cape vegetation is a mosaic of vegetation types, many of which have become severely threatened by development (Lubke *et al.*, 1988, Low and Rebelo, 1996). The vegetation of the region falls in the Tongoland-Pondoland phytochorion (White, 1983) that is considered to have originated in Natal and migrated south-westward where it merged with Cape and arid flora, hence the vegetation is generally highly diverse.

One of the most striking features of the Gamtoos River Thicket vegetation is the degree to which most of the Thicket vegetation is fragmented. Most of the fragmentation of the Gamtoos River Thicket probably already materialised in pre-colonial times (_ 300 years ago), but the fragmentation process has undoubtedly been accelerated by the fire and grazing regimes applied in recent times by landowners. The relative ease with which the Gamtoos Thicket is burned away may be due to the fact that the Gamtoos Thicket is largely restricted to a relatively small valley, where the much of the soil is derived from nutrient poor geological formations (Uitenhage and Table Mountain group). This is at probably further enhanced by the relatively high winter rainfall (< 250 mm) which this area receives, which would favour the establishment of Fynbos and Renosterveld vegetation after a fire, rather than those of the more slow growing Thicket species. With a paucity of predictable summer rain, the Gamtoos Thicket vegetation is at present retreating to fire-safe sites, e.g. gullies and rocky outcrops. The fragmentation of Gamtoos Thicket by fire must, however, have been a long-standing state, because most of the local Mosaic units are rich in localized endemic plant species in the matrix vegetation, with only few pertaining to the Thicket clumps. An interesting evolutionary selection, towards a grassy growth form, is prevalent in several members of the local Asphodelaceae, such as Aloe micracantha, Gasteria pulchra and Haworthia longiana. The grass-like leaves of these species may have evolved as a response to competition from true grasses, or as a form of mimicry against herbivory. One of the most remarkable aspects about the often, small clumps of Gamtoos Valley Thicket is that they retain their integrity as Thicket units. They remain intact Thicket units in the species present and in their structure. In terms of number of species per area ratio, they may even be richer in species than extensive stands of Thicket vegetation. These isolated Thicket clumps seem to be safe sites for certain uncommon Thicket species, e.g. Ceropegia species. In this respect these fragmented Thicket clumps seem to defy the island bio-geographical rules. The species enrichment of these Thicket clumps may be due to reduced seed predation, reduced competition levels, or a combination of factors in which the long-livedness of the woody Thicket species plays a vital role. Whatever the answer, it would be an interesting aspect to investigating further.

1.6.1 Eastern Cape Biodiversity Conservation Plan (ECBCP)

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning (SANBI 2007). These form the key output of the conservation plan. They are used to guide protected area selection and should remain in their natural state as far as possible.

As indicated in Figure 5, the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007), the proposed site falls within an area designated a CBA 2 status. As indicated in Table 1, the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007), the proposed site falls within an area designated a CBA 2 status.

Due to the limited impact of the development at a local and regional scale as well as the inclusion of a substantial intact open space, the effect on Critical Biodiversity Areas (CBA) and Ecological Process Areas (ESA), will most likely be insignificant or of low significance.

Since the site also falls within an area having a CBA 2 status, the impact to Critical Biodiversity Areas at a local scale would be of moderate significance. With the implementation of appropriate mitigation measures, which will include the proposed of ecological corridors connecting east-west during final design, this can most likely be reduced to low at a regional scale. The bulk of the high density development is concentrated along the southern portion of the site. It will thus retain the northern portion of the site as open space as well as the grassland/wetland strip, with seasonal wetland properties, as well as a corridor of thicket. This will thus retain sufficient ecological corridor.

1.6.2 Protected areas

The Seekoei River Nature Reserve is located to the west of the site. While the site is directly adjacent to the nature reserve and has also been designated an ecological process area, the proposed development will retain a substantial open space area (approximately 80 % of the site), so will provide an ecological corridor connecting to the nature reserve.

1.7 Garden Route Biodiversity Sector Plan: CBA and ESA

The Garden Route Biodiversity Sector Plan identifies two habitats being present, Dune Thicket Mosaic Sand Fynbos and Valley Thicket. The specific vegetation types are Zeekoei Limestone Strandveld and Kabeljous Valley Thicket. The descriptions according to the GRBSP are provided below and an assessment of the site is addressed in Section 2 of this report:.

Dune Thicket Mosaic Sand Fynbos This habitat occurs just inland of the Dune Thicket Mosaic Forest, within the zone that is exposed to periodic fires, albeit rarely. Fire does therefore not seem to be a major determinant of the flora present, but the species present indicate that physical soil disturbance by mole rats and large herbivores were important disturbance regimes. Here the small "Milkwood forests" are virtually absent, but patches of typical Dune Thicket occur on the north facing slopes and in the dune slack areas, often with several Fynbos elements present on south facing slopes. An unusual feature is the relative abundance of succulents in the mixture of Thicket and Fynbos elements. We recognize three rather divergent vegetation units in this habitat type.

The **Zeekoei Limestone Strandveld** is an interesting vegetation unit that deserves special protection measures as it occurs in a highly threatened landscape within kilometres of the coastline between Cape St Francis and Jeffrey's Bay. Typical of this unit is a dense sward of palatable grasses often dominated by *Themeda triandra*, a short and stunted fynbos shrub assemblages especially on the limestone ridges often together with patches of mostly dune thicket vegetation. Also characteristic is the occasional presence of dwarf or stunted *Acacia karoo* trees that remind one of the coastal grasslands northwards from Port Elizabeth and behind the dunes at Woody Cape Nature Reserve.

Another distinguishing feature of this unit is the fine scale mosaic nature of the vegetation with thicket clumps of various sizes in a sea of grassland/shrubland. The historical pressure of game would have had a large influence on shaping the structure and composition of this unit. The lack of this, combined with a reduction in the frequency of fires in some places is having an unmeasured impact on the system. The trend seems to be an increase in the occurrence and spread of many thicket forming plants that if not held in check by herbivores and fires, can tend to smother and out compete the grassland and shrub land that harbours a significant proportion of the diversity and endemism of this vegetation unit. On top of this is the massive destruction of

this unit by urban sprawl. Useful indicator species of the **Zeekoei Limestone Strandveld** are: *Acacia karoo, Disparago kraussii, Helichrysum anomalum, Hermannia althaeifolia, Agathosma capensis, Jamesbrittenia microphylla, Cineraria geraniifolia, Hypodiscus striatus, Euphorbia burmannii, Justicia orchioides, Lightfootia diffusa, Gymnosporia heterophylla, Felicia erigeroides, Blepharis integrifolius, Ruschia congesta* and *Ruschia leptocalyx.*

Valley Thicket Only small examples of this habitat occur along river drainage areas in the eastern section of the domain. Spiny shrubs and trees are abundant in the Valley-Thicket, which differs from the Dune Thicket in being largely restricted to deep clayey soils, derived from Bokkeveld shale and the species present differs. The tree component is better developed with species such as *Euclea undulata, Pappea capensis, Rhus glauca, Schotia afra* and *Scolopia mundii* more abundant. The shrub component is very similar to those of the Dune Thicket, but species such as Azima tetracantha and Rhus crenata are absent and replaced by species such as *Capparis sepiaria, Clutia daphnoides* and *Ehretia rigida* in the Valley Thicket.

We recognize two units in this habitat. The **Kabeljous Valley Thicket** is found in kloofs and sheltered sites in and around Jeffrey's Bay. *Euphorbia triangularis* reaches its western most distribution on the coastline here. The stunted (<5 m tall) woody component is also unmistakable of this unit. Being close to the coastline there are several species from the adjacent dune thicket (e.g. *Aloe africana, Sideroxylon inerme)* that co-occur with species more typical of Valley Thicket vegetation e.g. *Euclea undulata, Schotia afra* and *Carissa bispinosa*. There are a number of unusual plants around the edges of this vegetation where it forms mosaics with Renosterveld (e.g. *Haworthia fasciata*, *Crassula tetragona, Phyllanthus incurvus, Pteronia hirsuta, Delosperma prasinum, Delosperma cf frutescens)* Grassy Fynbos (e.g. *Euryops euryopoides, Agathosma ovata, Metalasia acuta*), or even Strandveld vegetation (e.g. *Rhus pallens* and *Felicia erigeroides*). Although some kloofs appear to be protected in Jeffrey's Bay, the rapid consolidation and expansion of this town threatens this unit. Special measures need to be taken to ensure the protection of this unit and its edges/transitions and boundaries with adjacent units.

1.8 Implications of Systematic Planning frameworks

The development of the site is unlikely to compromise the vegetation units significantly due to:

- The limited development footprint, specifically of the higher density area along the southern portion.
- The general proximity to transformed, disturbed and degraded areas and low conservation priority vegetation types.
- The inclusion of a significant open space area (approximately 80 % of the site), which will be maintained and will contribute positively to both ecological processes and conservation of the habitat and species present.
- The implementation of an Environmental Management Plan to include the following:
    - A flora relocation plan before construction, which will include a search and rescue of protected flora.
    - A rehabilitation plan, which will be driven primarily by the appropriate removal and replacement of topsoil during site clearing.
    - An ongoing Open Space Management Plan during the operational phase, which will include an Alien Vegetation Management Plan.

1.9 Regional Planning Maps

The maps below illustrate the Regional Planning context discussed above.

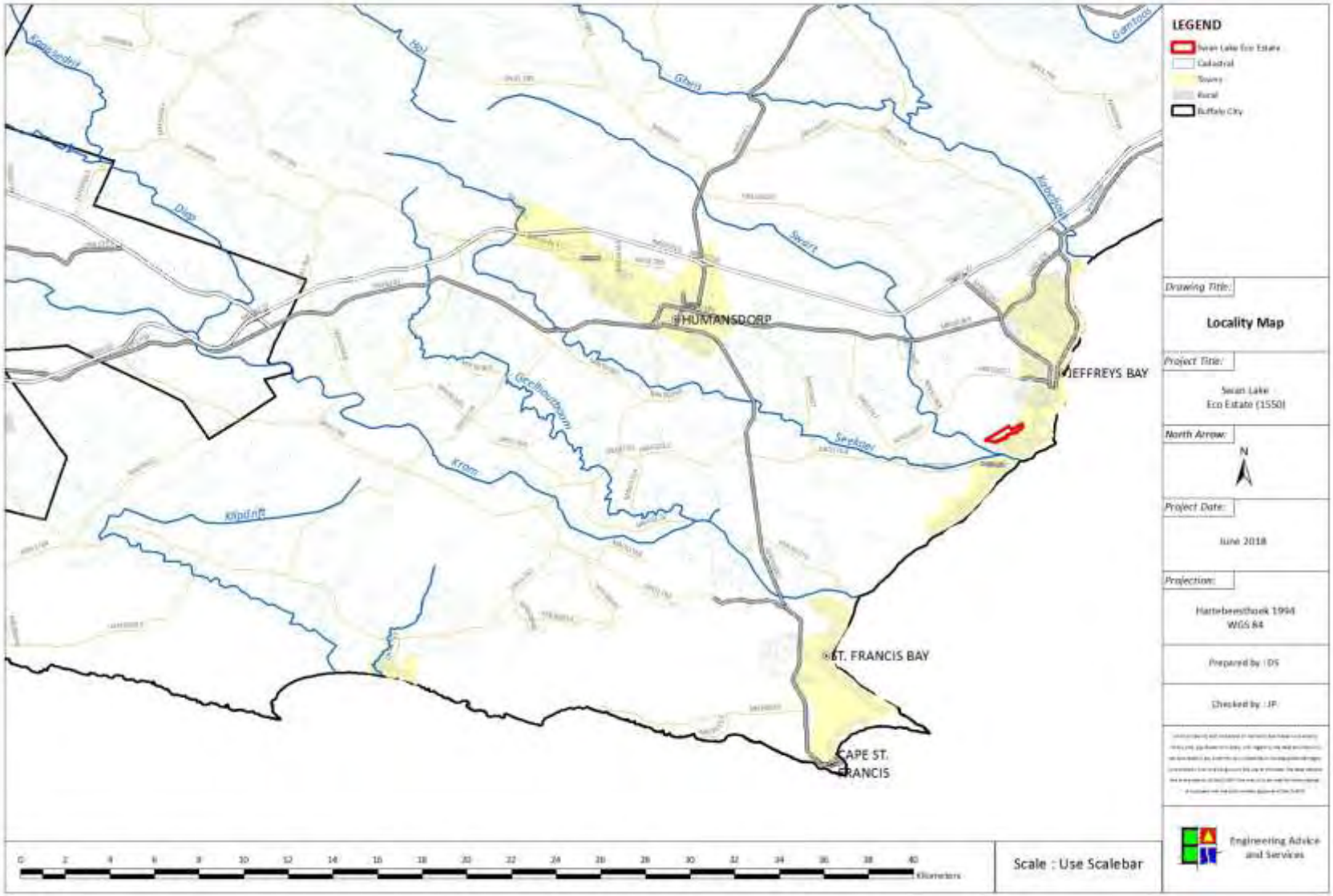


Figure 3: Locality Map.

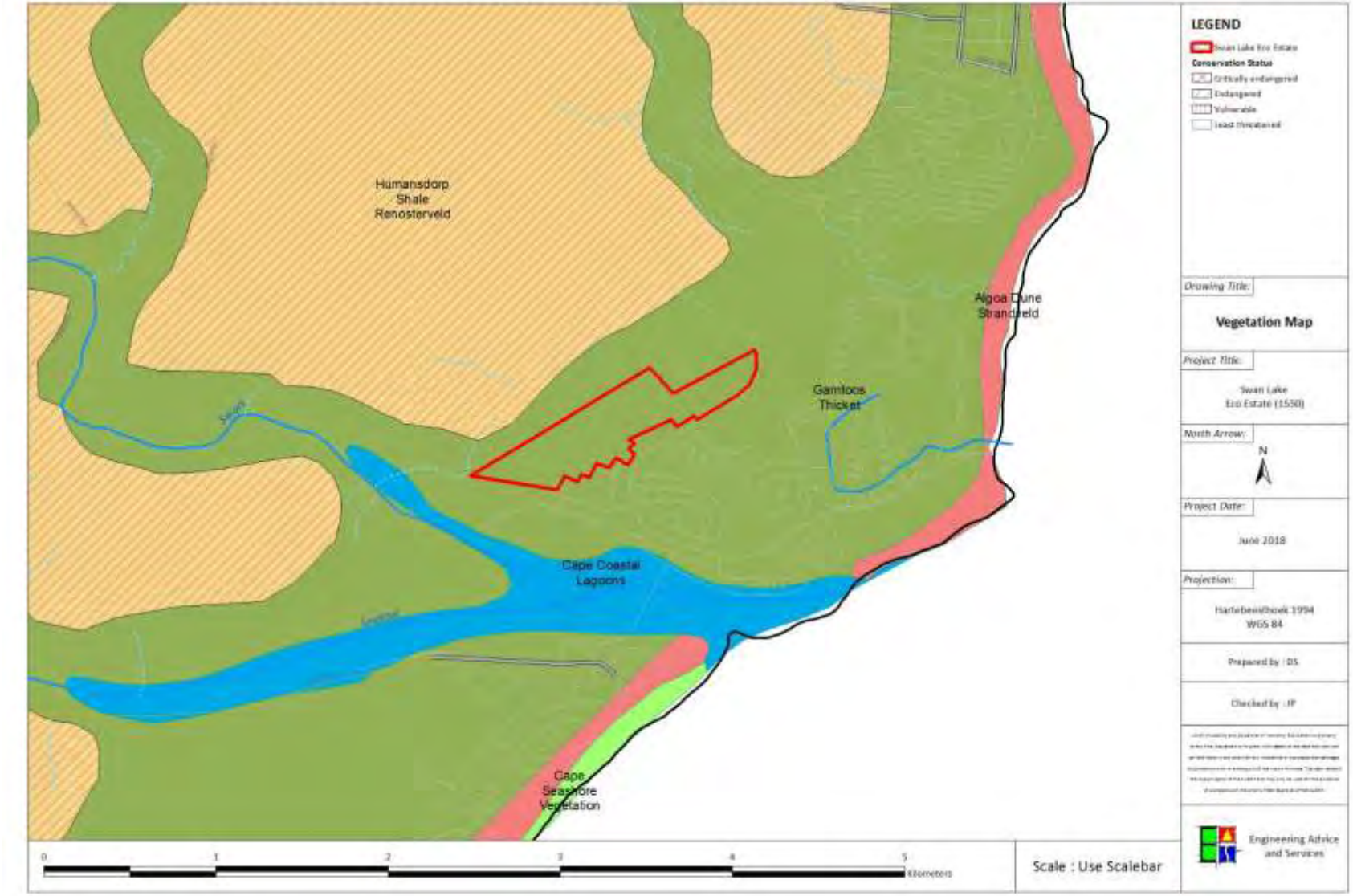


Figure 4: Vegetation and Status

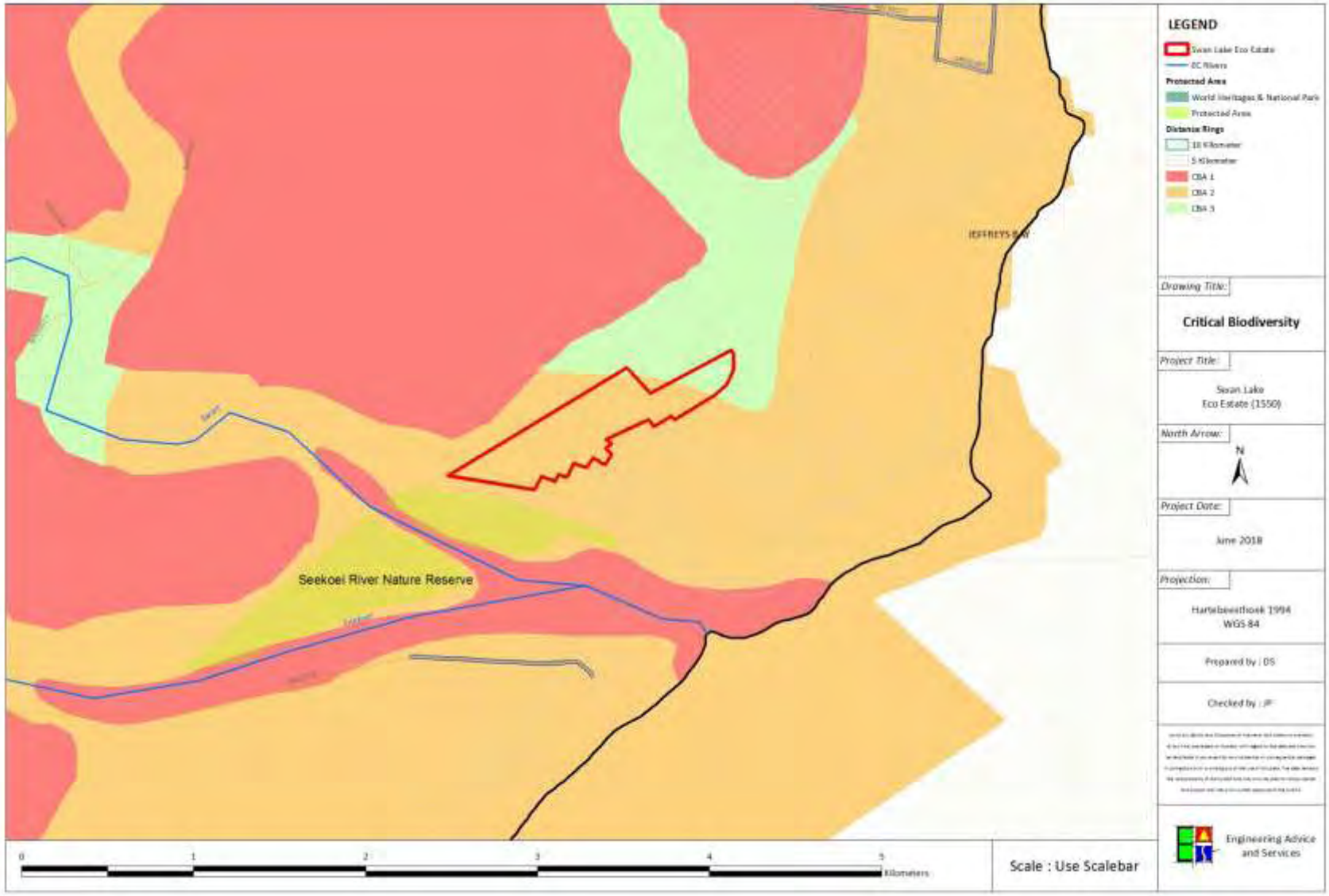


Figure 5: Critical Biodiversity Areas, as per Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007).

Figure 6: Rivers and Wetlands

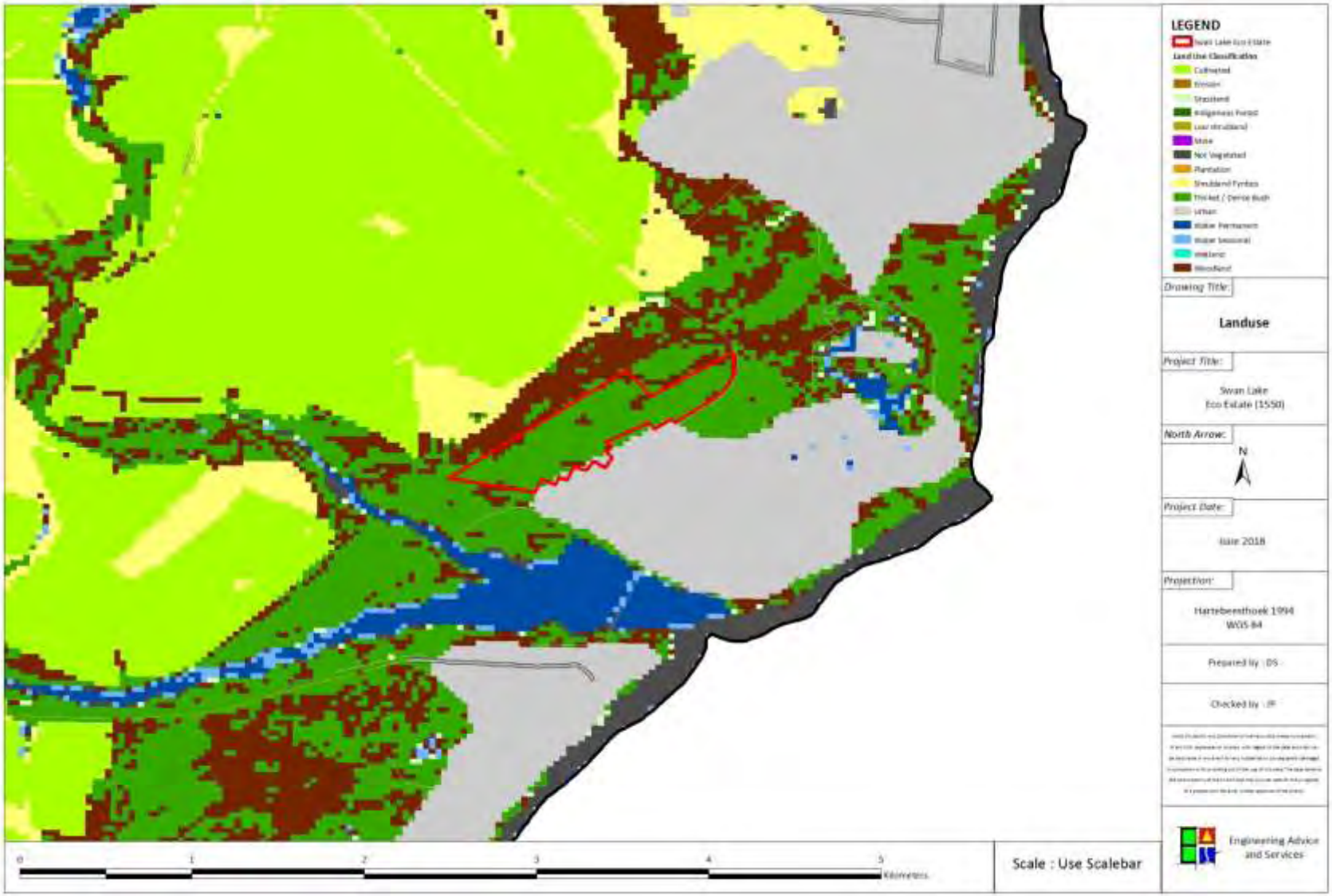


Figure 7: Land Cover

Figure 8: Garden Route Biodiversity Sector Plan: Vegetation with CBA and ESA

Figure 9: Aerial Photo of site

2 Description of the Terrestrial Environment

2.1 Topography and Drainage

The affected area can generally be described as gentle undulating sea-facing vegetated dunes.

2.2 Vegetation and Flora

Three distinct habitats are noted on site, which form a mozaic, including Coastal Thicket, Coastal Fynbos and Grassland/Wetland habitat.

A short description of each unit is described below and a map indicating the mapped vegetation is provided in Figure 18 and incorporating the site development plan over the mapped vegetation in Figure 19 below.

2.2.1 Valley/Coastal Thicket

As described in the general description above, the **Valley/Coastal Thicket** is present on the gently to moderately undulating sometimes aeolian dune landscape in close to the coast, dominated by a dense Thicket in a mozaic with a Fynbos mozaic.

Figure 10: Typical Thicket

Figure 11: Typical Thicket.

The Valley/Coastal Thicket within the site is comprised of a dense thicket including large dominant trees such as Milkwood (Sideroxylon inerme) and Boerboon (*Schotia afra*). Other species include *Aloe africana, Aloe pluridens, Azima tetracantha, Diospyros dichrophylla, Dovyalis rotundifolia, Euclea racemosa, Euclea undulata, Euphorbia triangularis, Grewia occidentalis, Gymnosporia arenicola, Maytenus procumbens, Mystroxylon aethiopicum, Pappea capensis, Rhus crenata, Rhus laevigata, Rhus longispina, Schotia afra* and *Scutia myrtina.* These are typical of the local Thicket and Coastal Thicket vegetation.

2.2.2 Coastal Fynbos

The Coastal/Limestone Fynbos within the site is comprised of a wide range of mostly shrubs, restios and grasses. Dominant species include *Agathosma apiculata and Metalasia muricata.* Common Species include *Anthospermum aethiopicum, Cliffortia ramosissima, Diospyros dichrophylla, Felicia echinata, Helichrysum spp., Isolepis* spp.*, Morella cordifolia, Muraltia squarrosa, Nylandtia spinosa* and *Rapanea gilliana.*

A notable difference to the description of Zeekoei Limestone Strandveld as per the GRBSP is the presence of *Agathosma apiculata*, which is a dominant, rather than *Agathosma capensis*. This could be as a result of a misidentification in the GRBSP.

Figure 12: Typical Fynbos

Figure 13: 'Typical Fynbos

Figure 14: Burned Fynbos

Figure 15: Burned Fynbos/Thicket

The Fynbos within the development footprint has been heavily impacted by Alien invasion and fire, which is likely to continue under status quo conditions. The impact of the development to this vegetation community will thus likely be moderate to low.

2.2.3 Grassland/Wetland

The grassland/wetland area is within a dune slack and prone to occasional seasonal flooding and a perched water table, draining to the east. Dominant species include various grasses as well as restios and shrubs. Typical species include *Cynodon dactylon, Digitaria eriantha, Eragrostis curvula, Imperata cylindrica, Panicum deustum, Themeda triandra, Tristachya leucothrix* and *Isolepis* spp.

Figure 16: Grassland/Wetland habitat

Figure 17: Grassland/Wetland habitat.

Figure 18: Mapped Vegetation with sensitivity indicated

2.2.4 Flora and Species of Special Concern

A comprehensive flora species list has been compiled by Dr D. McDonald as a separate report and will thus not be included in this report. The site visit conducted in June 2018 did not identify any species that were not identified in the original assessment.

2.2.5 Alien Invasive species

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 allows 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 river banks and wetlands.

A list of species and their respective NEMBA status occurring within the vicinity of the site is provided in Table 2. No serious or problematic invasives were noted to be present in close proximity of the construction footprint.

Table 2: Alien Invasive plants and common weeds present and respective NEMBA classifications.

Botanical Name	Common name	Family	Status*	Extent
Acacia cyclops	Rooikrantz	Fabaceae	NEMBA, Cat 2	Scattered clumps and individual large trees
Cestrum laevigatum	Inkberry	Solanaceae	NEMBA, Cat 1b	Scattered individuals
Acacia mearnsii	Black Wattle	Fabaceae	NEMBA, Cat 2	Scattered trees

*** NEMBA:** Alien and Invasive Species as per National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Draft Alien and Invasive Species Lists (GN R598 and GN R599 of 2014 (category 1, 2 or 3)

It is likely that a range of ruderal weeds will be introduced during the construction phase. Appropriate measures to be implemented to control these weeds and a suitable aftercare period to be implemented.

Eradication protocol

Standard eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control any alien invasive species or weeds. The EMP to provide for measures to mitigate this during development construction and to be monitored by the ECO.

3 Impact Assessment

3.1 Assessment of the significance of the potential impacts

3.1.1 Criteria of assigning significance to potential impacts

The following methodology is to be applied in the specialist studies for the assessment of potential impacts:

Criteria	Description
Nature of impact	Review the type of effect that a proposed activity will have on the environment and should include "what will be affected and how?"
Extent	Indicate whether the impact will be: • *(S) local* and limited to the immediate area of development (the site); • (L) limited to within 5 km of the development; or • (R) whether the impact may be realized regionally, nationally or even internationally.
Duration	Review the lifetime of the impact, as being: • *(V) very short term* (0 - 1 years), • *(S) short term* (1 - 5 years), • (M) medium (5 - 15 years), • *(L) long term* (>15 years but where the impacts will cease after the operation of the site), or • *(P) permanent*.
Intensity	Establish whether the impact is destructive or innocuous and should be described as either: • *(L) low* (where no environmental functions and processes are affected) • *(M) medium* (where the environment continues to function but in a modified manner) or • *(H) high* (where environmental functions and processes are altered such that they temporarily or permanently cease).
Probability	Consider the likelihood of the impact occurring and should be described as: • *(I) improbable* (low likelihood) • *(P) probable* (distinct possibility) • *(H) highly probable* (most likely) or • *(D) definite* (impact will occur regardless of prevention measures).
Status of the impact	Description as to whether the impact will be positive (a benefit), negative (a cost), or neutral.
Degree of confidence	The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as high, medium or low.
Significance	• *(L) Low:* Where the impact will not have an influence on the decision or require to be significantly accommodated in the project design • *(M) Medium*: Where it could have an influence on the environment which will require modification of the project design or alternative mitigation; • *(H) High*: Where it could have a 'no-go' implication for the project unless mitigation or re-design is practically achievable.

3.1.2 Significance Rating

		Duration				
		Permanent	**Long term**	**Medium term**	**Short term**	**Very short term**
	High Intensity					
Extent	**National**	High	High	High	High	Medium
	Regional	High	High	High	High	Medium
	Local	High	High	Medium	Medium	Medium
	Site specific	Medium	Medium	Medium	Medium	Medium
	Medium Intensity					
Extent	**National**	High	High	High	Medium	Medium
	Regional	High	High	High	Medium	Medium
	Local	Medium	Medium	Medium	Medium	Medium
	Site specific	Medium	Medium	Medium	Medium	Low

		Duration				
		Permanent	**Long term**	**Medium term**	**Short term**	**Very short term**
	Low Intensity					
Extent	**National**	Medium	Medium	Medium	Medium	Medium
	Regional	Medium	Medium	Medium	Medium	Medium
	Local	Medium	Medium	Medium	Medium	Low
	Site specific	Medium	Medium	Medium	Low	Low

Furthermore, the following must be considered:

1) Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
2) All impacts should be evaluated for both the construction, operation and decommissioning phases of the project, where relevant.
3) The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.
4) Management actions: Where negative impacts are identified, specialists must specify practical mitigation objectives (i.e. ways of avoiding or reducing negative impacts). Where no mitigation is feasible, this should be stated and the reasons given. Where positive impacts are identified, management actions to enhance the benefit must also be recommended.

3.2 Identification of potential impacts

3.2.1 Possible impacts on biodiversity during construction and operations

Construction and operations can result in a range of negative impacts on terrestrial, marine and other aquatic ecosystems if not properly managed. Table 3 describes impacts that may potentially occur in the site (as per DEDEAT guidelines) as well indicating the relevant EMP section. The predicted significance of these are summarised in Table 3 to **Error! Reference source not found.**, where **SB** = Significance BEFORE mitigation and **SA** = Significance AFTER mitigation.

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

The main impacts because of the proposed activity include the following:

1. Permanent or temporary loss of vegetation cover because of site clearing in construction. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
2. Loss of species of special concern during 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 during construction may result in some areas being susceptible to soil erosion after completion of the activity. Dune sands have a high erosion susceptibility.
4. Susceptibility of post construction disturbed areas to invasion by exotic and alien species. 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 due to fragmentation of intact vegetation corridors and fragmentation of intact vegetation.

3.2.3 Potential cumulative and indirect impacts

- Limited cumulative impacts are expected because of the expansion of the site, due to the limited disturbance area. These include regional loss of vegetation and species of special concern.
- It is unlikely that the proposed development construction will have any significant indirect impacts relating to vegetation.

Table 3: Summary indicating significance of potential impacts

Impact	Description/Comment	Extent	Duration	Intensity	Probability	SB*	Status	SA*
CONSTRUCTION								
Permanent or temporary loss of vegetation cover because of site clearing in construction of proposed development	The clearing of vegetation and installation of the proposed development will result in the temporary removal of vegetation cover.	Site	Short	Medium	Definite	Mod	-ve	Low
Loss of species of special concern during site clearing activities	Some protected species will be removed during construction of the proposed development because of vegetation clearing.	Site	Short	Low	Definite	Mod	-ve	Low
Susceptibility of post construction disturbed areas to invasion by exotic and alien species	After the proposed development has been constructed, the disturbed area will be susceptible to recolonisation by invasive species and weeds.	Site	Short	Low	Probable	Mod	-ve	Low
Susceptibility of some areas to erosion because of construction related disturbances	Clearing of vegetation cover during proposed development construction will temporarily result in areas being susceptible to erosion.	Site	Short	Low	Probable	Low	-ve	Low
Disturbances to ecological processes because of proposed development construction	Ecological processes may be temporarily disturbed during the construction process and during temporary discharge.	Site	Long	Medium	Improbable	Low	-ve	Low
OVERALL						**Mod**		**Low**
OPERATION								
Permanent or temporary loss of vegetation cover because of site clearing in construction of proposed development	No additional loss of natural vegetation is likely after construction is completed.	Site	Long	Low	Probable	Mod	-ve	Low
Loss of species of special concern habitat as a result of site clearing activities	No additional loss of species of special concern is likely after construction is completed	Site	Long	Low	Probable	Low	-ve	Low
Invasion by exotic and alien species during operational phase	The implementation of an ongoing alien management plan will reduce the fire risk and reduce alien infestation.	Site	Long	Medium	Definite	Mod (-ve)	**+ve**	**Moderate**
Susceptibility of some areas to erosion because of construction related disturbances	Clearing of vegetation cover during proposed development construction will temporarily result in areas being susceptible to erosion.	Site	Long	Low	Probable	Low	-ve	High
Disturbances to ecological processes because of proposed development construction	The retention of natural vegetation within the Open Space area will assist to conserve the vegetation and maintain ecological processes.	Local	Long	Medium	Probable	Low (-ve)	**+ve**	**High**
OVERALL						**Low**		**Mod (+ve)**

*(*SB = Significance BEFORE Mitigation; SA = Significance AFTER Mitigation)*

Figure 19: Mapped Vegetation with site development plan

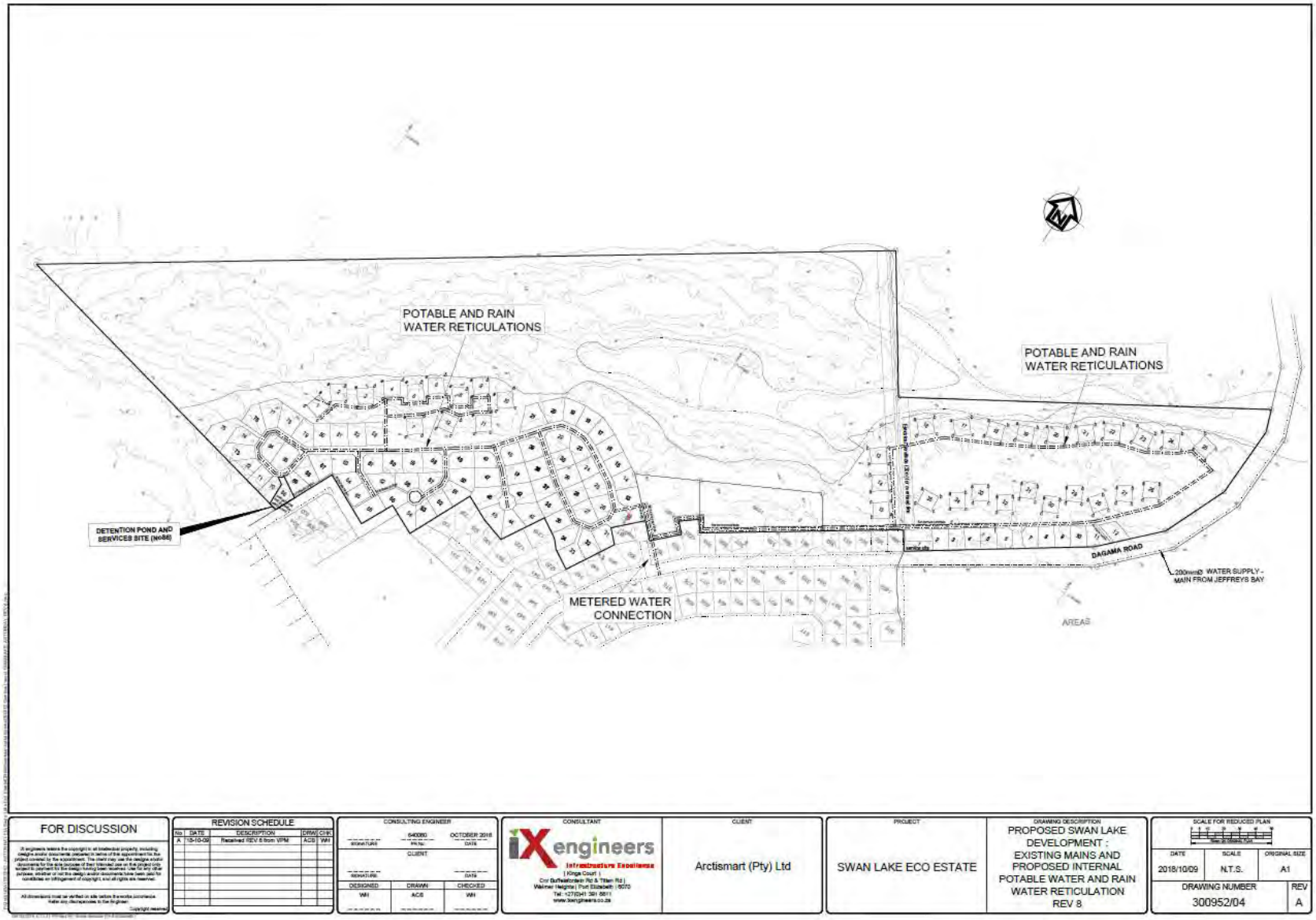


Figure 20: Potable Water Reticulation

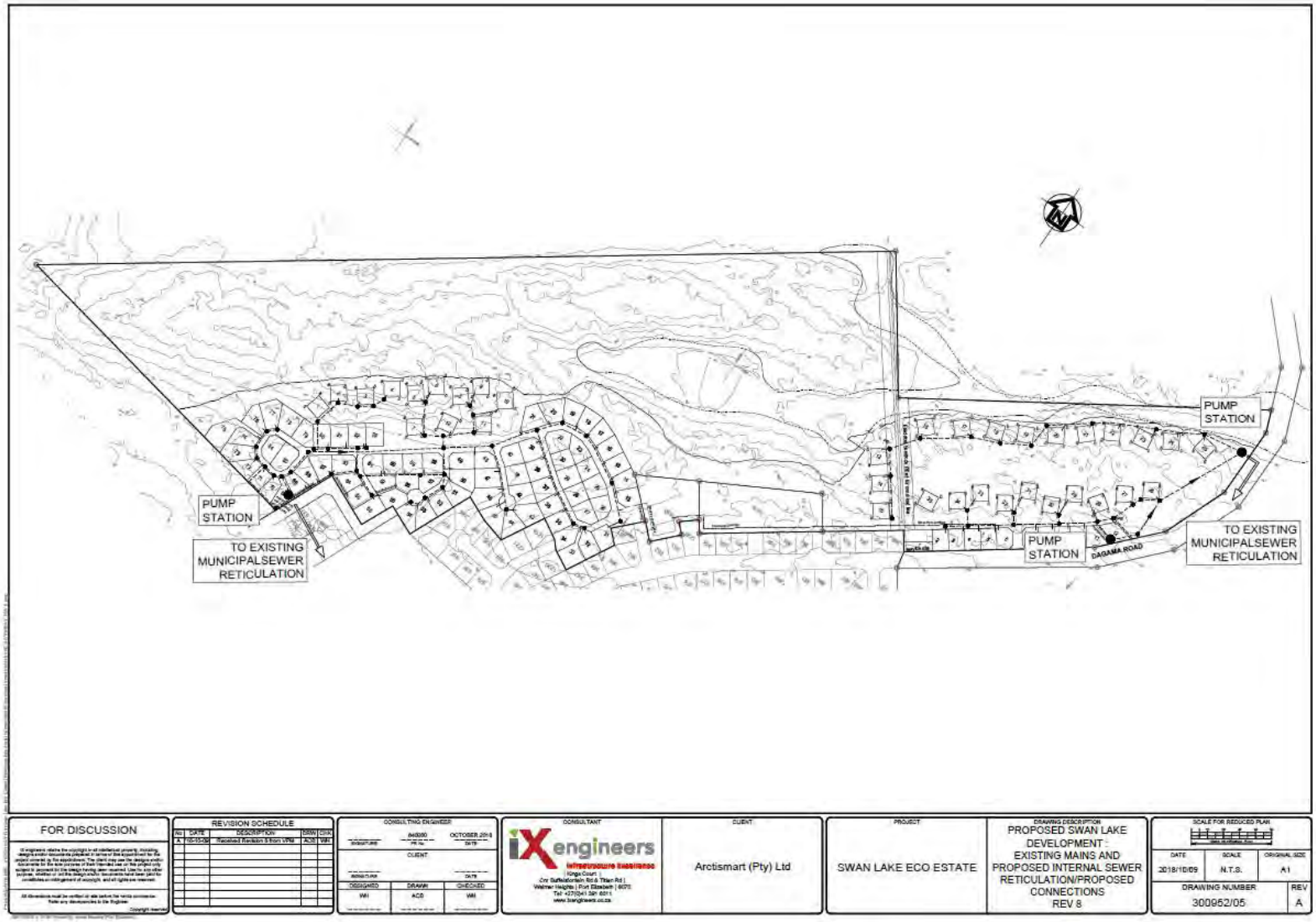


Figure 21: Sewer Reticulation

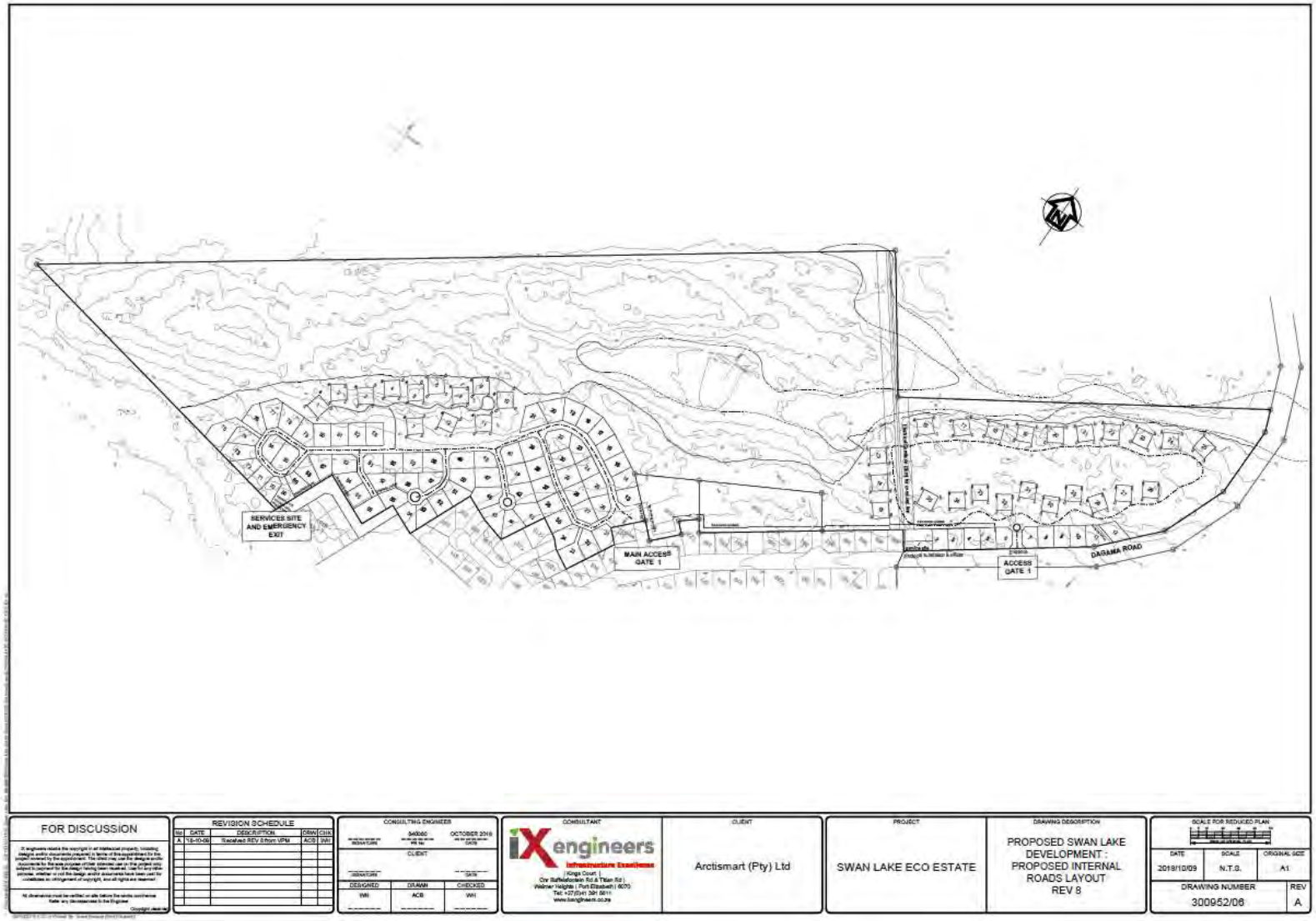


Figure 22: Internal Road Layout

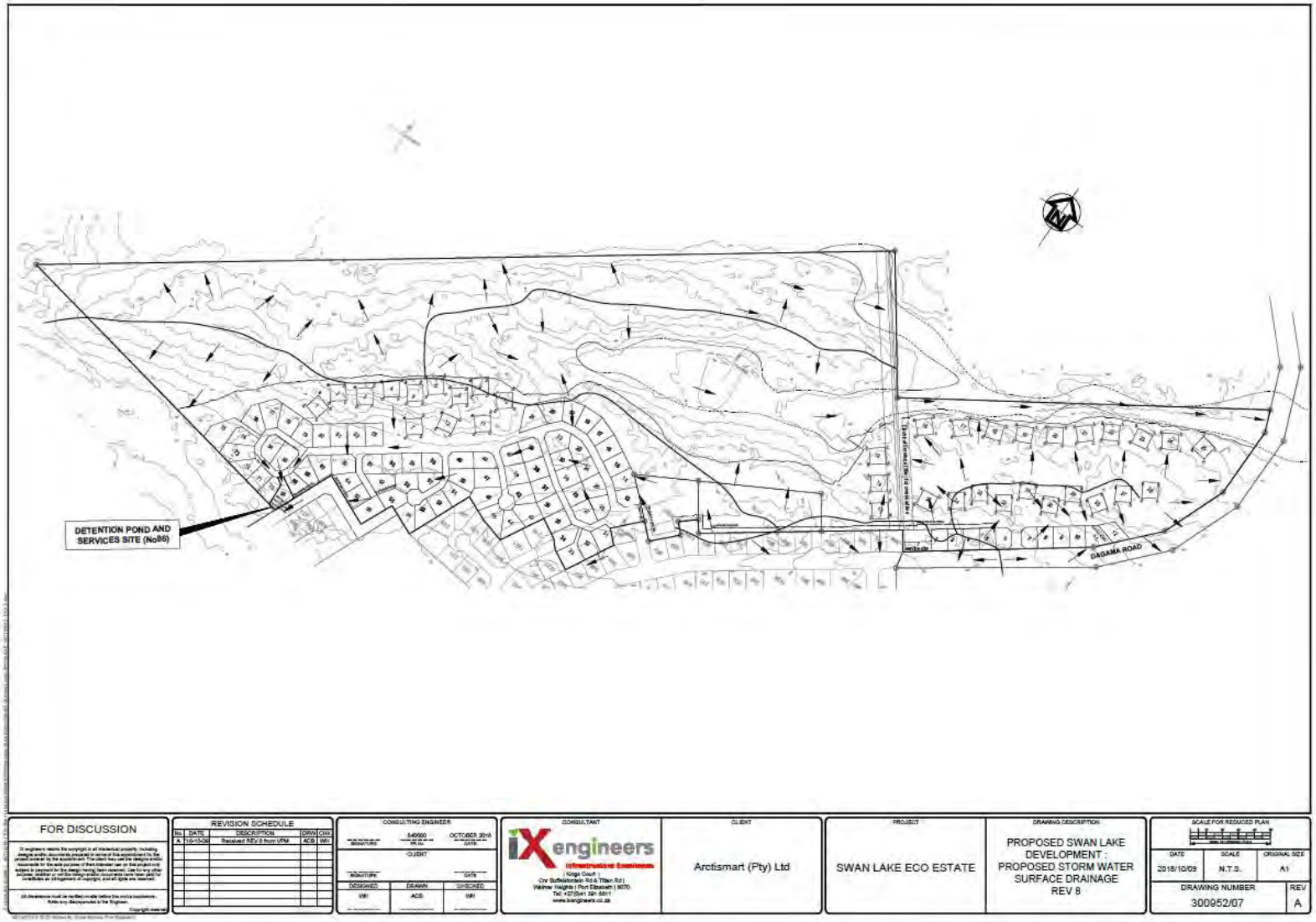


Figure 23: Stormwater

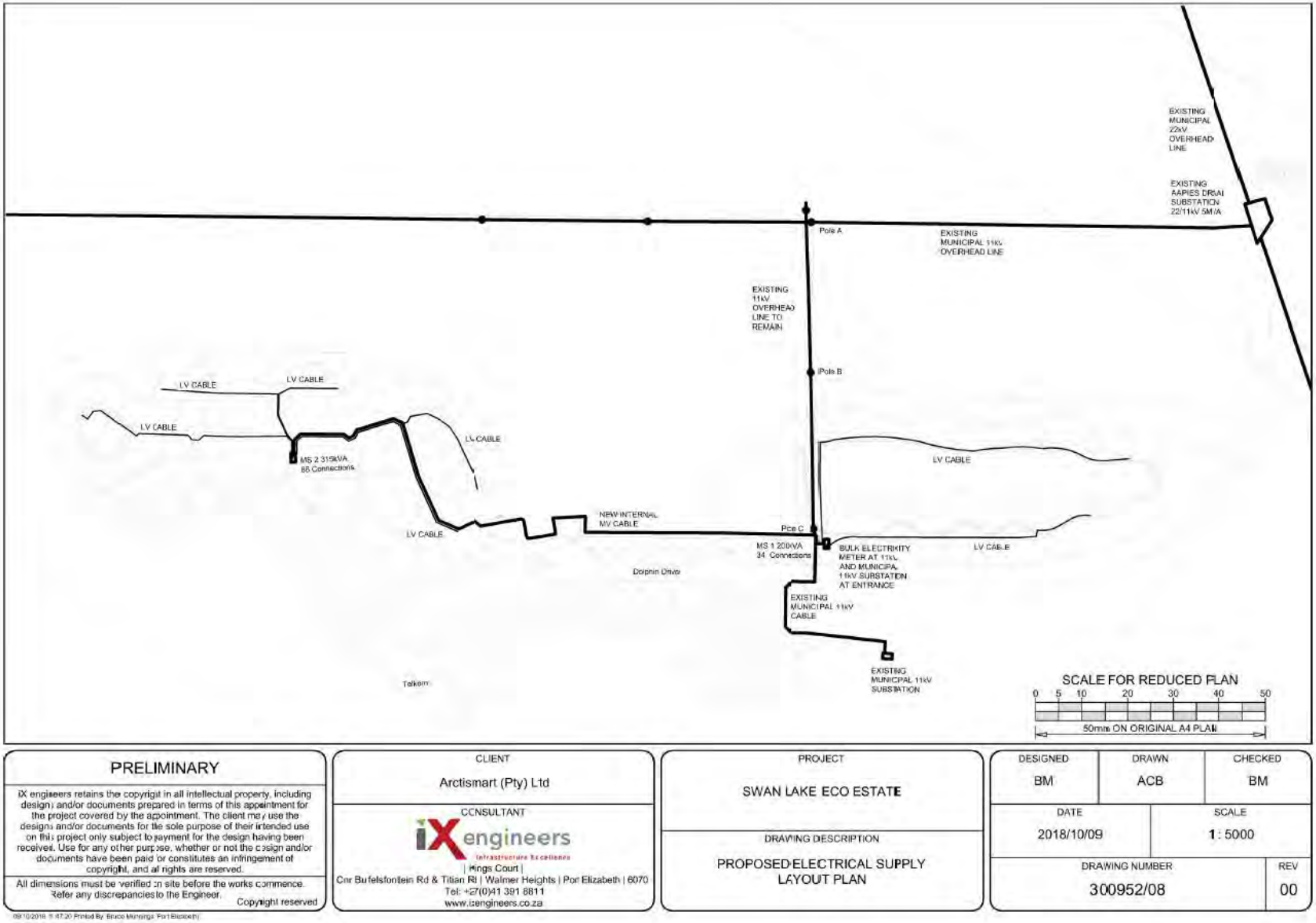


Figure 24: Electrical Supply Layout

4 Mitigation and Management

The mitigation measures in the table below are recommended to minimise impacts to vegetation and flora.

Table 4: Recommended Mitigation measures.

Impact	Mitigation Measures
Permanent or temporary loss of vegetation cover as a result of site clearing in construction of proposed development	• Blanket clearing of vegetation must be limited to the proposed development footprint and associated infrastructure, 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 disturbed areas on completion. • Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses and dunes.
Loss of species of special concern during site clearing activities	• Some protected species are likely to be affected. • Respective permits must be obtained timeously (1 – 2 months) before vegetation clearing commences and a flora search and rescue plan must be implemented. Rescued plants should be replanted into nearby disturbed areas of similar habitat. • Permits must be kept on site and in the possession of the flora search and rescue team at all times. • Once flora search and rescue is complete, a clearance certificate must be issued by the botanist and copies of a post audit report supplied to DEDEAT
Susceptibility of post construction disturbed areas to invasion by exotic and alien species	• Alien species 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.
Susceptibility of some areas to erosion as a result of construction related disturbances	• Suitable measures must be implemented in areas that are susceptible to erosion (i.e. on dunes with mobile sands and near watercourse), including but not limited to gabions and temporary 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 replaced on completion. • Disturbances to the watercourses must be kept to a minimum and measures implemented to mitigate any erosion risk. • A suitable grass crop must be applied on completion of construction. • Adequate scour protection and energy dissipation measures must be designed and installed at discharge points. Where vegetation cover is disturbed downstream of the discharge point, measures must be implemented to rehabilitate before discharge commences.
Disturbances to ecological processes as a result of proposed development construction	• Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences. • Any clearing within forest areas must be done in a manner than minimises the width of clearing required. The final siting will require approval from the necessary authority (DAFF). • Disturbances to the watercourses must be kept to a minimum.

5 Recommendations and Conclusions

The clearing of vegetation from the proposed development at Aston Bay site will result in the localised and permanent loss of vegetation cover within the affected footprint. The impacts will be confined to the construction footprint, having a limited area (approximately 7 Ha).

Despite recent updated Spatial Planning Frameworks, subsequent to the original assessment conducted in 2008 and amended in 2009 and the designation of the site as an Ecological Process Area (as per the GRBSP), the proposed development plan will only result in the loss of 7 Ha of vegetation, with the retention of around 80 % of the site as Open Space. This is thus not deemed to be a significant overall loss at a local and regional level, as the retention of 80 % of the site as Open Space will contribute significantly to conservation of both the vegetation types and allow for a functional ecological process area. The latest amended and approved site development plan does already take cognisance of these issues sufficiently and is avoiding the more sensitive areas.

In terms of the latest and applicable policies, regulations and legislation, including regional planning frameworks, this re-assessment does not find any additional constraints or issues, as the ecological process requirements have been adequately met by the latest revised site development plan. The retention of the large Open Space area (approximately 80 % of the site), with a combination of all the represented vegetation elements, will serve to meet the ecological process area requirements adequately.

Most species of special concern that are present generally have widespread distributions, and any losses are unlikely to result in any significant impacts to populations. A flora search and rescue will ensure that protected species are relocated before construction. These rescued flora can be utilised for rehabilitation of other areas that are temporarily disturbed (such as services, etc.)

The clearing of vegetation may result in a temporary increase in erosion and erosion risk (both as a result of water and wind) in some areas of the site during construction, due to mobile dune sands. Adequate measures must be implemented to stabilise areas having an erosion risk using appropriate means as necessary, including temporary cut-off berms and similar structures. Adequate vegetation cover must be achieved as soon as possible after disturbance. Adequate stormwater management measures must be implemented for the development due to the aeolian sands present. The services layouts (Potable Water, Sewer, Stormwater, Stormwater and Electrical) have been assessed as per Figure 20 to Figure 24 and no issues have been noted. Measures to be implemented to minimise clearing and also to rehabilitate servitudes on completion of construction.

Minimising the clearing footprint, rehabilitation of the disturbance footprint, in conjunction with the implementation of an alien vegetation management plan will result in an overall positive impact to the intact vegetation that will be retained. Overall impacts will be localised and of low to moderate significance. Measures must be implemented to eradicate any weeds and invasive species that may regenerate after any disturbance.

It is recommended that the following grasses would be suited, where required for any large scale regrassing - *Cynodon dactylon, Eragrostis curvula, Panicum deustum, Panicum maximum, Setaria sphacelata, Sporobolus africanus and Themeda triandra*. As a secondary recommendation, suitable flora from the flora search and rescue described above can be used for rehabilitation of disturbed areas. This might include any protected species as well as any other species that are conductive to relocation can be rescued and then replanted into areas where rehab is required, including Aloes, groundcover succulents, etc.

The impacts of the *status quo* will most likely have no negative impacts resulting in direct loss of terrestrial vegetation. However without the ongoing implementation of a management plan ongoing alien invasion and fires will most likely result in a slow decline in the ecological.

This re-assessment confirms that the original findings of the Ecological Assessment, relating to the Environmental Authorisation issued 2009, are still applicable. No significant changes in legislation or site conditions that would warrant a further extension not being granted. Furthermore, the subsequent changes and refinements to the layout indicate that overall ecological impacts are likely to be reduced.

6 Appendix A: Site Photographic Record

Photo 1:

Photo 2:

Photo 3:

Photo 4:

Photo 5:

Photo 6:

Photo 7:

Photo 8:

Photo 9:

Photo 10:

Photo 11:

Photo 12:

Photo 13:

Photo 8:

Photo 7:

Photo 6:

Photo 5:

Photo 4:

Photo 3:

Photo 2:

Photo 1:

Photo 42:

Photo 41:

Photo 40:

Photo 18:

Photo 17:

Photo 16:

Photo 15:

Photo 14:

Photo 13:

Photo 12:

Photo 11:

Photo 10:

Photo 9:

Photo 8:

Photo 7:

Photo 6:

Photo 5:

Photo 4:

Photo 3:

Photo 2:

Photo 1:

7 Annexure B: Specialist Declaration, CV and Professional Registration

Province of the
EASTERN CAPE
ECONOMIC DEVELOPMENT, ENVIRONMENTAL AFFAIRS & TOURISM

DETAILS OF EAP AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2017

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to Environmental Impact Assessment Regulations, 2017

PROJECT TITLE

VEGETATION RE-ASSESSMENT OF PROPOSED SWANLAKE ECO ESTATE

Specialist:	Engineering Advice and Services		
Contact person:	Mr Jamie Pote		
Postal address:	PO BOX 13867, Humewood, Port Elizabeth		
Postal code:	6013	Cell:	076 888 9890
Telephone:	041 581 2421	Fax:	086 683 9899
E-mail:	jamiep@easpe.co.za		
Professional affiliation(s) (if any)	SACNASP; IAIASA		
Project Consultant:	Cape EA Prac		
Contact person:	Ms Louise-Mari v Zyl		
Postal address:	PO Box 2070, George		
Postal code:	6530	Cell:	071 603 4132
Telephone:	044 874 0365	Fax:	044 874 0432
E-mail:	louise@cape-eaprac.co.za		

Version 1 of April 2017

4.2 The specialist appointed in terms of the Regulations_

I, MR JAMIE POTE declare that

General declaration:

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Signature of the specialist:

ENGINEERING ADVICE AND SERVICES

Name of company (if applicable):

05 JULY 2018

Date:

Signature of the Commissioner of Oaths:

Date: 2018/07/05

Designation:

Official stamp (below)

SUID-AFRIKAANSE POLISIEDIENS
STASIEKOMMISSARIS
HUMEWOOD
2018 -07- 05
STATION COMMISSIONER
SOUTH AFRICAN POLICE SERVICE

Version 1 of April 2017

Curriculum Vitae

Name of firm	Engineering Advice & Services (Pty) Ltd
Name of staff	JAMIE ROBERT CLAUDE POTE
ID Number	740515 5152 089
Profession	Registered Ecological Scientist and Environmental Scientist
Years with firm	3 Years
Nationality	South African
Membership to Professional Societies	The South African Council for Natural Scientific Professions (SACNASP): Pr. Sci. Nat.: 115233 International Association for Impact Assessment South Africa (IAIAsa) Member Number 5045

KEY QUALIFICATIONS

Mr Jamie Pote has 15 years extensive professional experience in a wide range of Ecological Specialist Assessments in South Africa (Eastern, Western & Northern Cape, Gauteng and Limpopo), Namibia, Mozambique, Democratic Republic of Congo, Republic of Congo and Ghana in the Infrastructure, Mining and Development Sectors. He also has experience in conducting Basic Assessments, EIA's, Section 24 G applications and Mining Permit EMP's as well as developing GIS and other tools for Environmental related work.

He has broad ecological experience in a wide range of habitats and ecosystems in Southern, West and Central Africa and has been involved in all stages of project development from inception, through planning and environmental application and authorization (BAR and EMP) to implementation (Flora relocation) and compliance monitoring (ECO auditing). Jamie has a well-deserved reputation for providing quality professional services. His strategy incorporates using proven methodologies with a highly responsive approach to sound environmental management, including developing adaptive methodologies and approaches with available technologies. He is highly capable of working within a team of qualified professionals or in an individual capacity.

EDUCATION

•BSc	Rhodes University (Botany and Environmental Science)	2001
•BSc (Hons)	Rhodes University (Botany)	2002

EMPLOYMENT RECORD

2003 – 2014	Self Employed Consultant	Specialist Environmental Consultant (Ecology)
2014 (Aug) – present	Engineering Advice & Services	Environmental Unit Manager, EAP and Ecologist

LANGUAGES

	Speak	**Read**	**Write**
English	Excellent	Excellent	Excellent
Afrikaans	Good	Excellent	Excellent

PROJECT EXPERIENCE

SPECIALISED ECOLOGICAL REPORTS

- Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif in Northern Cape 2006
- Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER in Eastern Cape2003
- Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation in Eastern Cape 2007
- Botanical Sensitivity Analysis for LSDP, Greenbushes-Hunters Retreat in NMB 2008
- Representative for landowner group for Seaview burial Park in NMB 2010
- Mapping of bridge for Kenton Water Board in Eastern Cape 2010
- Rehabilitation Plan for N2 Upgrade - Coega to Colchester in NMB 2010

- Rehabilitation Plan for Nieu Bethesda in Eastern Cape 2011
- Mapping and Ecological services for Congo Agriculture in Republic of Congo 2013
- Section 24G Assessment and Rehabilitation Plan for Bingo Farm in Eastern Cape 2014
- Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMBM 2015
- Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

- Flora Relocation for Disco Poultry Farm in NMB 2010
- Flora Relocation for Mainstream Windfarm in Eastern Cape 2010
- Flora Search and Rescue Plan for Red Cap Wind Farm in Eastern Cape 2012
- Flora and Fauna Search and Rescue for Mainstream Windfarm in Eastern Cape 2013
- Flora Search and Rescue for Steytlerville Bulk Water Supply in Eastern Cape (Phase 1, 2 & 3) 2013
- Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ in NMB 2013
- Flora and Fauna Search and Rescue for Jeffreys Bay School in Eastern Cape 2013
- Flora and Fauna Search and Rescue for Riversbend Citrus Farm in NMB 2014
- Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW in Eastern Cape (Phase 4) 2015
- Flora Search and Rescue for Steytlerville Bulk Water Supply in 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 Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017

INFRASTRUCTURE DEVELOPMENT PROJECTS

- Botanical Assessment for PE Airport Extention in NMB 2006
- Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course in BCM, Eastern Cape2007
- Botanical Assessment for Radar Mast construction for South African Weather Service - BCM and NMB 2008
- Ecological Assessment for Jansenville Cemetery in Eastern Cape 2009
- Ecological Assessment for Kouga Dam wall upgrade in Eastern Cape 2012
- Botanical Assessment for Kidd's Beach Desalination Plant in BCM, Eastern Cape 2006

POWERLINE INFRASTRUCTURE PROJECTS

- Botanical Assessment for Steynsburg - Teebus 132 kV powerline in Eastern Cape 2004
- Botanical Assessment for Eskom132kV Dedisa Grassridge Power line-Coega in NMB 2006
- Botanical Assessment for Eskom Power line – Tyalara-Wilo in Eastern Cape 2006
- Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline in NMB 2009
- Botanical Assessment for Eskom Powerline - Albany-Kowie in Eastern Cape 2009
- Botanical Assessment for Dedisa-Grassridge Powerline in Eastern Cape 2010
- Ecological Assessment for Grahamstown-Kowie Powerline in Eastern Cape 2010
- Ecological Assessment for Dieprivier Karreedouw 132kV Powerline in Eastern Cape 2012
- Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline in NMB 2012
- Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab in Eastern Cape 2013
- Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline 2015
- Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment in Kouga LM 2016
- Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline in Kouga LM 2016

BRIDGE INFRASTRUCTURE PROJECTS

- Detailed Botanical Assessment for Port Alfred water bridge in Eastern Cape 2004
- Botanical & Floristic Report for Hankey bridge in Eastern Cape 2006
- Environmental Risk Assessment for Elands River bridge in Eastern Cape 2007
- Detailed Botanical Assessment for Motherwell Bridge in NMB 2007
- Detailed Botanical Assessment, GIS maps for Erasmuskloof Bridge in Eastern Cape 2007
- Map Production for Russell Rd Stormwater in NMB 2008
- Basic Botanical Assessment for Albany Bridge in Eastern Cape 2008
- Species of Special Concern Mapping for Seaview Bridge in NMB 2009
- Species of Special Concern Mapping for Chelsea Bulk Water Bridge in NMB 2009
- Basic Botanical Assessment for Wanhoop farm bridge in Eastern Cape 2010
- Basic Botanical Assessment for Chatty Sewer in NMB 2010
- Detailed Ecological Assessment for Suikerbos Bridge in Gauteng 2012

- Ecological Assessment for Steytlerville Bulk Water Supply in Eastern Cape (Phase 4) 2013
- Ecological Assessment for Steytlerville Bulk Water Supply in Eastern Cape (Phase 5) 2013
- Vegetation Assessment for Wanhoop-Willowmore Bulk Water Supply in Eastern Cape 2016
- Vegetation Assessment for Butterworth Emergency Water Supply Scheme 2017

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

- Ecological Assessment for Road Layout for Whiskey Creek- Kenton in Eastern Cape 2006
- Botanical Assessment for Mn Conveyor Screening Report in NMB 2008
- Botanical Basic Assessment for Bholani Village Rd, Port St Johns in Eastern Cape 2009
- Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade in NMB 2009
- Botanical Assessment for Chelsea RD - Walker Drive Ext. in NMB 2010
- Botanical Assessment for Motherwell - Blue Water Bay Road in NMB 2010
- Ecological Assessment for Port St John Road in Eastern Cape 2010
- Ecological Assessment Review for Penhoek Road widening in Eastern Cape 2012
- Ecological Assessment for R61 road widening in Eastern Cape 2012
- Botanical Assessment for CDC IDZ Mn Terminal, conveyor and railway line in NMB 2013

MINING PROJECTS

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

WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE PROJECTS

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

- Ecological Assessment for Windcurrent Wind Farm in Eastern Cape 2012

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

- Botanical Assessment for Kenton Petrol Station in Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester - Petrol Station in NMB 2005
- Botanical Assessment for Bluewater Bay Erf 805 in NMB 2009
- Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ in NMB 2010
- Ecological Assessment for OTGC Tank Farm in NMB 2012
- Ecological Assessment for Green Star grading for SANRAL in NMB 2014
- Ecological Assessment for Bay West City ENGEN Service Station 2015

HOUSING DEVELOPMENT PROJECTS

- Botanical Assessment for Bridgemead – Malabar PE in NMB 2004
- Botanical Basic Assessment for Trailees Wetland Assessment in Eastern Cape 2005
- Botanical Assessment and Rehab Plan for Arlington Racecourse - PE in NMB 2005
- Botanical Assessment for Smart Stone in NMB 2005
- Botanical Assessment for Peninsular Farm (Port Alfred) in Eastern Cape 2005
- Botanical Assessment for Mount Pleasant - Bathurst in Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside) in NMB 2005
- Basic Botanical Assessment for Parsonsvlei 3/4 in Eastern Cape 2005
- Botanical Assessment for Gonubie Portion 809/9 in BCM, Eastern Cape 2006
- Botanical Assessment for Glengariff Farm 723 in BCM, Eastern Cape 2006
- Botanical Assessment for Gonubie Portion 809/10 in BCM, Eastern Cape 2006
- Botanical Assessment for Gonubie Portion 809/4 & 5 in BCM, Eastern Cape 2006
- Botanical Assessment for Plettenberg bay - Ladywood 438/1&3 in Western Cape 2006
- Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant in BCM 2006
- Botanical Assessment for Bosch Hoogte in NMB 2006
- Botanical Assessment for Plettenberg bay Farm 444/38 in Western Cape 2006
- Botanical Assessment for Plettenberg Bay - 444/27 in Western Cape 2006
- Botanical Assessment for Leisure Homes in BCM, Eastern Cape 2006
- Botanical Assessment for Plettenberg Bay - 438/24 in Western Cape 2007
- Botanical Assessment for Plettenberg Bay - Olive Hills 438/7 in Western Cape 2007
- Vegetation Assessment for Kwanokuthula RDP housing project in Western Cape 2008
- Site screening assessment for Greenbushes Site screening in NMB 2008
- Botanical Assessment for Fairfax development in Eastern Cape 2008
- Botanical Assessment for Plettenberg Bay Brakkloof 50&51 in Western Cape 2008
- Botanical Assessment, GIS mapping for Theescombe Erf 325 in NMB 2008
- Site Screening for Mount Road in NMB 2008
- Botanical Assessment for Greenbushes Farm 40 Swinburne 404 in NMB 2008
- Botanical Assessment for Greenbushes 130 in NMB 2008
- Botanical Assessment for Greenbushes Kuyga no. 10 in NMB 2008
- Botanical Assessment for Kouga RDP Housing in Eastern Cape 2009
- Botanical Assessment for Fairview Erf 1226 (Wonderwonings) in NMB 2009
- Species List Compilation for Zeeloeirivier Humansdorp in Eastern Cape 2009
- Botanical Assessment for Woodlands Golf Estate (Farm 858) in BCM, Eastern Cape 2009
- Botanical Assessment for Plettenberg Bay - 438/4 in Western Cape 2009
- Botanical Assessment for The Crags 288/03 in Western Cape 2010
- Revision of Ecological Assessment for Fairview Housing – NMB (EC) 2010
- Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development in WC 2010
- Botanical Assessment for Little Ladywood in Western Cape 2010
- Botanical Assessment and Open Space Management Plan for Motherwell NU31 in NMB 2010
- Botanical Assessment and Open Space Management Plan for Plett 443/07 in Western Cape 2010
- Botanical Assessment for Willow Tree Farm in NMB 2010
- Flora Search and Rescue Plan for Kwanobuhle Housing in Western Cape 2011
- Ecological Assessment for Ethembeni Housing in NMB 2012
- Ecological Assessment for Pelana Housing in Limpopo 2012
- Ecological Assessment for Lebowakgoma Housing in Limpopo 2013
- Ecological Assessment for Giyani Development in Limpopo 2013
- Ecological Assessment for Palmietfontein Development in Limpopo 2013
- Ecological Assessment for Seshego Development in Limpopo 2013

- Botanical Assessment for Sheerness Road in BCM, Eastern Cape 2013
- Ecological Assessment for Hankey Housing, Kouga District Municipality 2015
- Ecological Assessment for erf 15, Kabega, Port Elizabeth 2017

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

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

MIXED USE DEVELOPMENT PROJECTS

- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park in NMB 2007
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park in NMB 2007
- Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage in NMB 2007
- Botanical Assessment and GIS maps for Utopia Estate PE in NMB 2008
- Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082 in NMB 2009
- Botanical Assessment, EMP and Open Space Management Plan for Bay West City in NMB 2010

ECO-ESTATE DEVELOPMENT PROJECTS

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

AGRICULTURAL PROJECTS

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

ENVIRONMENTAL MANAGEMENT PLANS

- Floral Survey for Mbotyi Conservation Assessment in Eastern Cape 2005
- Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve in Eastern Cape 2005
- Biodiversity & Ecological Processes for Bathurst-Commonage in Eastern Cape 2006
- EMP for Kromensee EMP (Jeffries Bay) in Eastern Cape 2006
- Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA in Western Cape 2009
- Basic Botanical Assessment for Kromensee EMP (Jeffries Bay) in Eastern Cape 2010
- Wetland Management Plan for NMB Portnet in NMB 2010

ENVIRONMENTAL MANAGEMENT, ENVIRONMENTAL CONTROL OFFICER, AUDITING AND MONITORING PROJECTS

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

BASIC ASSESSMENT REPORT PROJECTS (DEDEAT)

- Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) 2014
- Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape 2015
- Basic Assessment Application for Hankey Housing, Kouga District Municipality 2015

MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

- 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)
- 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 Nkonkobe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbhashe 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 Ingquza Hill LM Borrow Pits – (SANRAL) 2017

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

ENVIRONMENTAL SCREENING PROJECTS

- Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood) 2015
- Preliminary Environmental Risk Assessment: NSRI Slipway, NMB 2015
- Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe, NMB 2015
- Environmental Screening Report for Proposed Development on Erf 559, Walmer, NMB 2015
- Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate, NMB 2015

GIS AND IT DEVELOPMENT

- Development of GIS databases and mapping tools for Manifold GIS software 2008
- Landsat Image classification and analysis (Congo Agriculture) 2010
- Development of *iAuditor* Environmental Audit templates (DRPW audits) 2014
- Environmental Risk model for Borrow Pit screening in Eastern Cape 2016
- Development of audit templates for DRPW and SANRAL projects 2017

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.

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).

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Jamie Robert Claude Pote

Registration number: 115233

is registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science

Effective **20 July 2016** Expires **31 March 2019**

President

Executive Director