



Terrestrial Biodiversity Assessment

Ngqamakhwe Phase 3 Bulk Reticulation

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Nggamakhwe Phase 3 Bulk Reticulation

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Draft Report

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1 Introduction & Background

1.1 Background

Indwe Environmental Consulting have been appointed by Sontinga Consulting through Amathole District Municipality (ADM), the Water Services Provider (WSP), to undertake the environmental application process for the Ngqamakhwe Phase 3 Water Supply Scheme project. The project falls within the Nqamakwe region of the Mnquma Local Municipality within the Amathole District Municipality in the Eastern Cape Province (Figure 1). The site is situated in the area surrounding Ngqamakhwe, which is situated between Butterworth and Tsomo. As part of this environmental application process, a Terrestrial Biodiversity Assessment is required.

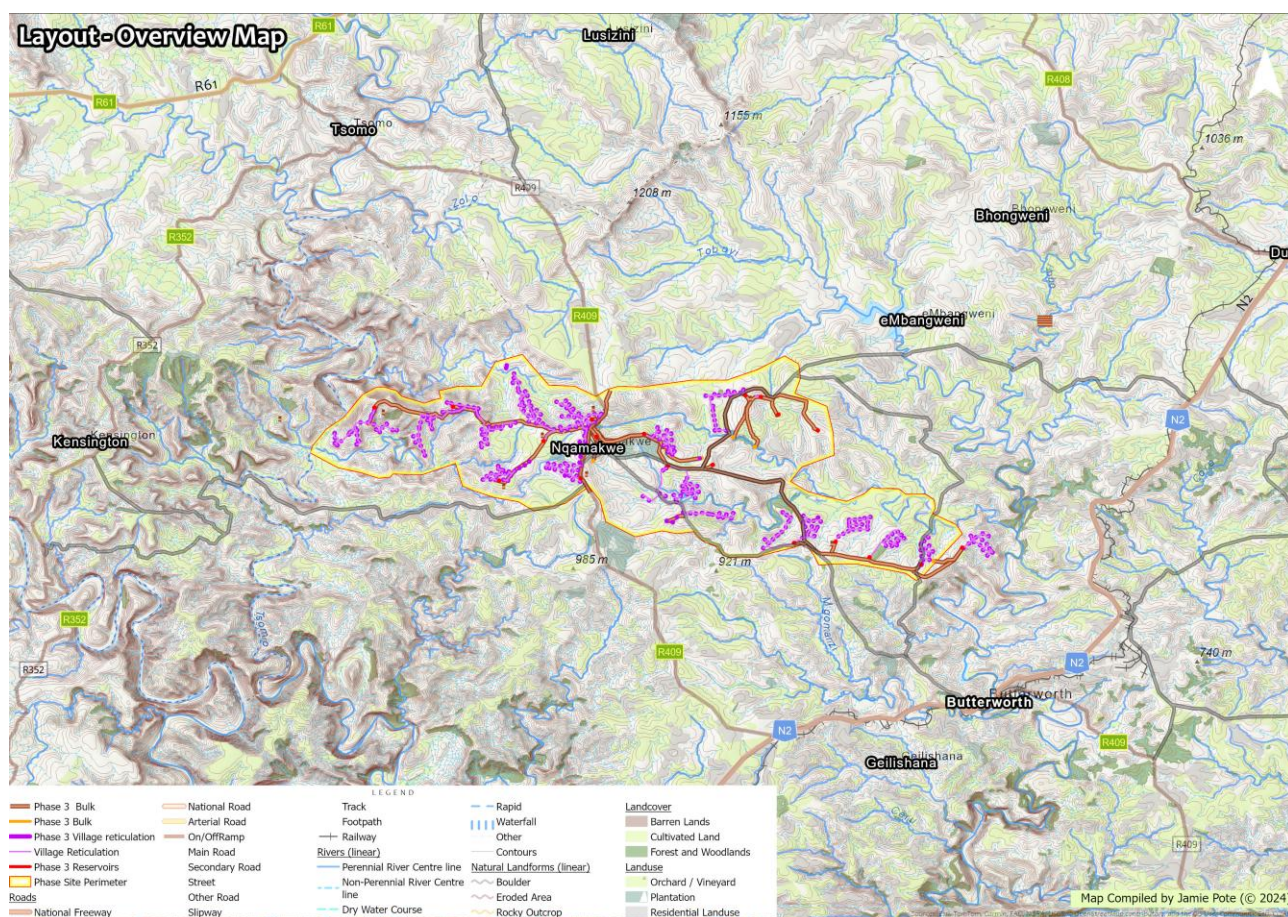


Figure 1: Site locality.

1.2 Activity Description

The proposed Ngqamakhwe Phase 3 Bulk Water Reticulation is located in the area to the west and east of Ngqamakhwe (Figure 2). The proposed Bulk reticulation is comprised of a network of Bulk water pipelines and reservoirs to augment the water reticulation of several villages in the surrounding area. Reservoirs and Clear Water Storage

There will be four distribution reservoirs namely Reservoir 2, 5, 9, 14 ranging between 250 and 980kL in capacity. Ten service reservoirs are proposed for Phase 3 ranging between 60 and 175kL in capacity.

A total of 48 hours clear water storage for distribution reservoir and 24 hours for services reservoirs is proposed for Phase 3.

Bulk Mains

The clear water gravity main will be sized to cater for a medium to long term demand of 60l/ capita/ day and will include a transmission loss factor of 10%. To regulate pressure difference, break pressure tanks will be installed at strategic points to dissipate residual pressures.

Reticulation and Standpipes

The reticulation shall be designed to deliver 0.17l/s per standpipe. There may be exceptions where this would not be achieved due to local topography. No pipe smaller than 50mm in diameter shall be used for the reticulation. The standpipes will be spaced in order for each household to be within 200m walking distance from a standpipe. The total number of standpipes to be installed will be 325.

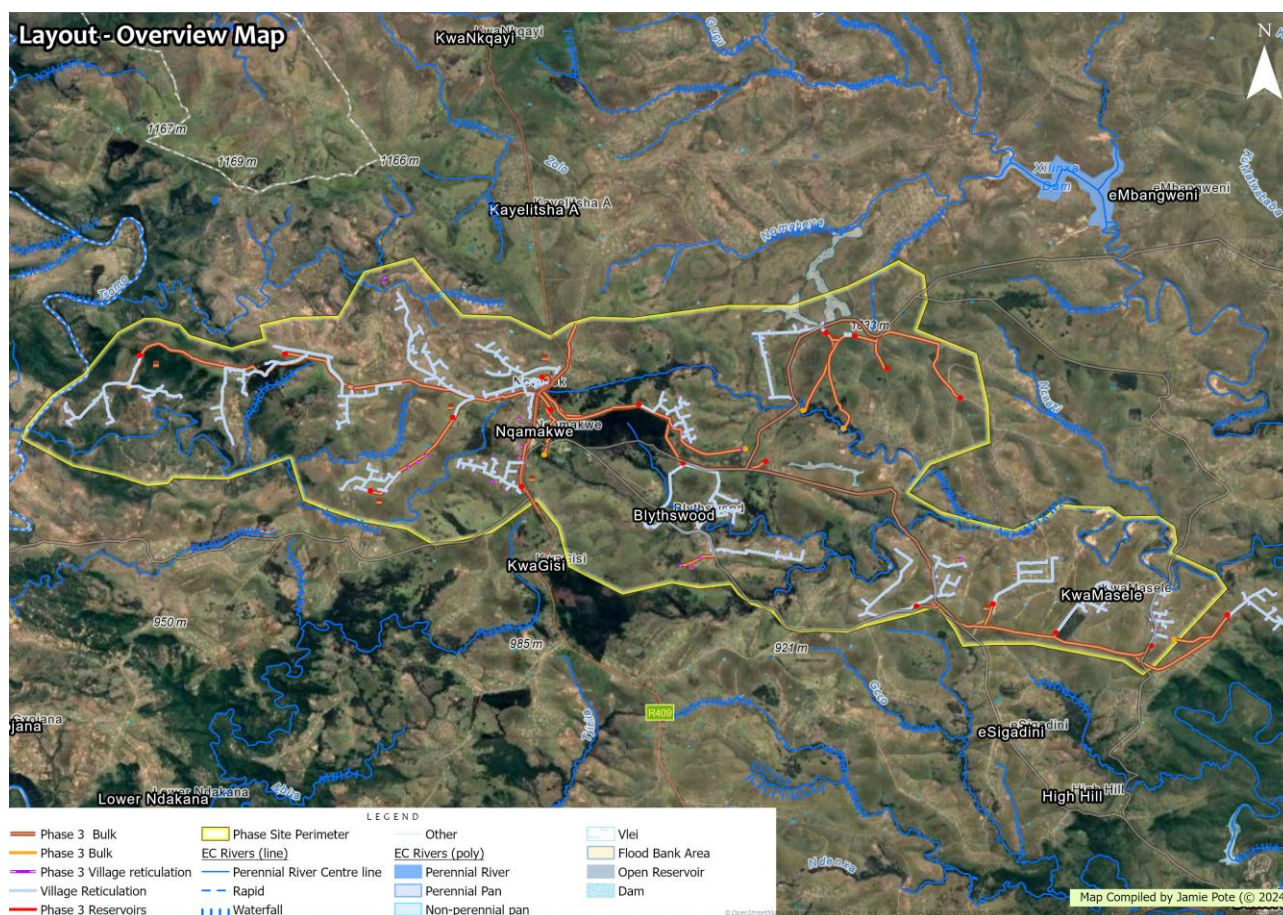


Figure 2: Site locality Aerial for proposed bulk water infrastructure.

1.3 Purpose of Report

1.3.1 Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes

This report is compiled according to the requirements for a Compliance Statement & Terrestrial Biodiversity Assessment for a Low Sensitivity site.

This report has been compiled to fulfil the requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020**. This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity.

In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant species theme**, this report includes these flora species requirements.

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

1.4 Methodology and Approach

The proposed methodology and approach are outlined below:

- Conduct a desktop study and identify potential risks relating to vegetation and flora of the site and surrounding area, for a Terrestrial Biodiversity and Plant and Animal species Compliance Statement. This will include the relevant Regional Planning and legislated frameworks, which will also be represented in a series of associated maps.
- Conduct a site verification to assess the following:
 - Field survey of vegetation, flora and habitats present and confirmation of presence of sensitive animal and plant species.
 - Reporting will be comprised of a Compliance Statement (for public review and comment) and a Final Report for submission. The draft and final detailed reports will address the following:
- To define the Present Ecological State (PES) of the biodiversity resources associated with the S24G Activities:
- To determine and describe the current as well as the pre-development habitats, communities and the ecological state associated with the unlawful activities.
- To conduct a faunal and floral Species of Conservation Concern (SCC) assessment, including potential for such species to occur within the unlawful activities and surroundings.
- To consider all sensitive landscapes including rocky ridges, wetlands and any other ecologically important features, if present.
- To determine the environmental impacts that the activity may have on the biodiversity of the area, and to develop mitigation and management measures to manage the current and future impacts as a result of the development activities.
- Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
- A species list highlighting the various species of special concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds).
- Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.
- A biodiversity EMPr for inclusion in the reports and EMP with specific management actions for construction and Operation.
- A map indicating buffers (if required) to accommodate Regional Planning and other requirements.

This terrestrial biodiversity assessment has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

1.4.1 Site visit

A site inspection was conducted for an earlier iteration of this proposed infrastructure **on 23 April 2018** by the same terrestrial biodiversity specialist (Mr Jamie Pote). Since this iteration of the infrastructure is largely the same as the original version, and the findings of the previous assessment, it is deemed by the specialist to not warrant any additional site visit, as no further information will be gathered that would warrant such an additional site visit and the state is not likely to have changed significantly during the intervening time period, as well as the disturbed and transformed nature of the site.

1.4.2 Assumptions, Uncertainties and Gaps in Knowledge

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

- No assessment has been made of aquatic aspects relating to any wetlands, pans, and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report. Refer to separate aquatic report.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.

2 Policy

2.1 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following is applicable¹:

- In terms of section 52 of NEMBA (Activity (a)(i)), the vegetation unit represented is primarily **Mthatha Moist Grassland**, with short sections also within **Tsomo Grassland** and **Eastern Valley Bushveld** on the western side and **Bisho Thornveld** on the eastern side.
- As per National Biodiversity Assessment/Red Listed Ecosystems (2022), **Mthatha Moist Grassland** has an **Endangered** status, with **Tsomo Grassland**, **Eastern Valley Bushveld** and **Bisho Thornveld** all currently having a **Least Concern** status (RLE, 2022).
- In terms of the CBA classification (ECBCP, 2019), most of the pipeline & associated infrastructure falls within No-Natural Area remaining or Other Natural Area, with short sections on the west and central sides passing through designated CB! & SBA 2 areas. The eastern end falls within an area of ESA 2 & ESA 2.
- The proposed Bulk Water Reticulation pipeline is a linear activity and will likely rehabilitate to pre-construction conditions within 2 years.
- Short sections of the pipeline will traverse non-perennial watercourses.
- Portions of the Bulk Water Reticulation pipeline and associated infrastructure falls within a moderately dense collection of rural villages.

¹ The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list.

Listing Notice 1:

Activity 12: The development of—

(xii) infrastructure or structures with a physical footprint of 100 square metres or more.

where such development occurs—

(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse: —

excluding—

(dd) where such development occurs within an urban area; or

(ee) where such development occurs within existing roads or road reserves.

Portions of the proposed activity will occur within 32m of a watercourse, and a Basic Assessment process will likely be triggered as watercourse crossings will be required.

Activity 19: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from—

(i) a watercourse.

(ii) the seashore.

(iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high water mark of the sea or an estuary, whichever distance is the greater—

The proposed activity may exceed the excavation of more than 5 cubic meters and will traverse several minor watercourses.

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

(i) the undertaking of a linear activity; or

(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

The proposed pipeline is a linear activity, thus would not trigger this activity. Clearing pertaining to the reservoirs, which will be permanent structures, may exceed 1 Ha in total, across all reservoirs combined, hence the activity will be triggered.

Listing Notice 2:

None are applicable.

Listing Notice 3:

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.

The pipeline and associated reservoirs fall within an Endangered Ecosystem as well as designated CBA areas, and clearing of natural vegetation will exceed 300m², hence the activity will be triggered.

Activity 14: The development of—

(ii) infrastructure or structures with a physical footprint of 10 m² or more, where such development occurs—

(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse

In the Eastern Cape –

ii. Outside urban areas, in:

(ff) Critical Biodiversity Areas (CBA) or Ecosystem Service Areas (ESA) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

This activity is likely to be triggered as the proposed activity will likely result in a structure greater than 10m² within 32m of a watercourse, within CBA and ESA designated areas.

In terms of the EIA Listing Notices, listing notice 1 & 3, the activity is triggered as indicated above, thus requiring a Basic Assessment process, and will require the clearing of indigenous vegetation.

Other potentially relevant legislation, which will be evaluated as required, includes the following:

- Liability for any environmental damage, pollution, or ecological degradation: Arising from all - related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing, or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.
- Public participation: Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and considered when the administrative discretion to grant or refuse the licence is made.
- Constitution of Republic of South Africa (1996): Section 24(a) of the Constitution states that everyone has the right ‘to an environment that is not harmful to their health or well-being’. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
- Eastern Cape Nature and Environmental Conservation Ordinance 19 of 1974: Lists Protected species, requiring permits for removal (Department of Economic Development, Environmental Affairs and Tourism).
- Water Use Authorisations: The National Water Act (No. 36 of 1998): Requires that provision is made both in terms of water quantity and quality for ‘the reserve’, namely, to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed, and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- Conservation of Agricultural Resources Act 43 of 1993: Lists Alien invasive species requiring removal.

2.2 Systematic Planning Frameworks

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

- National Environmental Screening Tool
- Critically Endangered, Endangered and Vulnerable Ecosystems
- Critical Biodiversity and Ecological Support Areas
- River, Estuarine and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers
- Protected Areas (and buffers) and National Protected Area Expansion Strategy areas (NPAES).
- Critical Habitat for listed endemic or protected species.

Table 1: Summary of Regional Planning Biodiversity features.

FEATURE ²	DESCRIPTION	IMPLICATIONS/COMMENT
National Environmental Screening Tool (Terrestrial Biodiversity)	Low & Very High Terrestrial Biodiversity Medium Low Plant & Animal Species sensitivities	Several elevated terrestrial biodiversity risks are potentially present that will require assessment in this report.
National Vegetation Map (NVM, 2024)	Mthatha Moist Grassland Tsomo Grassland Eastern Valley Bushveld Bisho Thornveld	Endangered Least Concern Least Concern Least Concern
Critically Endangered and Endangered Ecosystems (RLE, 2022)	Mthatha Moist Grassland	Endangered, implications of status will be assessed
Vulnerable Ecosystems (NBA, 2022)	None	N/A
Eastern Cape Biodiversity Conservation Plan (2019)	CBA 1, CBA 2 & ESA 2	N/A
Protected Areas (SAPAD)	None	N/A
NPAES	None	N/A
Strategic Water Source Areas (SWSA)	None	N/A
Regional Hotspots & Regions of Endemism	None	N/A
Important Bird Areas (IBA's)	None	N/A
Key Biodiversity Areas (KBA's)	None	N/A
Marine/Coastal areas	None	N/A
RAMSAR sites	None	N/A
Within 32 m of Watercourse	Sections of pipeline will be within 32 m of a watercourse	Refer to aquatic assessment.
Surrounding Land Uses	Surrounding land primarily rural villages.	Site and surrounding area are relatively degraded and/or transformed and/or with scattered secondary vegetation elements.
Critical Habitat for listed endemic/ protected species	No specific populations of threatened species were identified within the footprint, and the affected footprint is largely disturbed or comprised of secondary vegetation.	

2.2.1 National Environmental Screening Tool

The DFFE Screening Tool indicates the following, summarised in Table 1:

- Terrestrial Biodiversity is Low/Very High (Figure 3).
- Plant species sensitivity is Low/Moderate (Figure 4).
- Animal Species sensitivity is Low/Moderate/High (Figure 5).

² Refer to Figure 6 to Figure 9.

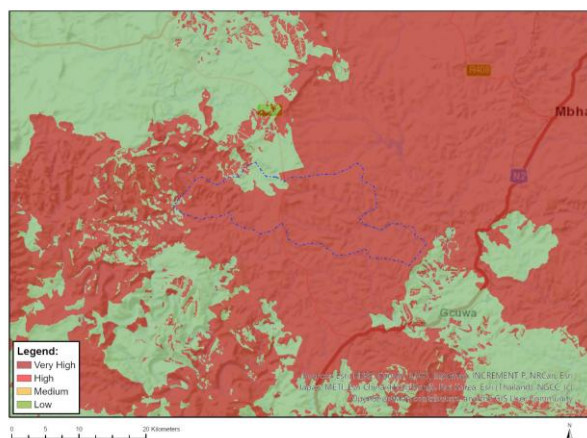


Figure 3: Terrestrial Biodiversity Sensitivity

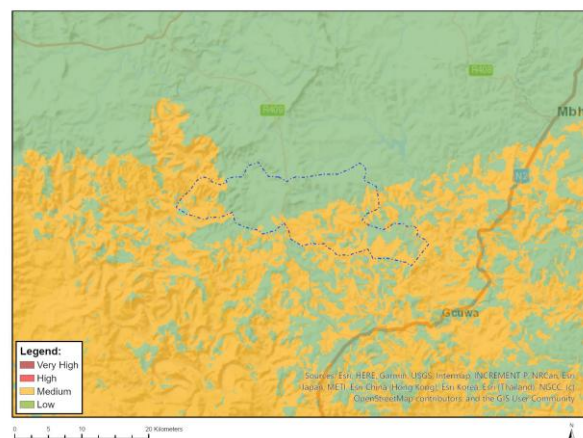


Figure 4: Plant Species Sensitivity

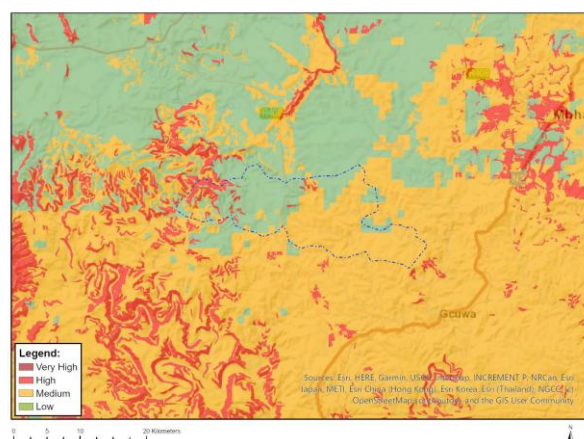


Figure 5: Animal Species Sensitivity

Table 2: Summary of Screening tool designations.

Terrestrial Sensitivity	Feature(s) in proximity
Very High	CBA1, CBA2, ESA2, FEPA Sub-catchment, Mthatha Moist Grassland (EN)
High	None
Medium	None
Low	Present
Plant Sensitivity	Feature(s) in proximity
Very High	None
High	None
Medium	<i>Greyia flanaganii</i> , <i>Adromischus liebenbergii</i> subsp. <i>orientalis</i> , <i>Asclepias cooperi</i> , <i>Prunus africana</i> , Sensitive species 1252, 1144, 80, 535, 554, 451, 1248, 944, 191 & 19
Low	Present
Animal Sensitivity	Feature(s) in proximity
Very High	None
High	<i>Gyps coprotheres</i> & <i>Falco biarmicus</i> (birds)
Medium	<i>Hydroprogne caspia</i> & <i>Neotis denhami</i> (birds), <i>Chrysoritis lyncurium</i> (insect), <i>Chrysospalax trevelyani</i> & Sensitive Species 8 (mammals)
Low	Present

NOTE: as per point 1.5 of the Terrestrial Biodiversity Specialist Assessment and Minimum Report Content Requirements:

'If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, **excluding linear activities** for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial

measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.'

Based on the above reporting protocol condition, the entire proposed bulk water pipelines will fall into the above category, which implies that for a temporary linear activity, such as a pipeline, the screening tool designated high sensitivity should be reduced to a low sensitivity and only a compliance statement would be required. Remnant disturbance after completion of pipeline will be nominal, whereas reservoirs will be permanent but limited in extent. It is anticipated that the construction pipeline footprint will return to its current state within two years of completion of construction.

2.2.2 Vegetation of Southern Africa

The National Vegetation Map (NVM, 2024, Figure 6) indicates that the pipeline and associated infrastructure fall predominantly within **Mthatha Moist Grassland**, with short sections within **Tsomo Grassland** and **Eastern Valley Bushveld** on the western side and **Bisho Thornveld** on the eastern side. The vegetation associated with the proposed pipeline and the surrounding rural villages shows high levels of fragmentation and degradation, being within an area having a moderately high density of rural villages with associated infrastructure including roads and cultivated areas. Degradation emanating from livestock grazing and general utilisation of biodiversity resources (i.e. fuelwood and building materials).

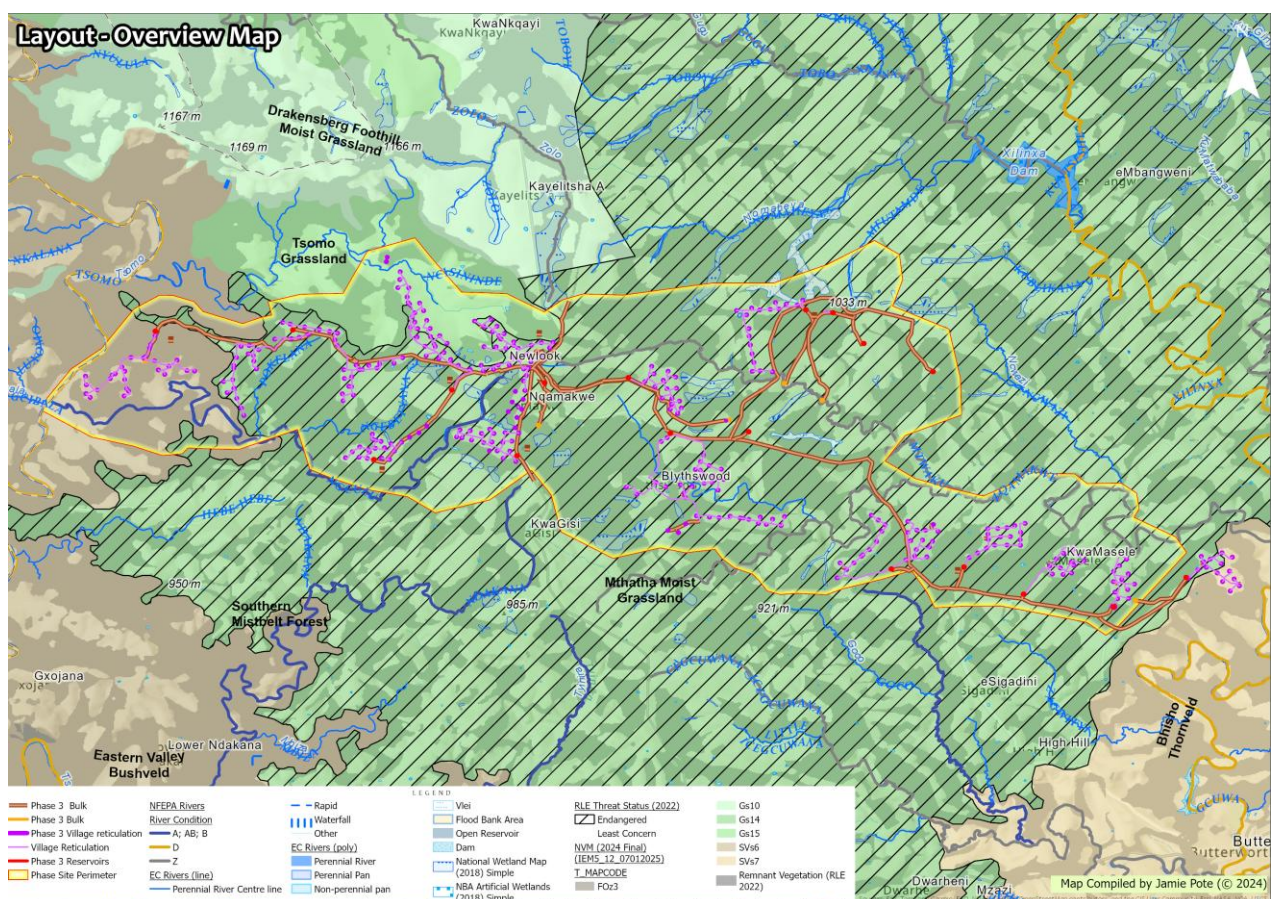


Figure 6: National Vegetation Type and RLE Conservation Status (NVM, 2025 & RLE, 2022).

Mthatha Moist Grassland (Gs14)

Distribution Eastern Cape Province: Plains between Mthatha and Butterworth parallel to the coastline and excluding the river valleys that intrude landwards into this unit. Altitude 600–1 080 m.

Vegetation & Landscape Features Undulating plains and hills supporting species-poor, sour, wiry grassland with *Eragrostis plana* and *Sporobolus africanus*; although in good condition, it is more likely to be dominated by *Themeda triandra*.

Geology & Soils Mudstones of the Tarkastad and Adelaide Subgroups (Beaufort Group, Karoo Supergroup) underlie this area, with highly leached soils typical of the Fa land type.

Climate summer rainfall, with MAP 600–970 mm. The coefficient of variation of MAP 25–30% across the unit, but drops to approximately 15% on the southeast-facing inland mountain slopes. Incidence of frost 2–14 days, but is higher further from the coast.

Important Taxa Graminoids: *Cyperus obtusiflorus* var. *obtusiflorus* (d), *Elionurus muticus* (d), *Eragrostis curvula* (d), *Heteropogon contortus* (d), *Microchloa caffra* (d), *Paspalum dilatatum* (d), *Sporobolus africanus* (d), *Themeda triandra* (d), *Abildgaardia ovata*, *Alloteropsis semialata* subsp. *eckloniana*, *Aristida congesta*, *Brachiaria serrata*, *Chloris virgata*, *Cymbopogon marginatus*, *Cynodon dactylon*, *Cyperus haematocephalus*, *C. obtusiflorus* var. *flavissimus*, *Digitaria eriantha*, *D. ternata*, *Eragrostis capensis*, *E. plana*, *Eustachys paspaloides*, *Harpochloa falx*, *Hemarthria altissima*, *Hyparrhenia hirta*, *Panicum ecklonii*, *Paspalum scrobiculatum*, *Setaria nigrirostris*, *Tristachya leucothrix*. Herbs: *Senecio coronatus* (d), *Centella asiatica*, *Chamaecrista mimosoides*, *Cyanotis speciosa*, *Eriosema salignum*, *Falkia repens*, *Helichrysum rugulosum*, *Indigofera hedyantha*, *I. hilaris* var. *hilaris*, *Ipomoea crassipes*, *Lobelia flaccida*, *Pentanisia prunelloides* subsp. *latifolia*, *Senecio retrorsus*, *Sonchus dregeanus*, *Vernonia capensis*, *V. natalensis*, *Wahlenbergia stellarioides*. Herbaceous Climber: *Rhynchosia totta*. Geophytic Herbs: *Boophone disticha*, *Habenaria dives*. Small Tree: *Acacia natalitia*. Low Shrubs: *Senecio pterophorus* (d), *Coddia rudis*, *Erica caffrorum* var. *caffrorum*, *Felicia filifolia* subsp. *filifolia*, *Hermannia parviflora*.

Biogeographically Important Taxon (Sub-Escarpment Grassland endemic) Small Tree: *Encephalartos friderici-guilielmi*.

Conservation Endangered. Target 23%. Only a small fraction is statutorily conserved in the Luchaba and Nduli Wildlife Reserves. More than 40% transformed for cultivation and plantations or by dense rural human settlements. Previously cultivated or fallow lands possibly constitute an estimated additional 25% (Steenkamp et al. 2005). *Acacia mearnsii*, *Solanum mauritianum* and *Richardia humistrata* are the most important aliens. Erosion a serious problem, with high to very high erosion levels in 34% of the unit, moderate erosion in 35%, and the remainder having low and very low erosion.

Remarks There is a high level of utilisation of this unit leading to degradation and transformation and the vegetation shows various stages of overutilisation (Steenkamp et al. 2005). Shifting cultivation and the effects of development have caused continuous disturbance of the soil surface, which has led to secondary succession changes in the grassland (documented in Smits et al. 1999). Poor grazing management has led to the dominance of unpalatable grasses and invasion by weedy, mostly alien, forb species (Hoare 2002).

Tsomo Grassland (Gs15)

Distribution: Eastern Cape Province: In the region to the east of the Queenstown Basin. The villages of Tsomo, Cala and Engcobo define the eastern extent of this unit and Cathcart, Queenstown and Sterkstroom the western extent. This vegetation unit occupies the plains in between the mountain peaks and ridges in this region. Altitude 760–1 580 m.

Vegetation & Landscape Features: Flat or gently undulating lowland plains intersected by mountains. The vegetation is a grassland or open thornveld, often grazed short or replaced by dwarf shrubland dominated by species of *Euryops*. Dominant and common species include omnipresent representatives of the genera *Cymbopogon*, *Elionurus*, *Eragrostis*, *Aristida* and *Themeda*. Asteraceae and Fabaceae are prominent among the forbs.

Geology & Soils: Mudstones of the Tarkastad Subgroup (Karoo Supergroup) overlain mostly by soils of moderate depth typical of Fb and Db land types.

Climate: Late summer rainfall, although some rain may fall at other times of the year. MAP 430–790 mm, increasing from west to east. The coefficient of variation in MAP 25–31% across the unit. Incidence of frost is variable (7–65 days) but is higher in the northwest.

Important Taxa: Graminoids: *Aristida congesta* (d), *Cynodon dactylon* (d), *Digitaria argyrograptia* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *Eustachys paspaloides* (d), *Heteropogon contortus* (d), *Hyparrhenia hirta* (d), *Microchloa caffra* (d), *Themeda triandra* (d), *Tragus berteronianus* (d), *Abildgaardia ovata*, *Andropogon appendiculatus*, *Aristida diffusa*, *Brachiaria serrata*, *Cymbopogon pospischilii*, *Eragrostis capensis*, *E. lehmanniana*, *E. racemosa*, *Harpochloa falx*, *Microchloa kunthii*, *Schoenoxiphium sparteum*, *Sporobolus africanus*, *Tristachya leucothrix*, *Urochloa panicoides*. Herbs: *Argyrolobium pauciflorum*, *Aster bakerianus*, *Berkheya onopordifolia* var. *onopordifolia*, *Commelina africana*, *Cyanotis speciosa*, *Gazania linearis* var. *linearis*, *Haplocarpha scaposa*, *Helichrysum rugulosum*, *Ipomoea crassipes*, *Pollichia campestris*, *Senecio retrorsus*, *Vernonia capensis*. Herbaceous Climber: *Rhynchosia totta*. Geophytic Herbs: *Oxalis depressa* (d), *Pelargonium sidoides*. Small Tree: *Acacia natalitia*. Low Shrubs: *Chaetacanthus setiger*, *Felicia muricata*, *Helichrysum odoratissimum*, *Senecio burchellii*, *Sutera pinnatifida*, *Tephrosia capensis* var. *acutifolia*. Tall Shrub: *Euryops floribundus* (d).

Conservation: Vulnerable. Target 23%. None conserved in statutory conservation areas. Only 1% conserved in private reserves. Some 27% transformed mainly for cultivation and by dense concentrations of rural settlements. Increased occurrence of alien *Schkuhria pinnata* and *Tagetes minuta* indicates heavy disturbance. Erosion is a serious problem and it is high in 33% of this unit, moderate in 32%, and low and very low in 34% of the area.

Eastern Valley Bushveld (SVs 6)

Distribution KwaZulu-Natal and Eastern Cape Provinces: Deeply incised valleys of rivers including the lower reaches of the Thukela, Mvoti, Mgeni, Mlazi, Mkhomazi, Mzimkulu, Mzimkulwana, Mtamvuna, Mtentu, Msikaba, Mzimvubu (and its several tributaries), Mthatha, Mbhashe, Shixini, Qhorha and Great Kei. Very seldom extending to the coast. Altitude 100–1 000 m.

Vegetation & Landscape Features Semideciduous savanna woodlands in a mosaic with thickets, often succulent and dominated by species of *Euphorbia* and *Aloe*. Most of the river valleys run along a northwest-southeast axis which results in unequal distribution of rainfall on respective north-facing and south-facing slopes since the rain-bearing winds blow from the south. The steep north-facing slopes are sheltered from the rain and also receive greater amounts of insolation adding to xerophilous conditions on these slopes.

Geology & Soils The area is underlain by the sediments of the Karoo Supergroup with the mudstones and lesser sandstones of the Adelaide and Tarkastad Subgroups (Beaufort Group) dominant, and some Ecca Group shale. Dominant land type Fa.

Climate Summer rainfall with some rain in winter. MAP about 550–1 000 mm. Frost infrequent. Mean monthly maximum and minimum temperatures for Nagle Dam 36.9 °C and 4.0 °C for December and June, respectively.

Important Taxa Tall Trees: *Acacia robusta*, *Sclerocarya birrea* subsp. *caffra*. Small Trees: *Acacia natalitia* (d), *A. nilotica* (d), *Combretum molle* (d), *Spirostachys africana* (d), *Acacia tortilis* subsp. *heteracantha*, *Berchemia zeyheri*, *Boscia albitrunca*, *Brachylaena elliptica*, *Cussonia spicata*, *Dombeya rotundifolia*, *Encephalartos natalensis*, *E. villosus*, *Hippobromus pauciflorus*, *Schotia brachypetala*, *Ziziphus mucronata*. Succulent Trees: *Euphorbia tirucalli* (d), *Aloe marlothii* subsp. *marlothii*, *A. rupestris*, *Euphorbia ingens*, *E. triangularis*. Tall Shrubs: *Dichrostachys cinerea* (d), *Calpurnia aurea*, *Coddia rudis*, *Ehretia rigida* subsp. *rigida*, *Euclea crispa* subsp. *crispa*, *Grewia occidentalis*, *Olea europaea* subsp. *africana*. Succulent Shrubs: *Aloe arborescens*, *Euphorbia grandicornis*, *Kleinia fulgens*. Soft Shrubs: *Hypoestes aristata*, *Peristrophe cernua*. Woody Climber: *Acacia brevispica* subsp. *dregeana*. Herbaceous Climber: *Ischnolepis natalensis*.

Graminoids: *Aristida congesta* (d), *Eragrostis curvula* (d), *Hyparrhenia hirta* (d), *Melinis repens* (d), *Panicum maximum* (d), *Themeda triandra* (d), *Cymbopogon pospischilii*, *Eragrostis superba*, *Heteropogon contortus*, *Panicum deustum*, *Sporobolus fimbriatus*, *S. pyramidalis*, *Tristachya leucothrix*, *Urochloa mosambicensis*. Herbs: *Achyranthes aspera*, *Hibiscus pedunculatus*. Geophytic Herb: *Sansevieria hyacinthoides*.

Endemic Taxa Tall Shrub: *Bauhinia natalensis*. Succulent Herb: *Huernia pendula*.

Conservation: Least threatened. Target 25%. Only 0.8% statutorily conserved, mainly in the Luchaba Wildlife Reserve; small patches also conserved in the Oribi Gorge Nature Reserve. Some 15% transformed mainly by cultivation. Alien plant invasions are a serious threat, with *Chromolaena odorata*, *Lantana camara* and *Caesalpinia decapetala* being most problematic.

Remarks This unit (together with the SVs 1 Thukela Valley Bushveld) corresponds closely to Acocks's (1953) 'Northern Variation of the Valley Bushveld' from the Great Kei River Valley northwards. He viewed this area as transitional to the Lowveld, particularly that part from the Umkomaas River Valley northwards. Its northern variation (i.e. from the Kei northwards) is more open than his southern variation (the latter is a part of the Albany Thicket Biome) and includes 'more grass, fewer succulents and more species of definitely tropical nature'. Examples of species of this unit that extend southwards from at least the lowveld savanna of Mpumalanga, or from savanna elsewhere at this northern latitude are *Acacia nilotica*, *Euphorbia ingens*, *Spirostachys africana* and *Vitex rehmannii* (extending southwards as far as the Umkomaas River Valley), *Combretum molle* and *Dichrostachys cinerea* (extending further south to around the southern border of KwaZulu-Natal), and *A. robusta*, *Dalbergia obovata*, *Dombeya cymosa*, *E. tirucalli* and *Vangueria infausta* (extending to the vicinity of the Great Kei River Valley or enter the easternmost extremity of the Albany Thicket Biome). In contrast to the thicket vegetation found in valleys south of the Great Kei River, Vlok & Euston-Brown (2002) found that most of the Kei Valley does not have extensive stands of thicket and that thicket only occurs as small clumps, usually on north-facing slopes in a matrix of savanna. Despite considerable disturbance to the vegetation here, they stated that there was no direct evidence that thicket did occur in more extensive stands in recent times. Only over a short length along the lower Great Kei River does true Albany Thicket Biome occur.

Bhisho Thornveld (SVs 7)

Distribution Eastern Cape Province: From near Mthatha in a band parallel to but inland of the coast to north of East London, turning to run along the southern side of the Amathole Mountains as far as Fort Beaufort. Also, on dissected hills and low mountains around Grahamstown, especially to the southwest, and in a few fragments in valleys northeast of the Amathole Mountains. Altitude mostly 200–700 m.

Vegetation & Landscape Features On undulating to moderately steep slopes, sometimes in shallow, incised drainage valleys. Open savanna characterised by small trees of *Acacia natalitia* with a short to medium, dense, sour grassy understorey, usually dominated by *Themeda triandra* when in good condition. A diversity of other woody species also occurs, often increasing under conditions of overgrazing.

Geology & Soils Mudstone with subordinate sandstone of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) underlies most of the area and is intruded by Karoo dolerite dykes and sills. The substrate is primarily loamy soils, but there is significant variability. The area was classified into a variety of land types, with Fa and Fb dominant.

Climate Summer rainfall with some rain in winter. MAP from about 500 mm in the west to more than 900 mm in the east. The coefficient of variation in MAP is approximately 25% but varies from about 20% at the coast to about 30% on the inland and western parts. Frost infrequent. The mean daily maximum temperatures for January 25°C in the east and 28°C in the west and the mean daily minimum temperatures for July 3°C inland and 9°C at the coast. Mean monthly maximum and minimum temperatures for King William's Town 37.0°C and –1.6°C for February and June, respectively.

Important Taxa Small Tree: *Acacia natalitia* (d). Tall Shrub: *Tephrosia capensis*. Low Shrubs: *Anthospermum rigidum* subsp. *pumilum*, *Chrysocoma ciliata*, *Felicia muricata*. Graminoids: *Eragrostis plana* (d), *Heteropogon contortus* (d), *Hyparrhenia hirta* (d), *Sporobolus africanus* (d), *Themeda triandra* (d), *Aristida junciformis* subsp. *junciformis*, *Bulbostylis humilis*, *Cynodon dactylon*, *Digitaria diagonalis*, *D. eriantha* subsp. *eriantha*, *Elionurus muticus*, *Eragrostis capensis*, *E. chloromelas*, *E. curvula*, *Kyllinga alata*, *Microchloa caffra*, *Paspalum dilatatum*, *Schoenoxiphium sparteum*. Herbs: *Centella asiatica*, *Commelina africana*, *Gazania linearis*, *Gerbera ambigua*, *Helichrysum miconiifolium*, *H. nudifolium* var. *pilosellum*, *H. rugulosum*, *Senecio retrorsus*, *Spermacoce natalensis*, *Wahlenbergia stellarioides*, *Zornia capensis*. Geophytic Herbs: *Hypoxis argentea*, *Moraea polystachya*, *Pellaea calomelanos*.

Conservation Least threatened. Target 25%. Only 0.2% statutorily conserved in the Doubledrift and Thomas Baines Nature Reserves. About 2% conserved in private reserves such as Shamwari Game Reserve, Rockdale Game Ranch and Fourie Safaris Game Farm. Some 20% already transformed for cultivation, urban development or plantations. Erosion is very low to moderate.

Remarks Due to the wide distribution of this unit, it incorporates a wide variety of environmental conditions. It borders on a number of other units and species from different vegetation types may co-occur along overlapping areas. Most similar to and forms a gradient to Gs 18 Bedford Dry Grassland in the west. Fire and grazing regimes appear to be key determinants of this vegetation unit, although soil characteristics are also important. *Acacia natalitia*, the main woody species of the SVs 7 Bisho Thornveld, tends to occur in habitats with high soil moisture balance.

2.2.3 National Biodiversity Assessment and Red Listed Ecosystems

The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategic objectives, and activities for managing and conserving biodiversity more effectively. Ecosystem protection level is an indicator that tracks how well represented an ecosystem type is in the protected area network. It has been used as a headline indicator in national reporting in South Africa since 2005.

The outcome of the most recent National Biodiversity Assessment or Red Listed Ecosystem Status (2022) indicate that *Tsomo Grassland*, *Eastern Valley Bushveld* and *Bisho Thornveld* have a Least Concern conservation status (Table 1), which indicates that more than 60 % of the unit remains, and that ecosystem functioning is not under imminent threat by loss of natural habitat. *Mthatha Moist Grassland* is designated an Endangered status, indicating that more than 60 % of its original natural habitat is lost, so their functioning is likely compromised.

2.2.4 Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) – Terrestrial

The Eastern Cape Biodiversity Conservation Plan – Terrestrial (2019, Figure 7) indicates that the pipeline(s) and associated infrastructure does overlap with areas designated CBA 1, CBA 2 & ESA 2. The western extent of the pipeline overlaps with CBA 1 and some CBA 2, the central area with some fragmented CBA 2 and minor ESA 2 pockets on the eastern side. The bulk water pipeline & associated infrastructure including reservoirs is located within an area having a moderate density of rural villages with associated land use including cultivated crops and roads. Baseline levels of fragmentation, transformation and degradation are thus fairly high. Much of the bulk water pipeline will also largely be installed adjacent to existing roads.

The pipeline is deemed a temporary activity and will likely rehabilitate to pre-construction conditions within 2 years of completion. The reservoirs, while permanent, have a relatively small and localised footprint that is unlikely to affect conservation targets nor connectivity above current baseline levels.

Much of the bulk water pipeline will also be installed along existing roads. The impact to designated CBA and ESA, as well as Endangered vegetation is thus likely to be low.

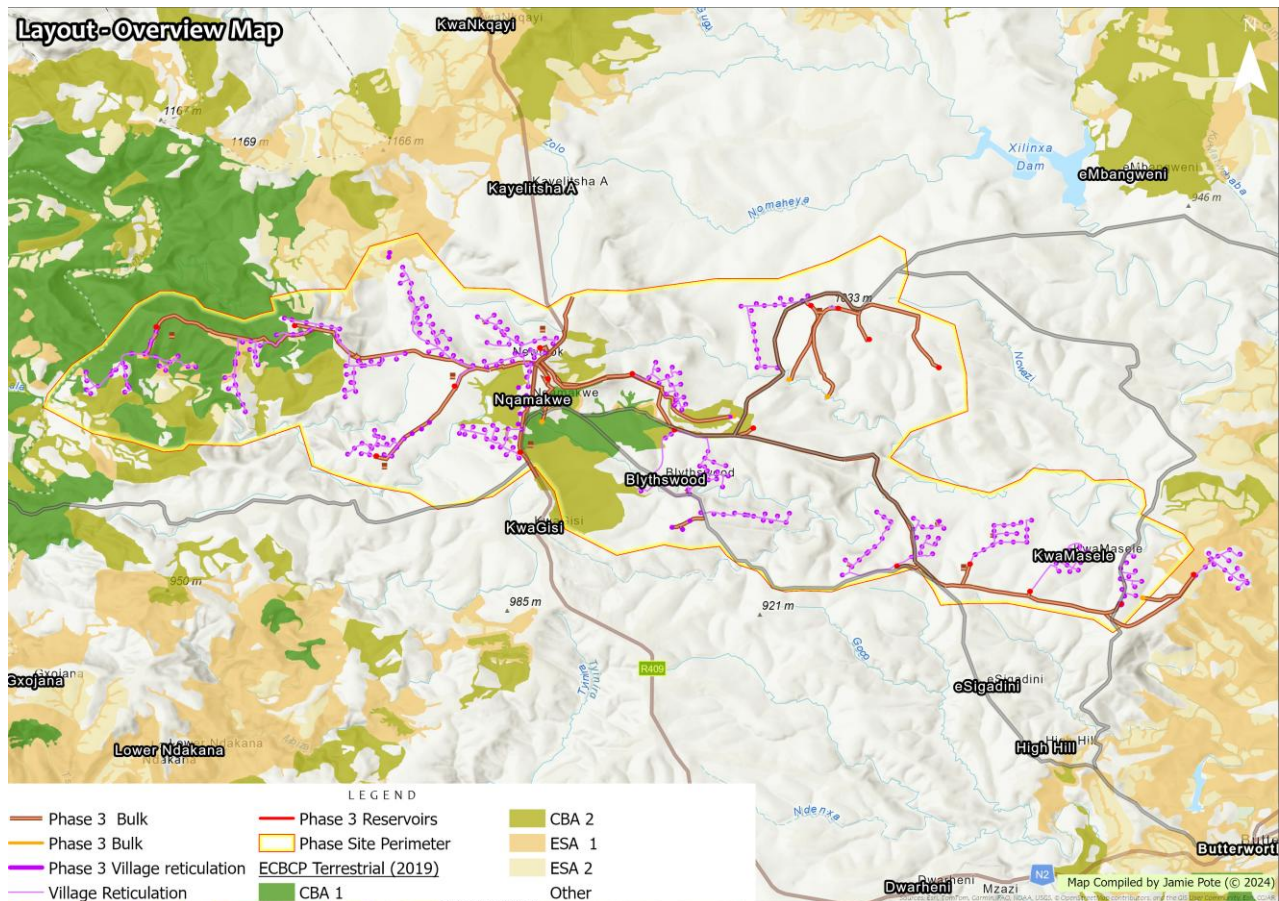


Figure 7: Eastern Cape Biodiversity Conservation Plan (ECBCP, 2022) – Terrestrial.

2.2.5 Protected areas

The proposed pipeline & associated infrastructure including reservoirs do not overlap with any designated Protected Area, NPAES designated area, Important Bird Area (IBA) and/or any associated buffers (Figure 8). The proposed activity is also not anticipated to have any direct or indirect impact on any of the nature reserves in proximity or any other protected area.

2.2.6 Rivers and Wetlands

While outside the scope of a terrestrial biodiversity assessment, sections of the bulk water pipeline will traverse minor non-perennial & perennial watercourse (Figure 9). Since most of the bulk water pipeline follows existing roads, the watercourse crossing points will be close to or directly adjacent to existing road crossings, where riparian vegetation tends to be disturbed. The loss of or impact to riparian vegetation associated with the watercourses will thus be low. The impact to associated flora and faunal will also likely be low and temporary.

This assessment confirms that the riparian vegetation along the watercourses where crossings will be required is degraded and/or secondary vegetation and natural riparian elements are limited to a few tufts of bulrushes, reeds and sedge tufts, as well as several weed species.

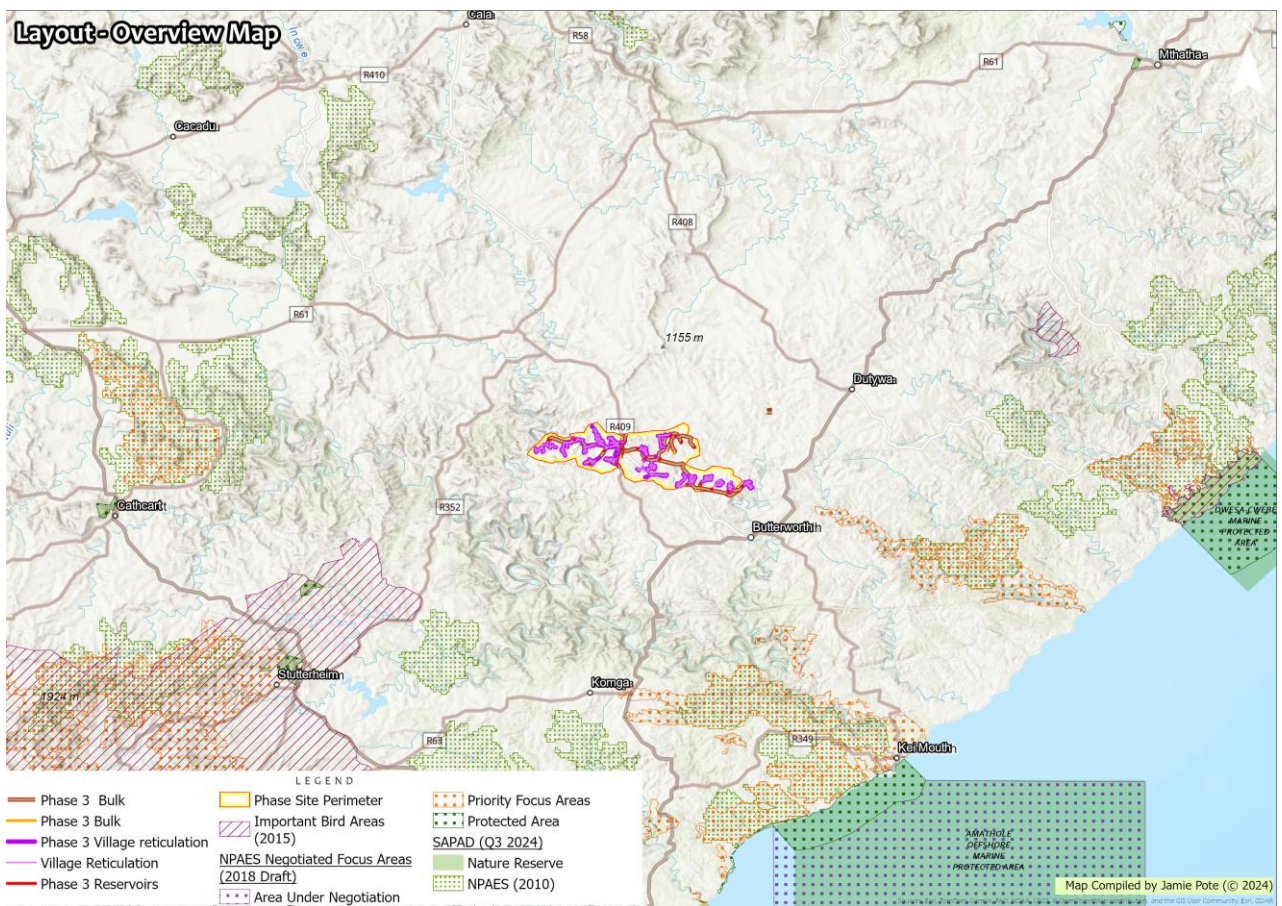


Figure 8: Protected Areas.

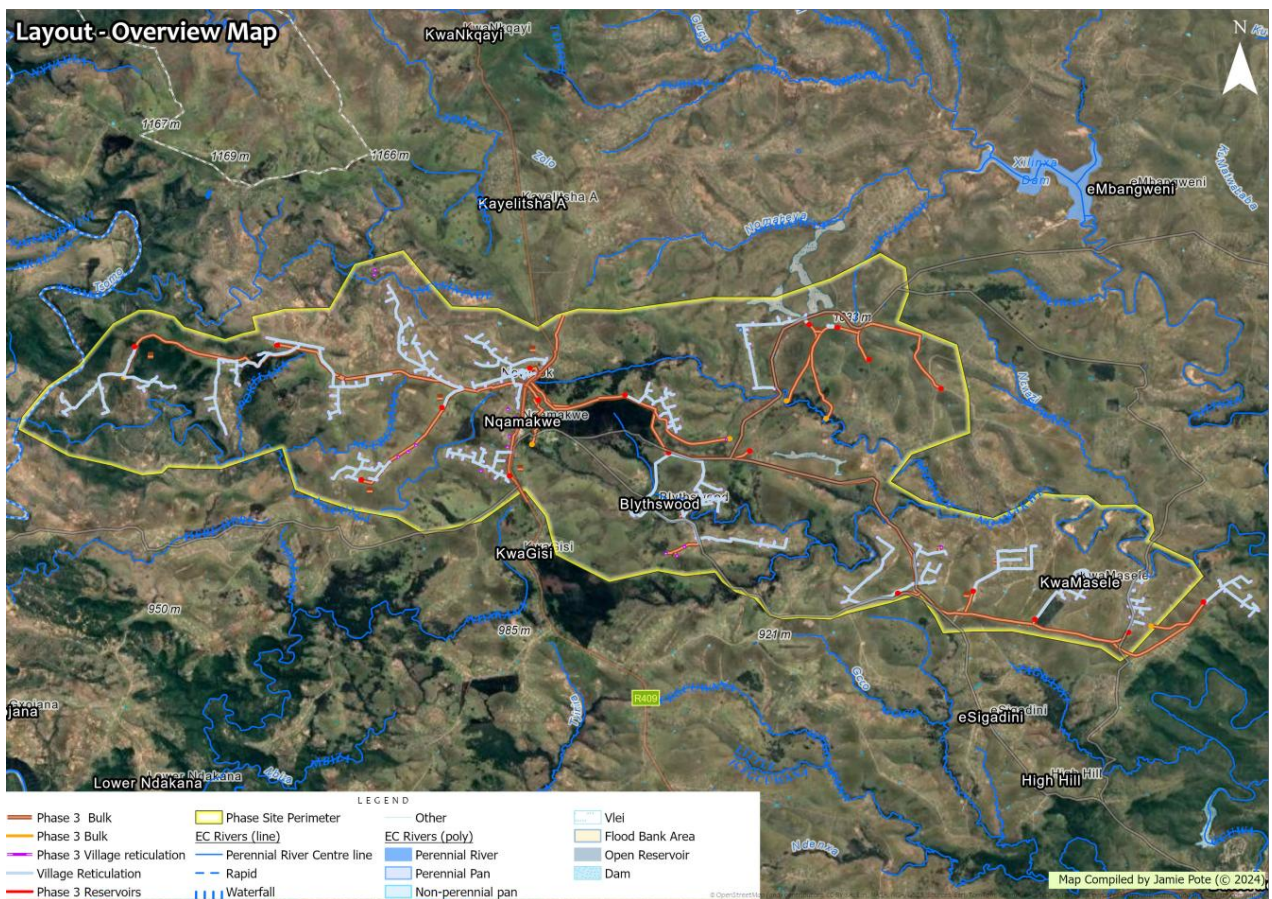


Figure 9: Rivers and Wetlands.

Any loss or impact to riparian vegetation will thus likely be negligible and temporary. The nature of the landscape, being hilly with incised watercourses on slopes and villages and roads tending to be on the ridges, the proposed pipeline infrastructure generally avoids watercourses.

3 Biodiversity Risk Identification and Assessment

3.1 Baseline Biodiversity Description

The area in which the proposed bulk water pipeline and associated infrastructure is proposed (including reservoirs) is situated within an area that has a moderate to high density rural settlements comprising several small villages with associated land use including cultivated areas and roads as well as moderate to high levels of livestock grazing. Vegetation is generally transformed and/or degraded and/or secondary within most of the footprint (Figure 10 to Figure 17). There is little evidence of significant remnant of pristine or near natural vegetation that will be disturbed, including Endangered vegetation.



Figure 10: General vegetation along pipeline route.

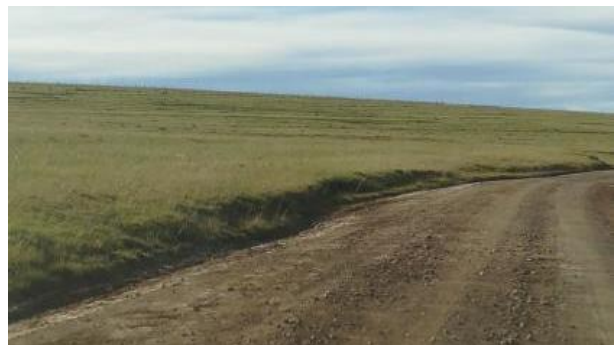


Figure 11: General vegetation along pipeline route



Figure 12: General vegetation along pipeline route



Figure 13: General vegetation along pipeline route



Figure 14: General vegetation along pipeline route



Figure 15: General vegetation along pipeline route



Figure 16: General vegetation along pipeline route



Figure 17: General vegetation along pipeline route

The majority of the bulk water pipeline and associated infrastructure falls within **Mthatha Moist Grassland (Endangered)**, with some passing through **Tsomo Grassland**, **Eastern Valley Bushveld** (on the western side) and **Bisho Thornveld** (on the eastern side), all having a **Least Concern** status. All units are typical of their respective vegetation units (as described below) and tend to be degraded due to high usage (grazing, wood harvesting, crop cultivation, etc.).

The **Mthatha Moist Grassland**, although **Endangered**, is largely showing signs of degradation due to disturbances associated with the rural settlements in the area and associated land use (agriculture, grazing, wood harvesting, etc.). In general, it is comprised of grassland with open thornveld still present along drainage lines. The vegetation is generally species-poor, dominated by grasses including *Eragrostis plana* and *Sporobolus africanus*. Indicative of the condition is the limited presence of *Themeda triandra*, due to the high utilisation for grazing.

The **Eastern Valley Bushveld** is comprised mostly of semideciduous savanna woodlands in a mosaic with thickets, often succulent and dominated by species of *Euphorbia* and *Aloe*. Most of the river valleys run along a northwest-southeast axis which results in unequal distribution of rainfall on respective north-facing and south-facing slopes since the rain-bearing winds blow from the south. The steep north-facing slopes are sheltered from the rain and also receive greater amounts of insolation adding to xerophilous conditions on these slopes.

The **Tsomo Grassland** also shows a high level of utilisation of this unit leading to degradation and transformation and the vegetation shows various stages of overutilisation. Shifting cultivation and the effects of development have caused continuous disturbance of the soil surface, which has led to secondary succession changes in the grassland.

The **Bisho Thornveld** also shows high level of utilisation, leading to degradation and transformation and the vegetation shows various stages of overutilisation, including tree harvesting. The vegetation is comprised of a grassland comprising species common to the adjacent grasslands, but with scattered sweet thorn (*Vachellia karoo*) and trees and various other common small trees and shrubs.

The vegetation is predominantly comprised of well grazed grasses with occasional less disturbed areas having an herbaceous layer (with some geophytic herbs), scattered trees and Aloes. Dense pockets of alien trees are also present (*Acacia mearnsii*). Several exposed rocky outcrops were noted, but no specialised habitat nor associated flora Species of Conservation Concern were observed to be present.

3.1.1 Topography and Drainage

The surrounding area can generally be described as flat to gently undulating plains in the east, becoming moderately rolling and mountainous in the west.

3.1.2 Terrestrial vegetation

The pipeline passes through predominantly Mthatha Moist Grassland with some Eastern Valley Bushveld and Tsomo Grassland. The vegetation is predominantly comprised of well grazed grasses with occasional less disturbed areas having an herbaceous layer (with some geophytic herbs), scattered trees and Aloes. Dense pocket sofa line trees are also present (*Acacia mearnsii*). Several exposed rocky outcrops were noted, but no specialised habitat nor potential associated flora Species of Conservation Concern were observed to be present.



The majority of the pipeline is directly adjacent to existing gravel roads and generally areas that are disturbed to a greater or lesser extent. The vegetation is largely dominated by grasses with the occasional trees, including *Acacia karroo*, although the vegetation is typically a grassland, fire,

overgrazing and wood harvesting are evident. Small dense clumps of invasive wattle (*Acacia mearnsii*) persist in fire protected rocky and incised watercourse sites.

The Eastern Valley Bushveld and Bisho Thornveld tree elements on the eastern and western side are largely lost along the ridges and adjacent to the roads and through settlements and cultivated lands, where the pipeline is planned and a degraded secondary grassland with occasional shrub elements remains. Thicket and Thornveld elements are now generally confined to incised valleys and lower slopes.

All reservoirs were noted to be located in predominantly open grassland with some rocky outcrops. Due to the limited localised footprint of the reservoirs and the overall degraded nature of the vegetation in the area, the terrestrial biodiversity impact of these will be negligible.

3.1.3 Riparian Vegetation

Several minor drainage lines and watercourses will be impacted where crossings are required. These are characterised by poorly developed riparian vegetation and are generally highly modified and/or disturbed or having dense alien infestation (*Acacia mearnsii*).

Marginal riparian vegetation tends to be limited due to the perennial nature of the watercourses and drainage lines and are generally highly disturbed or having dense alien infestation (*Acacia mearnsii*). Occasional indigenous trees are sometimes in proximity to the drainage lines and watercourses.





The lower zone tends to be colonised by ruderal pioneer species, grasses and sedges, which would during the wet season. The upper zone is sometimes colonised by trees species with *Acacia karroo* prevalent, which probably utilise the perched water table. This band of vegetation serves to stabilise the stream banks.

No significant Reedbeds or other riparian features were noted. These areas will be assessed separately in the aquatic specialist reports.

The installation of the pipelines is unlikely to have any significant impact on any indigenous vegetation as it will largely be within the transformed and degraded areas, where vegetation represented is often secondary. The watercourse crossings are also generally adjacent to existing road crossings and thus also disturbed and/or secondary with only some scattered clumps of bulrushes, reeds and sedges; hence loss of any natural vegetation will likely be negligible.

3.1.4 Flora & Fauna

No endemic and range restricted species were recorded to be present. Several species are known from the surrounding area, but unlikely to be affected by the proposed activity. Several PNCO protected species were noted in the area, for which permits will be required before construction commences.

Red Listed, Endemic and Protected Flora

The site falls within the general distribution range of several endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable or Rare. Some of these species are also only from a single or a few populations. As per Table 3, no Endangered or Critically Endangered flora species were confirmed to be present nor are known to be present in the affected area.

Table 3: Flora Species of Special Concern

SCIENTIFIC NAME	FAMILY	STATUS ³	COMMENT/PRESENCE
<i>Adromischus liebenbergii</i> subsp. <i>orientalis</i>	Crassulaceae	NEST (M), Rare	Not recorded, unlikely
<i>Aloe arborescens</i>	Asphodelaceae	PNCO	Present
<i>Aloe marlothii</i>	Asphodelaceae	PNCO	Present
<i>Aloe rupestris</i>	Asphodelaceae	PNCO	Present
<i>Asclepias cooperi</i>	Apocynaceae	NEST (M), Rare	Not recorded, unlikely

³ PNCO - Provincial Nature Conservation Ordinance (1974); NFA - National Forests Act of (1998); ToPS – Threatened or Protected Species; IUCN: CR - Critically Endangered, En - Endangered, Vu - Vulnerable; LC - Least Concern.

SCIENTIFIC NAME	FAMILY	STATUS ³	COMMENT/PRESENCE
<i>Greyia flanaganii</i>	Melanthaceae	NEST (M), Rare	Not recorded, unlikely
<i>Prunus africana</i>	Rosaceae	NEST (M), VU	Not recorded, unlikely
Sensitive species 1144		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 1248		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 1252		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 19		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 191		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 451		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 535		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 554		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 80		NEST (M), PNCO	Not recorded, unlikely
Sensitive species 944		NEST (M), PNCO	Not recorded, unlikely

PNCO (Provincial Nature Conservation Ordinance) permits will be required as a few specimens were recorded in close proximity to or along the pipeline and associated infrastructure (reservoirs). A search and rescue is recommended before construction commences.

Red Listed and Protected Fauna

As per Table 4, no Endangered or Critically Endangered fauna species were found to be present nor are known to be present in close proximity to the affected area or are likely to be directly affected by the proposed activity (Table 4) and no faunal species of conservation concern was recorded on the site. Since the project footprint is relatively small, is situated within an urban and disturbed area, any disturbance or displacement associated with increased activity or habitat destruction as a direct result of the activity is unlikely to pose a significant negative impact to any faunal species.

Table 4: Fauna Species of Special Concern (SCC)

SCIENTIFIC NAME	COMMON NAME	STATUS ⁴	COMMENT/PRESENCE
Mammals			
<i>Chrysospalax trevelyani</i>	Giant Golden Mole	NEST (M),	Minimal localised and mostly temporary infrastructure not likely to pose any risk to this species. Suitable habitat is not present within the footprint.
Sensitive Species 8		NEST (M)	Minimal localised and mostly temporary infrastructure not likely to pose any risk to this species. Species unlikely to occur in proximity to settlements.
Birds			
<i>Falco biarmicus</i>	Lanner Falcon	NEST (H), VU (SA), LC (Intl)	Minimal localised and mostly temporary infrastructure not likely to pose any risk to this species.
<i>Gyps coprotheres</i>	Cape Vulture	NEST (H), EN (SA), EN (Intl)	Minimal localised and mostly temporary infrastructure not likely to pose any risk to this species.
<i>Hydroprogne caspia</i> (<i>Sterna caspia</i>)	Caspian Tern	NEST (M), VU (SA), LC (Intl)	Minimal localised and mostly temporary infrastructure not likely to pose any risk to this species.

⁴ PNCO - Provincial Nature Conservation Ordinance (1974); ToPS – Threatened or Protected Species

SCIENTIFIC NAME	COMMON NAME	STATUS ⁴	COMMENT/PRESENCE
<i>Neotis denhami</i>	Denham's Bustard	NEST (M), VU (SA), NT (Intl)	Minimal localised and mostly temporary infrastructure not likely to pose any risk to this species.
Reptiles			
None of concern			
Amphibians			
None of concern			
Invertebrates			
<i>Chrysoritis lyncurium</i>	Tsomo River Opal	NEST (M)	Minimal localised and mostly temporary infrastructure not likely to pose any risk to this species. Suitable habitat is not present within the footprint.

No fauna PNCO permits are anticipated to be required.

Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations ("the Regulations") which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist with the conservation of our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

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

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

Several exotic invasive and other weed species were noted within the site and surrounding area. Proliferation of weedy and exotic species often indicate disturbance especially during or after construction. A list of species is included in Table 5. During construction it is highly likely that species listed as well as species currently not on site could be introduced through the construction process and will tend to flourish on disturbed areas (such as pipeline trench and around reservoirs. A weed

management programme is recommended throughout and after construction to counter the weed proliferation that would be expected. These species can have serious implications on terrestrial biodiversity but also crop cultivation in the area.

Table 5: Alien (exotic) invasive and other weed species and status.

SCIENTIFIC NAME	COMMON NAME	FAMILY	STATUS ⁵	PRESENCE
<i>Acacia mearnsii</i>	Black Wattle	FABACEAE	CARA 2	Scattered trees and clumps most prevalent along watercourses and drainage lines.
<i>Bidens pilosa</i>	Blackjack	Asteraceae	CARA 1b	Present, uncommon.
<i>Cirsium vulgare</i>	Thistle	Asteraceae	CARA 1b	Present, uncommon.
<i>Datura sp.</i>	Datura		CARA 1b	Present, uncommon
<i>Pennisetum clandestinum</i>	Kikuyu	Poaceae	CARA 1b	Present, common.
<i>Ricinus communis</i>	Castor Oil Plant		CARA 1b	Present, uncommon.
<i>Solanum mauritianum</i>	Bugweed	Solanaceae	CARA 1b	Present, uncommon.
<i>Tagetes minuta</i>	Khakibos	Asteraceae	CARA 1b	Present, uncommon.

Eradication protocol

The act required the removal of these species, being the responsibility of the landowner/contractor.

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the EMP, and a detailed action plan compiled and implemented by the ECO.

3.1.5 Present Ecological State

In summary, the following general observations can be noted regarding the site:

- The area in and around the pipeline & associated infrastructure is largely degraded and/or transformed and/or secondary vegetation.
- Alien invasion is variable low along most of the route, but high in localised dense alien wattle stands
- Erosion risk is moderate to high due to slope, around watercourse and general dispersive nature of the soils in the area.

Based on “point 1.5 of the Terrestrial Biodiversity Specialist Assessment and Minimum Report Content Requirements”, the entire proposed pipeline, which will be considered a temporary activity (that will re-instate to pre-construction conditions within 2 years), is designated a low terrestrial sensitivity. The watercourse crossings and reservoirs sites are designated a moderate sensitivity, since the habitat is still degraded to varying degrees and loss associated with the proposed activity will be negligible, but additional duty of care will be required before and during construction.

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are intricately linked to the terrestrial system. In this case the riverine community that runs past the border of the site forms an integral link between upstream and downstream communities and as a corridor for various faunal especially avifaunal species.

⁵ CARA - Conservation of Agricultural Resources Act (1993); National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A (2016).

The bulk water pipeline will traverse degraded non-perennial watercourses, but the largely temporary activity in degraded and secondary habitat (largely associated with existing road crossings) is unlikely to have any significant impacts above current baseline levels of disturbance.

3.1.6 Terrestrial Vegetation Sensitivity Assessment

An overall vulnerability assessment of proposed pipeline and pipeline, incorporating key vegetation and ecological indicators was undertaken and includes the following key criteria:

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

Intactness

Three basic classes are differentiated as follows:

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

Intactness for the site is **Low**.

Alien Invasion

Three classes are differentiated as follows:

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

Alien invasion for the site is **Low to High**.

Degradation

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

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

Degradation for the site is **Moderate** (degraded grasslands) to **High** (Transformed).

Overall Sensitivity score

Overall vulnerability (or Sensitivity) of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site.

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

Based on “point 1.5 of the Terrestrial Biodiversity Specialist Assessment and Minimum Report Content Requirements”, the entire proposed pipeline, which will be considered a temporary activity (that will re-instate to pre-construction conditions within 2 years), is designated a low terrestrial sensitivity. The watercourse crossings and reservoirs sites are designated a moderate sensitivity, since the habitat is still degraded to varying degrees and loss associated with the proposed activity will be negligible, but additional duty of care will be required before and during construction.

Habitat Sensitivity

- The pipeline is largely considered to have a LOW Sensitivity due to the disturbed nature of the habitat and the temporary nature of the activity.
- The reservoir and watercourse crossings are designated a MODERATE Sensitivity, as additional precautionary measures may be required during construction.
- No HIGH sensitivity areas are identified.

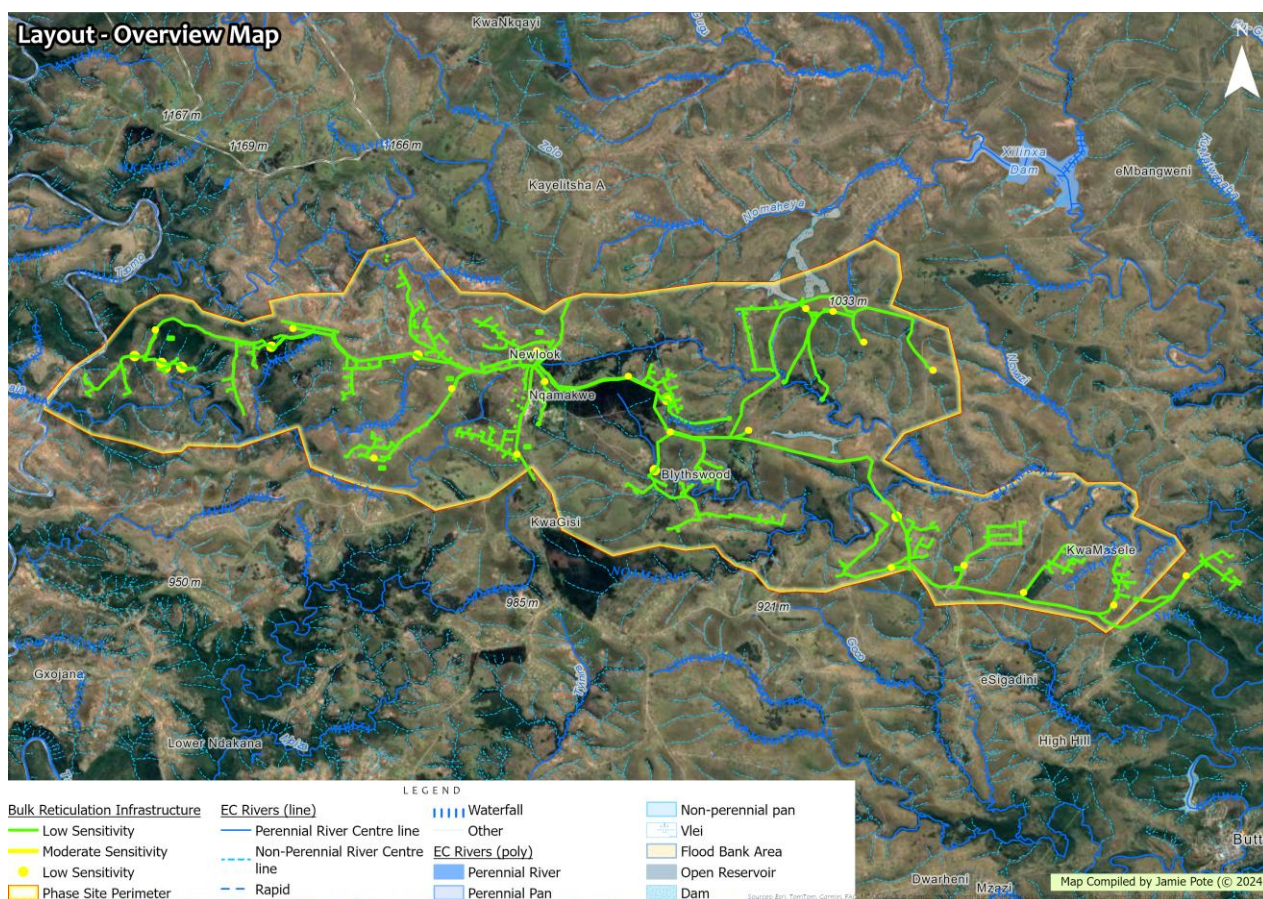


Figure 18: Vegetation of proposed infrastructure showing entire pipeline route as low sensitivity (green) but with reservoir and water crossing sites designated moderate sensitivity (marked as yellow points).

3.1.7 No-Go Areas

- No No-go areas are identified within the site footprint.

3.1.8 Potential Development Footprints

The proposed pipeline and associated infrastructure footprint is considered to be developable.

3.2 Risks and Potential Impacts to Biodiversity

3.2.1 Summary of actions, activities, or processes that require mitigation.

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

1. Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
2. Loss of Flora Species of Conservation Concern during pre-construction site clearing activities. Species of special concern are potentially present within the affected area, which could be destroyed during site preparation.
3. Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
4. Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
5. Disturbances to ecological processes. Activity may result in disturbances to ecological processes.
6. Aquatic and Riparian processes. Diversion and increased velocity of surface water flows – Changes to the hydrological regime and increased potential for erosion. Impact of changes to water quality. Loss of riparian vegetation / aquatic habitat. Loss of species of special concern.
7. Loss of Faunal Habitat & Species of Conservation Concern: Activity will result in the loss of habitat for faunal species as well as potential direct loss of faunal species.

3.2.2 Potential Terrestrial Biodiversity Impacts (Indirect)

No significant indirect impacts are anticipated.

3.2.3 Potential Terrestrial Biodiversity Impacts (Cumulative)

No cumulative impacts are expected because of the development of the site providing recommendation and mitigation measures are adhered to, due to the limited disturbance area.

3.3 Assessment of Risks and Impacts to Biodiversity

3.3.1 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	EXPLANATION
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: <ul style="list-style-type: none"> • (S) <i>local</i> and limited to the immediate area of development (the site). • (L) <i>limited</i> 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: <ul style="list-style-type: none"> • (V) <i>very short term</i> (0 - 1 years), • (S) <i>short term</i> (1 - 5 years), • (M) <i>medium</i> (5 - 15 years), • (L) <i>long term</i> (>15 years but where the impacts will cease after the operation of the site), or • (P) <i>permanent</i>.
Intensity	Establish whether the impact is destructive or innocuous and should be described as either: <ul style="list-style-type: none"> • (L) <i>low</i> (where no environmental functions and processes are affected) • (M) <i>medium</i> (where the environment continues to function but in a modified manner) or • (H) <i>high</i> (where environmental functions and processes are altered such that they temporarily or permanently cease), including loss of critical endangered ecosystem and or critically endangered species (population).
Probability	Consider the likelihood of the impact occurring and should be described as: <ul style="list-style-type: none"> • (I) <i>improbable</i> (low likelihood) • (P) <i>probable</i> (distinct possibility) • (H) <i>highly probable</i> (most likely) or • (D) <i>definite</i> (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	<ul style="list-style-type: none"> • (VL) <i>Very Low</i>: Considered to be negligible. • (L) <i>Low</i>: Where the impact will not have an influence on the decision or require to be significantly accommodated in the project design • (M) <i>Medium</i>: Where it could have an influence on the environment which will require modification of the project design or alternative mitigation. • (H) <i>High</i>: Where it could have a ‘no-go’ implication for the project unless mitigation or re-design is practically achievable. • (VH) <i>Very High</i>: Confirmed No-Go area, no mitigation feasible, redesign and avoidance are required, where activity will have a significant permanent and irreversible impact on a critically endangered ecosystem or species population.

3.3.2 Significance Rating

INTENSITY	DURATION				
	PERMANENT	LONG TERM	MEDIUM TERM	SHORT TERM	VERY SHORT TERM
HIGH INTENSITY					
Ex National	Very High	Very High	High	High	Medium

INTENSITY		DURATION				
		PERMANENT	LONG TERM	MEDIUM TERM	SHORT TERM	VERY SHORT TERM
	Regional	Very High ⁶	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
LOW INTENSITY						
EXTENT	National	Medium	Medium	Medium	Medium	Medium
	Regional	Medium	Medium	Medium	Medium	Low
	Local	Medium	Medium	Medium	Low	Very Low
	Site specific	Low	Low	Low	Very Low	Very Low

3.3.3 Assessment of Terrestrial Biodiversity Impacts

Operations can result in a range of negative impacts on terrestrial ecosystems if not effectively managed. **Error! Reference source not found.** describes impacts that may potentially occur on the site (as per DEDEAT guidelines) as well indicating the relevant EMP section. The predicted significance of these during the construction phase are summarised in Table 6 and during the operational phase are summarised in Table 7.

Table 6 : Construction Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology).

Nature of impact	Extent	Duration	Intensity	Probability	Status of the impact	Degree of confidence	Significance (before)	Significance (after)
Vegetation	S	S	L	D	-ve	H	L	VL
Flora Species	S	S	L	P	-ve	M	L	VL
Alien Invasive Species	S	M	L	H	-ve	H	L	VL
Erosion	S	M	L	P	-ve	M	L	VL
Ecological Processes	S	S	L	P	-ve	H	L	VL
Aquatic & Riparian Processes	S	V	L	P	-ve	M	L	VL
Faunal Habitat	S	V	L	D	-ve	H	L	VL
Faunal Processes	S	V	L	P	-ve	H	L	VL
Faunal Species	S	V	L	P	-ve	M	L	VL

Table 7: Operational Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology).

Nature of impact	Extent	Duration	Intensity	Probability	Status of the impact	Degree of confidence	Significance (before)	Significance (after)
Vegetation	S	S	L	D	-ve	H	L	VL

⁶ Considered a regional impact if activity will result in significant permanent and irreversible loss to a critically endangered species population or ecosystem (vegetation type)

Nature of impact	Extent	Duration	Intensity	Probability	Status of the impact	Degree of confidence	Significance (before)	Significance (after)
Flora Species	S	S	L	P	-ve	M	L	VL
Alien Invasive Species	S	M	L	H	-ve	H	L	VL
Erosion	S	M	L	P	-ve	M	L	VL
Ecological Processes	S	S	L	P	-ve	H	L	VL
Aquatic & Riparian Processes	S	V	L	P	-ve	M	L	VL
Faunal Habitat	S	V	L	D	-ve	H	L	VL
Faunal Processes	S	V	L	P	-ve	H	L	VL
Faunal Species	S	V	L	P	-ve	M	L	VL

All impacts are assessed to be of low significance before mitigation and can be reduced to very low (or insignificant) with the implementation of the mitigation measures.

3.3.4 Terrestrial Biodiversity Impact Reversibility

In general, most impacts will have a high reversibility in the affected habitat, as well as transformed or degraded areas, except where hardening of surfaces or removal of topsoil may occur.

3.3.5 Impacts and Risks to Irreplaceable Biodiversity Resources

Risks to Irreplaceable Biodiversity Resources is low to very low.

3.3.6 Residual Risks and Uncertainties

No residual risks or uncertainties are anticipated.

3.4 Findings, Outcomes and Recommendations

3.4.1 Summary of Findings

- The vegetation on site is generally near-natural but degraded along most of the pipeline length as well as around the reservoir sites.
- The proposed infrastructure does overlap with some designated CBA 1, CBA 2 and ESA 2 areas. Since the pipeline largely follows existing roads and is within disturbed areas, as well as being a temporary activity that will rehabilitate to pre-construction conditions within two years, the impact to CBA or ESA will be negligible. Similarly, the small and localised footprint of the reservoirs will also result in a negligible impact to CBA or ESA targets.
- No Sensitive Plant or Animal species identified as per the National Environmental Screening Tool were found to be present or likely to be present.
- Species protected in terms of the PNCO are present and permits and a pre-construction search and rescue recommended.
- The pipeline is largely considered to have a LOW Sensitivity due to the disturbed nature of the habitat and the temporary nature of the activity.
- The reservoir and watercourse crossings are designated a MODERATE Sensitivity, as additional precautionary measures may be required during construction.
- No HIGH sensitivity areas are identified.
- No No-go areas are identified within the site footprint.
- No significant direct, indirect or cumulative impacts are anticipated.

3.4.2 Recommendations & Mitigation Measures

- The proposed activity is unlikely to pose any risk to natural ecological processes, vegetarian or plant and animal species of conservation concern.

Table 8 lists specific mitigation measures that must be implemented and adhered to. These must be considered to be conditions of authorisation.

Table 8: Specific Mitigation Measures and Recommendations

IMPACT	MITIGATION MEASURES
Vegetation	<ul style="list-style-type: none"> No clearing outside of footprint to take place. Surrounding intact vegetation not to be cleared unnecessarily during the construction process.
Flora Species	<ul style="list-style-type: none"> A flora search and rescue is <u>unlikely</u> to be required and no protected flora or fauna were found to be present.
Alien Invasive Species	<ul style="list-style-type: none"> A suitable weed and alien invasive management strategy to be implemented along the pipeline after completion of construction.
Erosion	<ul style="list-style-type: none"> Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted. If natural vegetation re-establishment does not occur, a suitable grass must be applied. Possible grasses include <i>Cynodon dactylon</i>, <i>Eragrostis curvula</i> & <i>Digitaria eriantha</i>.
Aquatic and Riparian processes	<ul style="list-style-type: none"> Adequate measures to be implemented for erosion and stormwater management.
Faunal Processes	<ul style="list-style-type: none"> The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to. Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.
Faunal Species	<ul style="list-style-type: none"> A faunal search and rescue is <u>unlikely</u> to be required and no protected species are likely to be affected. No animals are to be harmed or killed during the course of operations. Workers are NOT allowed to snare any faunal species.

3.5 Site Preparation and Vegetation Clearing Plan

Flora relocation is recommended before commencement, as well as the necessary PNCO permits.

No fauna relocation is likely to be required before commencement, and permits are unlikely to be required.

3.6 Open Space Management/Conservation Plan

None are applicable for this project.

3.7 Maintenance Management Plan

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

4 Organizational Capacity and Competency

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

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

5 Emergency Preparedness and Response

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

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

6 Stakeholder Engagement

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

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities

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

7 Monitoring and Review

Key monitoring activities should include the following:

1. Pre-construction
 - a) Ensure flora permits are in place timeously (PNCO only) – allow at least 1 or 2 months before commencement.
 - b) Environmental Awareness and training (EAT) – Ensure all labour are informed and plant operators are aware of risks, issues, do's and don'ts and no-go areas.
2. Bush clearing
 - a) Ensure working plant has no oil or hydraulic leaks
 - b) Check delineated footprints area not exceeded.
3. Construction
 - a) Regular checks on trenches for trapped animals and possible drowning risks
 - b) Regular checks of fences for snares
4. Rehabilitation

- a) Check quality of topsoil and weed free.
- b) Check for weed regrowth and manage timeously (before seed is set)
- 5. Operation monitoring
 - a) Weed management on ongoing basis.
 - b) Erosion to be addressed on ongoing basis

8 Appendices

8.1 Appendix A: References

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- South African Bird Atlas Project: <http://sabap2.birdmap.africa>
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- World Resources Institute (WRI): <https://www.wri.org>

8.2 Appendix B: Abbreviations & Glossary

8.2.1 Abbreviations

CARA	Conservation of Agricultural Resources Act, Act 43 of 1983
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs (<i>now DFFE, see below</i>)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DFFE	The Department of Environmental Affairs was renamed the <u>Department of Forestry, Fisheries & the Environment</u> (DFFE) in April 2021, incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries.
DEMC	Desired Ecological Management Class
DWS	Department of Water Affairs and Sanitation
DWAF	Department of Water Affairs and Forestry (former department name)
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMC	Ecological Management Class
EMP	Environmental Management Plan
EMPr	Environmental Management Programme report
ER	Environmental Representative
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
LM	Local Municipality
masl	meters above sea level
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, Act 107 of 1998
NFA	National Forests Act
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NFA	National Forest Act, Act 84 of 1998
PEMC	Present Ecological Management Class
PES	Present Ecological State
PNCO	Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).
RDL	Red Data List
RHS	Right Hand Side
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SoER	State of the Environment Report
SSC	Species of Special Concern
ToPS	Threatened or Protected Species
ToR	Terms of Reference
+ve	Positive
-ve	Negative

8.2.2 Glossary

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

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

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

	(b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land.
Evolutionary Processes	<p>The process by which genetic changes have taken place and continue to take place in populations of plants and animals over successive generations in response to environmental changes. Evolutionary Processes includes the mechanisms that produce the biodiversity of life and include Mutation and Migration (Gene Flow), Genetic Drift, Natural Selection, Common Descent, Speciation, Sexual Selection, and Biogeography. Disruptions to evolutionary processes can prevent ecosystems and species from adapting to environmental change over time. Significant fragmentation is considered to be an important disrupter of evolutionary processes.</p> <p>Series of actions which enable new species to evolve in response to changing Biodiversity is maintained by ecological processes at the micro-scale (such as in pollination and nutrient cycling via microbial action) through to the mega-scale (natural events e.g. fire, flood; migration of species along river valleys or coastal areas, quality and quantity of water feeding rivers and estuaries; marine sand movement and the seasonal mountain-to-coast migration of birds that pollinate plants).</p>
Exotic	Non-indigenous; introduced from elsewhere, may also be a weed or alien <i>invasive</i> species. Exotic species may be invasive or non-invasive.
Fragmentation (Habitat Fragmentation)	The ‘breaking apart’ of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development 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.
Habitat Banking	A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time (IEEP).
IFC PS6	International Finance Corporation Performance Standard 6 – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)
Indicator	Information based on measured data used to represent an attribute, characteristic, or property of a system.
Indicator species	A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.
Indigenous	Native; occurring naturally in a defined area.
Indigenous Species (Native species)	<p>A species that has been observed in the form of a naturally occurring and self-sustaining population in historical times (<i>Bern Convention 1979</i>).</p> <p>A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy <u>using its natural dispersal systems</u> (<i>modified after the Convention on Biological Diversity</i>)</p>
Indirect Impact	Impacts triggered in response to the presence of a project, rather than being directly caused by the project’s own operations (BBOP)
Instream habitat	Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse;
Intact Habitat / Vegetation	Land that has not been significantly impacted upon by man’s activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Intrinsic Value	The inherent worth of something, independent of its value to anyone or anything else.

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

	now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN).
Patch	A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements.
Protected Area	A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Range restricted species	Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited <u>extent of occurrence</u> (EOO): <ul style="list-style-type: none"> For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres (km²).
Refugia	A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting.
Rehabilitation	Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/ or minimised. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure (BBOP).
Resilience	The capacity of a natural system to recover from disturbance (OECD).
Restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions (IEC).
Riparian	Pertaining to, situated on or associated with the banks of a watercourse, usually a river or stream.
Riparian Habitat	Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.
River Corridors	River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED).
Terrestrial	Occurring on, or inhabiting, land.
Threatened Species	Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species (IUCN). Any species that

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

8.3 Appendix C: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included in the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed in 3.3 will be managed / controlled as set out under mitigating measures (3.3) and as detailed in this section for the more significant impacts during the operational phase.

8.3.1 Alien and Invasive Plant Management Plan

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

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

8.3.2 Fires

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers should also be informed or otherwise involved.
- Any contractors must take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.

8.3.3 Soil Aspects

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- Any removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

8.3.4 Infrastructural Requirements

Topsoil

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

Stormwater and Erosion Control

- Stormwater Management Plans must be developed for the site and should include the following:
 - The management of stormwater during construction.
 - The installation of stormwater and erosion control infrastructure.
 - The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater must be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes should be profiled at a maximum 1:3 gradient.
- Diversion channels should be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation must be retained as far as possible to minimise erosion problems.
- Visual inspections will be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden runoff from cleared areas must be prevented from entering rivers and streams.
- No river or surface water may be affected by silt emanating from the site.

Site Office / Camp Sites

- Any site office / camp and/or laydown areas to be located in a transformed / previously disturbed area.

Operating Procedures in the Site

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

- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity, or the access road.

Excavations

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

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

Rehabilitation of Processing and Excavation Areas

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

8.3.5 Rehabilitation Plan

Rehabilitation Objective

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

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

Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped and stockpiled separately and only used in rehabilitation work towards the end of the operation. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for

too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year. The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

Revegetation

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

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

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

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

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

Drainage and Erosion Control

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

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

Visual Impacts Amelioration

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

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

8.3.6 Monitoring and Reporting

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

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

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

Closure Objectives

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

8.4 Appendix D: General Impact Rating Scale

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

These scales are:

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

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

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

The scales are described in detail below.

8.4.1 The Severity/ Beneficial Scale

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

NEGATIVE IMPACT	POSITIVE IMPACT
<u>Very severe</u> An irreversible and permanent change to the affected system(s) which cannot be mitigated.	<u>Very Beneficiary</u> A permanent and very substantial benefit to the affected system(s) with no alternative to achieve this benefit.

NEGATIVE IMPACT	POSITIVE IMPACT
For example, change in topography resulting from a quarry.	
<u>Severe</u> Long-term impacts on the affected system(s) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	<u>Beneficial</u> A long-term impact and substantial benefit to the affected system(s). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
<u>Moderately severe</u> Medium- to long-term impact on the affected system(s) that could be mitigated.	<u>Moderately beneficial</u> A medium- to long-term impact of real benefit to the affected system(s) Other ways of optimising are equally difficult, expensive and time consuming (or a combination of these), as achieving them in this way.
<u>Slight</u> Medium- to short term impacts on the affected system(s) Mitigation is very easy, cheap, less time consuming or not necessary.	<u>Slightly beneficial</u> A short- to medium-term impact and negligible benefit to the affected system(s) Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
<u>No effect</u> The system(s) is not affected by the proposed development.	<u>Do not know/Cannot know</u> In certain cases, it may not be possible to determine the severity of the impact.

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

8.4.2 Spatial and Temporal Scales

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

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

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

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

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

8.4.3 The Degree of Certainty and the Likelihood Scale

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

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

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

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

8.4.4 The Environmental Significance Scale

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

SIGNIFICANCE	DESCRIPTION
Very High (6)	Impacts considered to have a major and permanent change to natural environment and are rate as VERY HIGH, usually resulting to severe or very severe/ beneficial to highly beneficial effects.

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

8.4.5 Absence of Data

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

8.5 Appendix E: Declaration, Specialist Profile and Registration

Annexure 1







CV



Jamie Pote

SENIOR ECOLOGIST AND ENVIRONMENTAL
SCIENTIST

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EDUCATION

Bachelor of Science
Rhodes University
2001 (Botany & Environmental Science)

Bachelor of Science (Honours)
Rhodes University
2002 (Botany)

Professional Natural Scientist
SACNASP
2016

SERVICES

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

ABOUT ME

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

EXPERIENCE AND CLIENTS

Key Sectors

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

Key Projects

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



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

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

Effective **20 July 2016**

Expires **31 March 2026**



A handwritten signature in black ink, appearing to read 'A. Keph', written over a horizontal line.

Chairperson

A handwritten signature in black ink, appearing to read 'N. S. ...', written over a horizontal line.

Chief Executive Officer



To verify this certificate scan this code

Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.)

PROJECT EXPERIENCE**PERFORMANCE STANDARD BIODIVERSITY AND CRITICAL HABITAT ASSESSMENTS (IFC PS6)**

- DBSA Environmental & Social Safeguards Standards 9: Biodiversity Conservation and Sustainable Management Assessment: The Ilitha Fibre Project, Ethekeini 2021
- Critical Habitat & Biodiversity Assessment - Roggeveld Wind Energy Project 2020
- Biodiversity Assessment for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008

TERRESTRIAL BIODIVERSITY ASSESSMENTS AND COMPLIANCE STATEMENTS

- Terrestrial Biodiversity Assessment (Addo BSD Offices) 2021
- Terrestrial Biodiversity Assessment (Blaauwater Farms) 2021
- Terrestrial Biodiversity Assessment (Buffelshoek Farm, Loerie) 2021
- Terrestrial Biodiversity & Aquatic Assessment & Review (Falcon Ridge Dam) 2021
- Terrestrial Biodiversity Assessment (Gubenxa Valley Deciduous Fruit) 2021
- Terrestrial Biodiversity Assessment (Little Chelsea Mixed-use) 2021
- Terrestrial Biodiversity Compliance Statement (Maidenhead Farm) 2021
- Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project Grid Interconnection 2021
- Terrestrial Biodiversity Compliance Statement (Lahlangubo River Bridge) 2021
- Terrestrial Biodiversity Assessment (Mbashe access roads - 3 sites) 2021
- Terrestrial Biodiversity Assessment (Burlington Farm Citrus Development, Cookhouse) 2020
- Terrestrial Biodiversity Compliance Statement: CHDM Cluster 9 Phase 3D Pipeline 2020
- Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project BESS 2020
- Terrestrial Biodiversity Assessment (Mbashe housing projects, Dutywa & Willowvale) 2020
- Terrestrial Biodiversity Assessment (Helpmekaar Dam, Tarkastad) 2020
- Terrestrial Biodiversity Assessment (Herbertsdale pipeline, Mossel Bay) 2020
- Terrestrial Biodiversity Assessment (Keurbooms Erf 155, Keurboomstrand) 2020
- Terrestrial Biodiversity Assessment (Lowmar Hydroelectric Project, Cradock) 2020
- Terrestrial Biodiversity Assessment (Mossel Bay Gas Power Plant) 2020
- Terrestrial Biodiversity Assessment (Erf 1820, Mthatha) 2020
- Terrestrial Biodiversity Assessment (Newlyn Manganese Terminal, Coega SEZ) 2020
- Terrestrial Biodiversity Assessment Thornhill Phase 2 Sanitation Link 2020

ENERGY PROJECTS (WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE)

- Preliminary Biodiversity Screening for Chrisdelina Ranch Agricultural Project, Kizenga District 2020
- Preliminary Biodiversity Screening and GIS mapping for Balekani Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping for Sihhoye Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping Mpaka Photovoltaic Solar Project 2020
- Preliminary Biodiversity Screening and GIS mapping for Chiwelwa Hydroelectric project 2020
- Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse), Eastern Cape 2020
- Ecological Assessment for Windcurrent Wind Farm, Eastern Cape 2012
- Ecological Assessment for Universal Windfarm, NMB 2011
- Ecological Assessment for Inca Energy Windfarm, Northern Cape 2011
- Ecological Assessment for Broadlands Photovoltaic Farm, Eastern Cape 2011
- Botanical Assessment for Electrawinds Windfarm Coega, NMB 2010
- Botanical Assessment and Open Space Management Plan for Mainstream WEF Phase 2, Eastern Cape 2010

SPECIALISED ECOLOGICAL REPORTS AND REVIEWS

- Rebels Vlei Riparian delineation 2021

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• Buck Kraal Dam Rehabilitation Plan Review	2020
• Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
• Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMBM	2015
• Section 24G Assessment and Rehabilitation Plan for Bingo Farm, Eastern Cape	2014
• Mapping and Ecological services for Congo Agriculture, Republic of Congo	2013
• Rehabilitation Plan for Nieu Bethesda, Eastern Cape	2011
• Mapping of pipeline for Kenton Water Board, Eastern Cape	2010
• Rehabilitation Plan for N2 Upgrade - Coega to Colchester, NMB	2010
• Representative for landowner group for Seaview burial Park, NMB	2010
• Botanical Sensitivity Analysis for LSDF, Greenbushes-Hunters Retreat, NMB	2008
• Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation, Eastern Cape	2007
• Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif, Northern Cape	2006
• Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER, Eastern Cape	2003

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

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

MINING PROJECTS

• Ecological Assessment for Bochum Borrow Pits, Limpopo	2013
• Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project, Limpopo (3 proposed Mines)	2013
• Ecological Assessment for Thulwe Road Borrow Pits, Limpopo	2013
• Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining, Ghana	2010
• Botanical Assessment for Zwartbosch Quarry, Eastern Cape	2008
• Botanical description & map production for Quarry - Rudman Quarry, Eastern Cape	2008
• Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie, Eastern Cape	2008
• Botanical Assessment & Maps for Sandman Sand Gravel Mine, Eastern Cape	2008
• Botanical Assessment & GIS maps for Shamwari Borrow Pit, Eastern Cape	2008
• Detailed Botanical Assessment, EMP and Rehab Plan for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo	2008
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Cala, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route, Eastern Cape	2008

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• Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart, Eastern Cape	2008
• Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting, Eastern Cape	2008
• Regional Botanical Map for mining prospecting permit, Welkom	2008
• Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Jeffreys Bay, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms River/Kareedouw, Eastern Cape	2007
• Biophysical Assessment for Humansdorp Quarry, Eastern Cape	2006
• Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East, Eastern Cape	2006
• Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry, NMB	2006
• GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers, Eastern Cape	2006
• Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter, Limpopo	2006
• Application for Mining Permit for Bruce Howarth Quarry, Eastern Cape	2006

POWERLINE INFRASTRUCTURE PROJECTS

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

PIPELINE INFRASTRUCTURE PROJECTS

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

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• Detailed Botanical Assessment for Motherwell Pipeline, NMB	2007
• Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline, Eastern Cape	2007
• Botanical & Floristic Report for Hankey pipeline, Eastern Cape	2006
• Detailed Botanical Assessment for Port Alfred water pipeline, Eastern Cape	2004

GENERAL INFRASTRUCTURE DEVELOPMENT PROJECTS

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

HOUSING DEVELOPMENT PROJECTS

• Terrestrial Biodiversity Assessment for Erf 1820 Mthatha, KSDM, Eastern Cape	2020
• Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay	2019
• Ecological Assessment Portion 21-23 and 41 of Farm 807, Gonubie, Buffalo City	2019
• Ecological Assessment for Emerald Sky Housing Project, BCMM	2019
• Ecological Assessment for Erf 14, Kabega, Port Elizabeth	2017
• Ecological Assessment for Fairwest Rental Housing, Port Elizabeth	2017
• Ecological Assessment for Hankey Housing, Kouga District Municipality	2015
• Ecological Assessment for Lebowakgoma Housing, Limpopo	2013
• Ecological Assessment for Giyani Development, Limpopo	2013
• Ecological Assessment for Palmietfontein Development, Limpopo	2013
• Ecological Assessment for Seshego Development, Limpopo	2013
• Botanical Assessment for Sheerness Road, BCM, Eastern Cape	2013
• Ecological Assessment for Ethembeni Housing, NMB	2012
• Ecological Assessment for Pelana Housing, Limpopo	2012
• Flora Search and Rescue Plan for Kwanobuhle Housing, Western Cape	2011
• Botanical Assessment for The Craggs 288/03, Western Cape	2010
• Ecological Assessment Revision Report for Fairview Housing, NMB	2010
• Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development, Western Cape	2010
• Botanical Assessment for Little Ladywood, Western Cape	2010
• Botanical Assessment and Open Space Management Plan for Motherwell NU31, NMB	2010
• Botanical Assessment and Open Space Management Plan for Plett 443/07, Western Cape	2010
• Botanical Assessment for Willow Tree Farm, NMB	2010
• Botanical Assessment for Kouga RDP Housing, Eastern Cape	2009
• Botanical Assessment for Fairview Erf 1226 (Wonderwonings), NMB	2009
• Species List Compilation for Zeekoerivier Humansdorp, Eastern Cape	2009
• Botanical Assessment for Woodlands Golf Estate (Farm 858), BCM, Eastern Cape	2009

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

AGRICULTURAL PROJECTS

• Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse)2020	2020
• Thornhill Eggland Specialist Ecological Assessment	2020
• Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015
• Ecological Assessment for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery)	2014
• Ecological Assessment for Doornkraal Pivot (Hankey), Eastern Cape	2014
• Ecological Assessment for Tzaneen Chicken Farm, Limpopo	2013
• Botanical Assessment and Open Space Management Plan for Kudukloof, NMB	2010
• Botanical Assessment and Open Space Management Plan for Landros Veeplaats, NMB	2010
• Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, NMB	2006

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

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

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MIXED USE DEVELOPMENT PROJECTS

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

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

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

ECO-ESTATE DEVELOPMENT PROJECTS

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

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

- Flora Search and Rescue for Nelson Mandela University Phase 2 & 3 Residences, Eastern Cape 2020

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• Flora Search and Rescue for Fairwest Housing Estate, Nelson Mandela Bay, Eastern Cape	2019
• Flora Search and Rescue for Utopia Estate, Nelson Mandela Bay, Eastern Cape	2019
• Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape	2018
• Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape	2018
• Flora Search and Rescue for Wilgekloof pipeline, Willowmore, Eastern Cape	2018
• Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
• Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)	2016
• Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2016
• Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW, Eastern Cape (Phase 4)	2015
• Flora and Fauna Search and Rescue for Riversbend Citrus Farm, NMB	2014
• Flora and Fauna Search and Rescue for Mainstream Windfarm, Eastern Cape	2013
• Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 1, 2 & 3)	2013
• Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ, NMB	2013
• Flora and Fauna Search and Rescue for Jeffreys Bay School, Eastern Cape	2013
• Flora Search and Rescue Plan for Red Cap Wind Farm, Eastern Cape	2012
• Flora Relocation for Disco Poultry Farm, NMB	2010
• Flora Relocation for Mainstream Windfarm, Eastern Cape	2010

ENVIRONMENTAL MANAGEMENT PLANS

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

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

• Basic Assessment Application for Parsonsvei Erf 984 & 1134 Parsonsvei	2020
• Construction of Deviation and Rehabilitation of Bridge along DR02481 road	2020
• Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse)	2020
• Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development	2020
• Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10	2020
• Basic Assessment Application for Nelson Mandela University Access Road, NMB	2019
• Basic Assessment, WULA and Borrow Pit/Quarry Mining Application, Clarkebury Rd, Idutywa	2019
• Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay	2019
• Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation	2019
• Basic Assessment Application for Erf 14 Kabega, NMBM	2017
• Basic Assessment Application for Hankey Housing, Kouga District Municipality	2017
• Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay	2017
• Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015

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- Basic Assessment Application for Hankey Housing, Kouga District Municipality 2015
- Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) 2014
- Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018

MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

- Mining BAR/EMP's for Blue Crane Route & Camdeboo LM 12 Borrow Pits – (DoT) 2019
- Mining BAR/EMP's for Elundini LM 6 Borrow Pits (DoT)
- Mining BAR/EMP's for Baviaans LM 6 Borrow Pits (DoT)
- Mining BAR/EMP's for Kouga & Koukamma LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for Sakhisizwe & Engcobo LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for Senqu LM 12 Borrow Pits (DoT)
- Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape – (SANRAL) 2018
- Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL) 2017
- Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Inkwanca (Enoch Mgijima) LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for 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 Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - Intsika Yethu and Emalahleni (DRPW) 2015
- Mining BAR/EMP's for Joe Gqabi DM Borrow Pits - Senqu (DRPW) 2015
- Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Amahlathi LM Borrow Pits - Amatole (DRPW) 2015
- Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits - Amatole (DRPW) 2015
- Mining BAR/EMP's for Sundays River Valley LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Kouga LM Borrow Pits - Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 - Matatiele (DRPW) 2014

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ENVIRONMENTAL COMPLIANCE AUDITING

- Environmental Compliance Audit (Habata Boerdery) 2021
- Environmental Compliance Audit (Sontule Farm) 2021

ENVIRONMENTAL MANAGEMENT, AUDITING, COMPLIANCE AND MONITORING PROJECTS

- Environmental Auditing Services Pre-construction and Construction (Rocky Coast Farm) 2021
- Environmental Auditing Services (Middledrift Breeder Facility) 2021
- Coega Aquaculture Development Zone Environmental Compliance and Monitoring for Construction (24 Months) 2020
- Construction of NMU West End Student Residences Phases 1 & 3 Environmental Control Office (30 Months) 2020
- Environmental Auditing and construction monitoring for construction of Phase 1 River Park (South End Precinct) 2020
- Waste Management License audit for Bedford Recycling project 2020
- Auditing for Construction of Fairwest Village Housing Project 2019
- Auditing for Construction of Utopia Estate monthly auditing 2019
- ECO for DRPW IRM Road Maintenance projects, Baviaans LM 2019
- ECO for DRPW IRM Road Maintenance projects, Senqu LM 2019
- ECO for DRPW IRM Road Maintenance projects, Kouga/Koukamma LM 2019
- ECO for DRPW IRM Road Maintenance projects, Sakhisizwe/Engcobo LM 2019
- ECO for DRPW IRM Road Maintenance projects, Elundini LM 2019
- ECO for DRPW IRM Road Maintenance projects, Emalahleni/Intsika Yethu LM 2019
- ECO for Construction of Fairwest Village Housing Project 2019
- ECO for Construction of Utopia Estate Mixed Use Project 2019
- ECO for Construction of NMU West End Student Residences Phases 1 & 3 2019
- ECO for Construction of Eco-Pullets pullet rearing facility, Paterson 2018
- ECO for DRPW IRM Road Maintenance projects, Raymond Mahlaba LM 2018
- ECO for DRPW IRM Road Maintenance projects, Inkwanca (Enoch Mgidjima) LM 2018
- ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery) 2017
- ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts 2017
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2017
- ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus Farm (km 42.2) to N10 (km 85.0) (SANRAL) 2016
- Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbashe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Nkonkobe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Senqu LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Elundini LM 2016
- ECO and Environmental Management for closure of Bushmans River Landfill site 2016
- ECO for DRPW IRM Road Maintenance projects, Amahlathi Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Makana/Ndlambe Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Mbashe/Mqume Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Port St Johns, Mbizana, Ingquza Hill LM's 2015
- ECO for Riversbend Citrus Farm, NMB 2014
- ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073, Eastern Cape - MSBA 2014

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• ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba	2014
• EMP and ECO for Utopia Estate, NMB	2013
• Final EMP submission for Seaview Garden Estate, NMB	2012
• ECO audits for NMB Road surfacing, NMB (multiple contacts)	2011
• EMP submission and ECO for Seaview Garden Estate, NMB	2010
• ECO for Mainstream Windfarm wind monitoring mast installation, Eastern Cape	2010
• EMP and ECO for Sinati Golf Estate EMP, BCM, Eastern Cape	2009
• Flora Relocation Plan and Permit application for Wildemans Plaas, NMB	2006

ENVIRONMENTAL SCREENING PROJECTS

• Somerset East Stormwater Environmental Screening Report	2021
• Woodlands Diary Road Upgrade Environmental Screening Report, Kouga LM	2021
• Risk Assessment and Screening for proposed Heatherbank access road, NMB	2020
• Environmental Screening Report for Proposed Life Hospital parking expansion, NMB	2019
• Environmental Screening Report for Erf 984 & 1134 development, Parsonslei, NMB	2019
• Environmental Screening Report for proposed Khayaletu School, Buffalo City	2018
• Environmental Screening Report for Proposed Housing Development of Erf 8700, Kabega Park, NMB	2017
• Environmental Screening Report for Proposed Housing Development of Erf 14, Kabega Park, NMB	2017
• Environmental Screening Report for Proposed Fairvest Social Housing project, Fairview, NMB	2016
• Environmental Screening Report for Development of Little Chelsea No 25, NMB	2016
• Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood)	2015
• Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth	2015
• Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe	2015
• Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth	2015
• Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate	2015
• Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB	2015

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

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.

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OTHER RESEARCH EXPERIENCE

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

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

SCOPE

The protocol (*Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020)*) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation.

The protocol (*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted on 30 October 2020*), provides the criteria for the assessment and reporting of impacts on plant and animal species for activities requiring environmental authorisation.

These protocols replace the requirements of Appendix 6 of the Environmental Impact Assessment Regulation⁷.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (<https://screening.environment.gov.za/screeningtool>). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute⁸.

SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

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

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

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

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

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

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

⁷ The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

⁸ The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on the screening tool).

TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	<u>General Information</u>	-
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "very high sensitivity" for terrestrial biodiversity, must submit a <u>Terrestrial Biodiversity Specialist Assessment</u> .	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being ' low sensitivity ' for terrestrial biodiversity, must submit a <u>Terrestrial Biodiversity Compliance Statement</u> .	✓
1.3	However, where the information gathered from the site sensitivity verification differs from the designation of ' very high ' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a ' low ' sensitivity, then a <u>Terrestrial Biodiversity Compliance Statement</u> must be submitted.	✓
1.4	Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a ' low ' terrestrial biodiversity sensitivity on the screening tool, a <u>Terrestrial Biodiversity Specialist Assessment</u> must be conducted.	✓
1.5	If any part of the proposed development footprint falls within an area of ' very high ' sensitivity, the assessment and reporting requirements prescribed for the ' very high ' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, <u>can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies</u> . Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.	✓
	VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features	
3.1.13	a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified <u>as having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate</u> ,	✓
	LOW SENSITIVITY RATING – for terrestrial biodiversity features	
4	<u>Terrestrial Biodiversity Compliance Statement</u>	✓
4.1	The compliance statement <u>must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences</u> .	✓
4.2	The compliance statement must:	
4.2.1	<u>be applicable to the preferred site and proposed development footprint;</u>	✓
4.2.2	<u>confirm that the site is of 'low' sensitivity for terrestrial biodiversity; and</u>	✓
4.2.3	<u>indicate whether or not the proposed development will have any impact on the biodiversity feature.</u>	✓
4.3	The <u>compliance statement must contain, as a minimum</u> , the following information:	
4.3.1	the <u>contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;</u>	✓
4.3.2	a <u>signed statement of independence</u> by the specialist;	✓
4.3.3	a <u>statement on the duration, date and season</u> of the site inspection and the relevance of the season to the outcome of the assessment;	✓
4.3.4	a <u>baseline profile description</u> of biodiversity and ecosystems of the site;	✓
4.3.5	the <u>methodology used to verify the sensitivities</u> of the terrestrial biodiversity features on the site, including equipment and modeling used, where relevant;	✓
4.3.6	in the case of a linear activity, <u>confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase;</u>	✓
4.3.7	where required, <u>proposed impact management outcomes or any monitoring requirements</u> for inclusion in the EMPr;	✓
4.3.8	a <u>description of the assumptions made and any uncertainties or gaps in knowledge or data; and</u>	✓

4.3.9	any <u>conditions to which this statement is subjected.</u>	EAP
4.4	A <u>signed copy of the compliance statement must be appended to the Basic Assessment Report</u> or Environmental Impact Assessment Report.	EAP

ANIMAL SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	<u>General Information</u>	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for <u>terrestrial animal species</u> must submit a Terrestrial Animal Species Specialist Assessment Report .	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for <u>terrestrial animal species</u> must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement , depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	✓
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for <u>terrestrial animal species</u> must submit a Terrestrial Animal Species Compliance Statement .	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial animal species sensitivity and it is found to be of a “low” sensitivity, then a Terrestrial Animal Species Compliance Statement must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial animal species sensitivity and it is found to be of a “very high” or “high” terrestrial animal species sensitivity, a Terrestrial Animal Species Specialist Assessment must be conducted.	✓
1.6	If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	✓
1.7	The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the <i>study area</i> .	✓
1.8	Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the <i>project areas of influence</i> (PAOI) must be determined by the specialist in accordance with <i>Species Environmental Assessment Guideline</i> ⁹ , and the study area must include the PAOI, as determined.	✓
	VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial animal species	
2	<u>Terrestrial Animal Species Specialist Assessment</u>	
	<u>VERY HIGH SENSITIVITY RATING</u>	✓
	1. Critical habitat for range-restricted species ¹⁰ of conservation concern, that have a global range of less than 10 km ² .	

⁹ Available at <https://bgis.sanbi.org/>¹⁰ Species with a geographically restricted area of distribution.

	<p>2. SCC listed on the IUCN Red List of Threatened Species¹¹ or on South Africa's National Red List website¹² as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.</p> <p>3. Species aggregations that represent $\geq 1\%$ of the global population size of a species, over a season, and during one or more key stages of its life cycle.</p> <p>4. The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.</p> <p>These areas are irreplaceable for SCC.</p>	
	<p>HIGH SENSITIVITY RATING</p> <p>1. Confirmed habitat for SCC.</p> <p>2. SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.</p> <p>These areas are unsuitable for development due to a very likely impact on SCC.</p>	✓
2.2.12	identify any <u>alternative development footprints</u> within the preferred site which would be of "low" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.	✓
2.3	The findings of the assessment must be written up in a Terrestrial Animal Species Specialist Assessment Report .	✓
3	Terrestrial Animal Species Specialist Assessment Report	
3.1.13	a <u>motivation must be provided</u> if there were any development footprints identified as per paragraph 2.2.12 above that were identified as having "low" or "medium" terrestrial animal species sensitivity and were not considered appropriate.	✓
4	MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION	
	<p>MEDIUM SENSITIVITY RATING – for terrestrial animal species:</p> <p>1. <u>Suspected habitat for SCC</u> based either on historical records (prior to 2002) or <u>being a natural area included in a habitat suitability model</u> for this species¹³.</p> <p>2. SCC listed on the IUCN Red List of Threatened Species or South Africa's <u>National Red List</u> website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.</p>	✓
4.6	Where SCC <u>are found on site or have been confirmed</u> to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for "very high" and "high" sensitivity in this protocol.	✓
4.7	Similarly, where <u>no SCC are found on site during the site inspection</u> or the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted.	✓
5	LOW SENSITIVITY RATING – for terrestrial animal species	
	<p>Terrestrial Animal Species Compliance Statement</p> <p>1. Areas where no natural habitat remains.</p> <p>2. Natural areas where there is no suspected occurrence of SCC.</p>	✓
5.1	The compliance statement <u>must be prepared by a SACNASP registered specialist</u> under one of the two fields of practice (Zoological Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	<u>be applicable to the study area;</u>	✓
5.2.2	<u>confirm that the study area, is of "low" sensitivity for terrestrial animal species; and</u>	✓

¹¹ <https://www.iucnredlist.org/>

¹² This category includes the categories Extremely Rare, Critically Rare and Rare

¹³ The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

5.2.3	indicate <u>whether or not the proposed development will have any impact</u> on SCC.	✓
5.3	The compliance statement ¹⁴ must contain, as a minimum, the following information:	✓
5.3.1	<u>contact details and relevant experience as well as the SACNASP registration</u> number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a <u>signed statement of independence</u> by the specialist;	✓
5.3.3	a statement on the <u>duration, date and season</u> of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the <u>methodology</u> used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	the mean density of observations/ number of samples sites per unit area ¹⁵ .	✓
5.3.6	where required, <u>proposed impact management actions</u> and outcomes or any monitoring requirements for inclusion in the EMPr;	✓
5.3.7	a <u>description of the assumptions made and any uncertainties or gaps</u> in knowledge or data; and	✓
5.3.8	any <u>conditions</u> to which the compliance statement is subjected.	✓
6	A <u>signed copy</u> of the Terrestrial Animal Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

PLANT SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	<u>General Information</u>	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for <u>terrestrial plant species</u> must submit a Terrestrial Plant Species Specialist Assessment Report .	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium sensitivity” for <u>terrestrial plant species</u> must submit either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement , depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	✓
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “low” sensitivity for <u>terrestrial plant species</u> must submit a Terrestrial Plant Species Compliance Statement .	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high”, for terrestrial plant species sensitivity and it is found to be of a “low” sensitivity, then a Terrestrial Plant Species Compliance Statement must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial plant species sensitivity and it is found to be of a “very high” or “high” terrestrial plant species sensitivity, a Terrestrial Plant Species Specialist Assessment must be conducted.	✓
1.6	If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be	✓

¹⁴ An example of a what is contained in a Compliance Statement for Animal Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

	disturbed or impacted.	
1.7	The Terrestrial Plant Species Specialist Assessment and the Terrestrial Plant Species Compliance Statement must be undertaken within the <i>study area</i> .	✓
1.8	Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the <i>project areas of influence</i> (PAOI) must be determined by the specialist in accordance with <i>Species Environmental Assessment Guideline</i> ¹⁵ , and the study area must include the PAOI, as determined.	✓
	VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial plant species	
2	Terrestrial Plant Species Specialist Assessment	
	<u>VERY HIGH SENSITIVITY RATING</u> <ol style="list-style-type: none"> 1. Critical habitat for range-restricted species¹⁶ of conservation concern, that have a global range of less than 10 km². 2. SCC listed on the IUCN Red List of Threatened Species¹⁷ or on South Africa's National Red List website¹⁸ as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare. 3. Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle. 4. The number of mature individuals that ranks the site among the largest 10 aggregations known for the species. <p>These areas are irreplaceable for SCC.</p> <p><u>HIGH SENSITIVITY RATING</u></p> <ol style="list-style-type: none"> 1. Confirmed habitat for SCC. 2. SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare. <p>These areas are unsuitable for development due to a very likely impact on SCC.</p>	✓
2.3.12	identify any <u>alternative development footprints</u> within the preferred site which would be of "low" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.	✓
2.4	The findings of the assessment must be written up in a Terrestrial Plant Species Specialist Assessment Report .	✓
3	Terrestrial Plant Species Specialist Assessment Report	✓
3.1.13	a <u>motivation must be provided</u> if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or "medium" terrestrial plant species sensitivity and were not considered appropriate.	✓
4	MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION	
	MEDIUM SENSITIVITY RATING – for terrestrial plant species:	
	<ol style="list-style-type: none"> 1. <u>Suspected habitat for SCC</u> based either on there being records for this species collected in the past, prior to 2002, or <u>being a natural area included in a habitat suitability model</u>¹⁹. 	✓

¹⁵ Available at <https://bgis.sanbi.org/>

¹⁶ Species with a geographically restricted area of distribution.

¹⁷ <https://www.iucnredlist.org/>

¹⁸ This category includes the categories Extremely Rare, Critically Rare and Rare

¹⁹ The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

	2. SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	
4.6	Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Plant Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity in this protocol.	✓
4.7	Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Plant Species Compliance Statement must be submitted.	✓
5	LOW SENSITIVITY RATING – for terrestrial plant species	
	Terrestrial Plant Species Compliance Statement	✓
	1. Areas where no natural habitat remains. 2. Natural areas where there is no suspected occurrence of SCC.	
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be applicable to the study area;	✓
5.2.2	confirm that the study area, is of “low” sensitivity for terrestrial plant species; and	✓
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	✓
5.3	The compliance statement ²⁰ must contain, as a minimum, the following information:	✓
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed statement of independence by the specialist;	✓
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMP; and	✓
5.3.6	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	✓
5.3.7	the mean density of observations/ number of samples sites per unit area ²¹ ; and	✓
5.3.8	any conditions to which the compliance statement is subjected.	✓
6	A signed copy of the Terrestrial Plant Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

²⁰ An example of a what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

²¹ Refer to the Species Environmental Assessment Guideline

8.7 Appendix G: Site Sensitivity Verification Report

8.7.1 Background

Indwe Environmental Consulting have been appointed to undertake an environmental application for a proposed Ngqamakhwe Bulk Reticulation in the Butterworth area, Eastern Cape province (Figure 19). As part of this environmental application process, a terrestrial biodiversity Assessment is required.

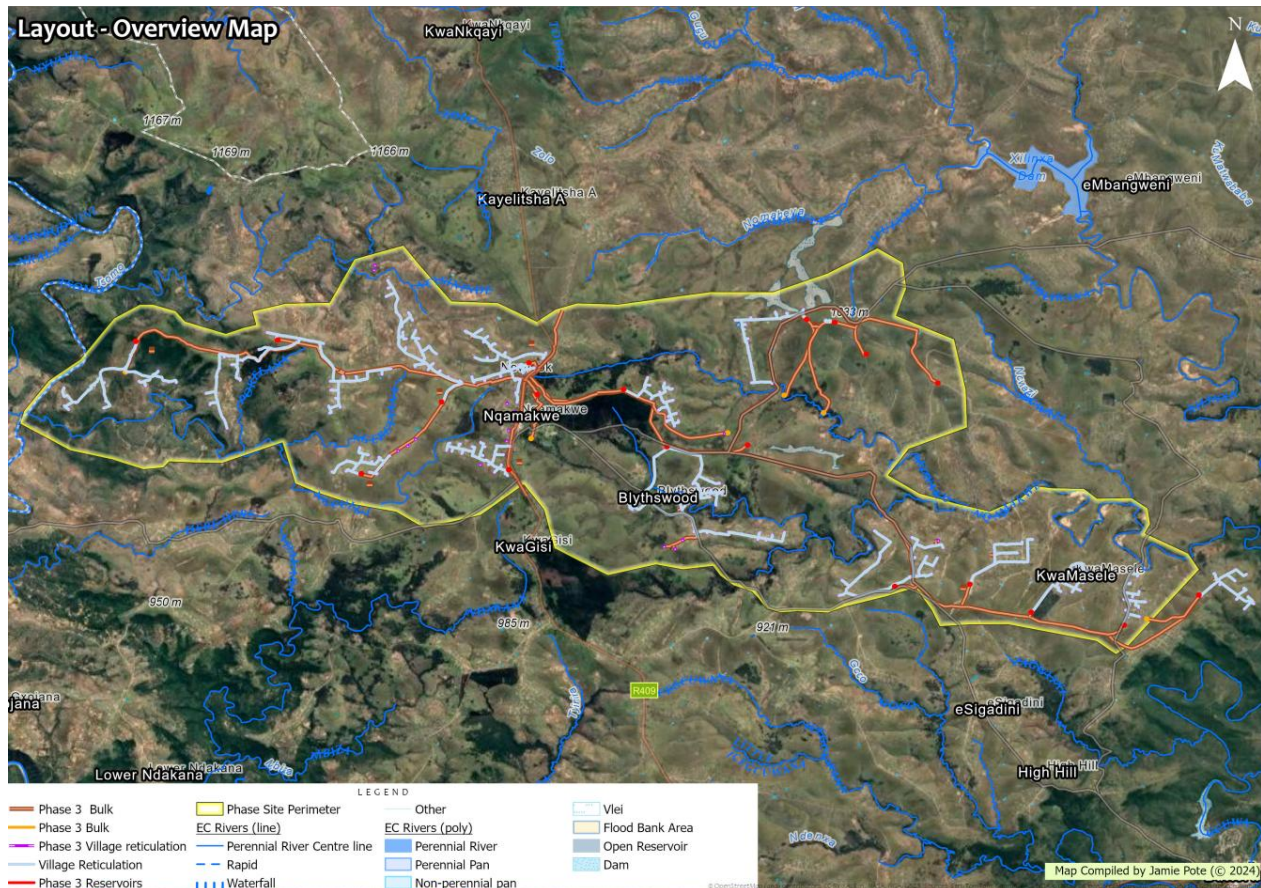


Figure 19: Site locality.

8.7.2 Activity Description & Location

The proposed Ngqamakhwe Phase 3 Bulk Water Reticulation is located in the area to the west and east of Ngqamakhwe (Figure 19). The proposed Bulk Water reticulation is comprised of a network of Bulk water pipelines and reservoirs to augment the water reticulation of several villages in the surrounding area.

It is the intention of the ADM to implement the Ngqamakhwe Regional Water Supply Scheme Phase 3 to service areas without adequate supply systems in the area. Phase 3 will include the transfer, storage and distribution of water to the Ngqamakhwe Town Centre and 29 villages in Wards 13, 16, 18 and 20 of the Mnquma Local Municipality area in the Eastern Cape Province. The proposed development involves the implementation of a regional water supply scheme to supply potable water to the Greater Ngqamakhwe area.

8.7.3 Purpose of Report

The “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation”, as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
2. The site sensitivity verification must be undertaken through the use of:
 - a. a desk top analysis, using satellite imagery.
 - b. a preliminary on -site inspection; and
 - c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
 - a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
 - b. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
 - c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

8.7.4 Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O), NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.

- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- SANBI BGIS – All other biodiversity GIS datasets.
- Eastern Cape Biodiversity Conservation Plan.
- The Garden Route Biodiversity Sector Plan for the Kouga Municipality (2010).
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (<http://csg.dla.gov.za>).
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>).
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

8.7.5 Site visit

A site inspection was conducted for an earlier iteration of this proposed bulk water reticulation **on 23 April 2018** by the same terrestrial biodiversity specialist (Mr Jamie Pote). Since this iteration of the layout is largely the same layout as the original version, the findings of the previous assessment are deemed by the specialist to not warrant any additional site visit, as no further information will be gathered that would warrant such an additional site visit and the state is not likely to have changed significantly during the intervening time period, as well as the disturbed and transformed nature of the site.

8.7.6 Assumptions, Uncertainties and Gaps in Knowledge

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

- No assessment has been made of aquatic aspects relating to any wetlands, pans and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report and have been undertaken by an aquatic specialist.
- No specific faunal assessment has been undertaken, but animals have been assessed in term of the terrestrial Biodiversity Assessment requirements.
- Any flora surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

8.7.7 National Environmental Screening Tool

The DFFE Screening Tool indicates the following, summarised in Table 9:

- Terrestrial Biodiversity is Low/Very High (Figure 20).
- Plant species sensitivity is Low/Moderate (Figure 21).
- Animal Species sensitivity is Low/Moderate/High (Figure 22).

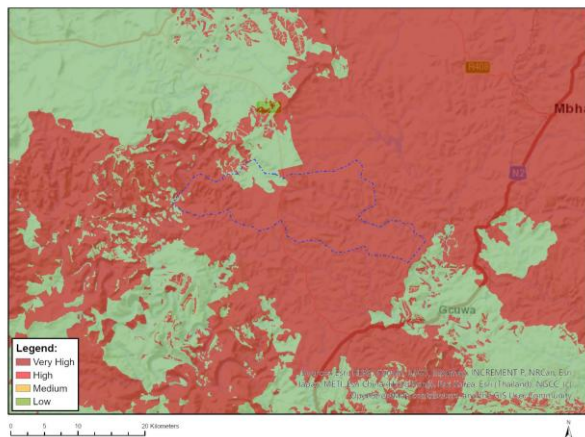


Figure 20: Terrestrial Biodiversity Sensitivity

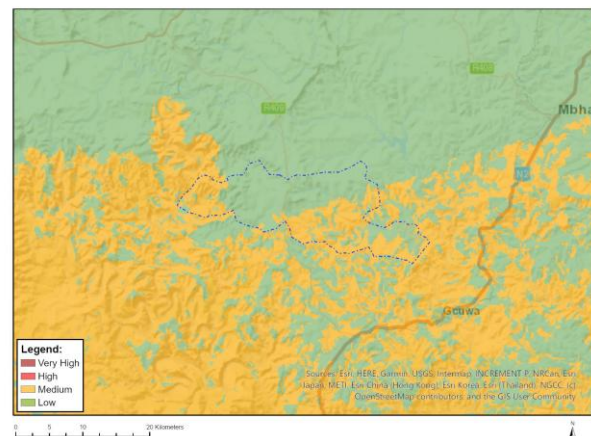


Figure 21: Plant Species Sensitivity

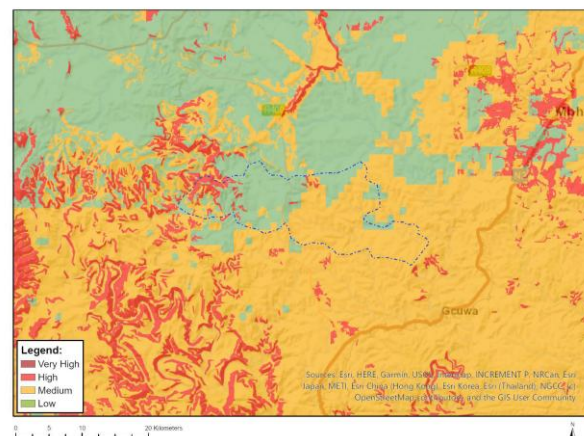


Figure 22: Animal Species Sensitivity

Table 9: Summary of Screening tool designations.

Terrestrial Sensitivity	Feature(s) in proximity
Very High	CBA1, CBA2, ESA2, FEPA Sub-catchment, Mthatha Moist Grassland (EN)
High	None
Medium	None
Low	Present
Plant Sensitivity	Feature(s) in proximity
Very High	None
High	None
Medium	<i>Greyia flanaganii</i> , <i>Adromischus liebenbergii</i> subsp. <i>orientalis</i> , <i>Asclepias cooperi</i> , <i>Prunus africana</i> , Sensitive species 1252, 1144, 80, 535, 554, 451, 1248, 944, 191 & 19
Low	Present
Animal Sensitivity	Feature(s) in proximity
Very High	None
High	<i>Gyps coprotheres</i> & <i>Falco biarmicus</i> (birds)
Medium	<i>Hydroprogne caspia</i> & <i>Neotis denhami</i> (birds), <i>Chrysoritis lyncurium</i> (insect), <i>Chrysospalax trevelyani</i> & Sensitive Species 8 (mammals)
Low	Present

NOTE: as per point 1.5 of the Terrestrial Biodiversity Specialist Assessment and Minimum Report Content Requirements:

'If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, **excluding linear activities** for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial

*measures, can be returned to the current state **within two years of the completion of the construction phase**, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.'*

Based on the above reporting protocol condition, the entire proposed bulk water pipelines will fall into the above category, which implies that for a temporary linear activity, such as a pipeline, the screening tool designated high sensitivity should be reduced to a low sensitivity and only a compliance statement would be required. Remnant disturbance after completion of pipeline will be nominal, whereas reservoirs will be permanent but limited in extent. It is anticipated that the construction pipeline footprint will return to its current state within two years of completion of construction.

The site assessment has physically screened for the presence of any species as listed in the National Environmental Screening Tool, as well as other possible species or sensitivities that are not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report. The following is deduced from the DFFE National Environmental Screening Tool:

- The terrestrial biodiversity theme is LOW. The site falls within an urban area and is not designated CBA or ESA nor is the vegetation unit under threat. The low terrestrial biodiversity sensitivity is confirmed to be correct, and a specialist sensitivity of low is thus allocated.
- A single flora (plant) species regarded as being of concern are flagged as potentially being present (MEDIUM sensitivity) and are assessed further in the report, however it is not present within the largely transformed and degraded vegetation, nor will the vegetation likely provide suitable habitat. The medium sensitivity is thus disputed, and a specialist sensitivity of low is allocated.
- No fauna (animal) species regarded as being of concern are flagged as potentially being present (LOW sensitivity) and are assessed further in the report. The site falls within an urban area and is comprised of transformed and secondary vegetation, thus unlikely to provide suitable habitat for faunal species of concern. The low fauna sensitivity is confirmed to be correct, and a specialist sensitivity of low is thus allocated.
- The aquatic sensitivity is Very High due to the pipeline traversing a watercourse. The aquatic aspects are outside of this terrestrial biodiversity assessment, but it is confirmed that no natural riparian elements of concern are preset nor likely to be affected. Refer to Aquatic Assessment.

8.7.8 Findings, Outcomes and Recommendations

Terrestrial Biodiversity

National Environmental Screening Tool flagged no terrestrial biodiversity sensitivities. The proposed pipeline is situated either within road verges or areas where no natural vegetation of significance remains, being largely degraded or transformed.

The SSVR thus confirms the designated Low Terrestrial Biodiversity sensitivity, and the specialist designates a low terrestrial biodiversity sensitivity. The pipeline is also a linear, temporary activity and any disturbance will likely return to pre-construction state within a 2-year period.

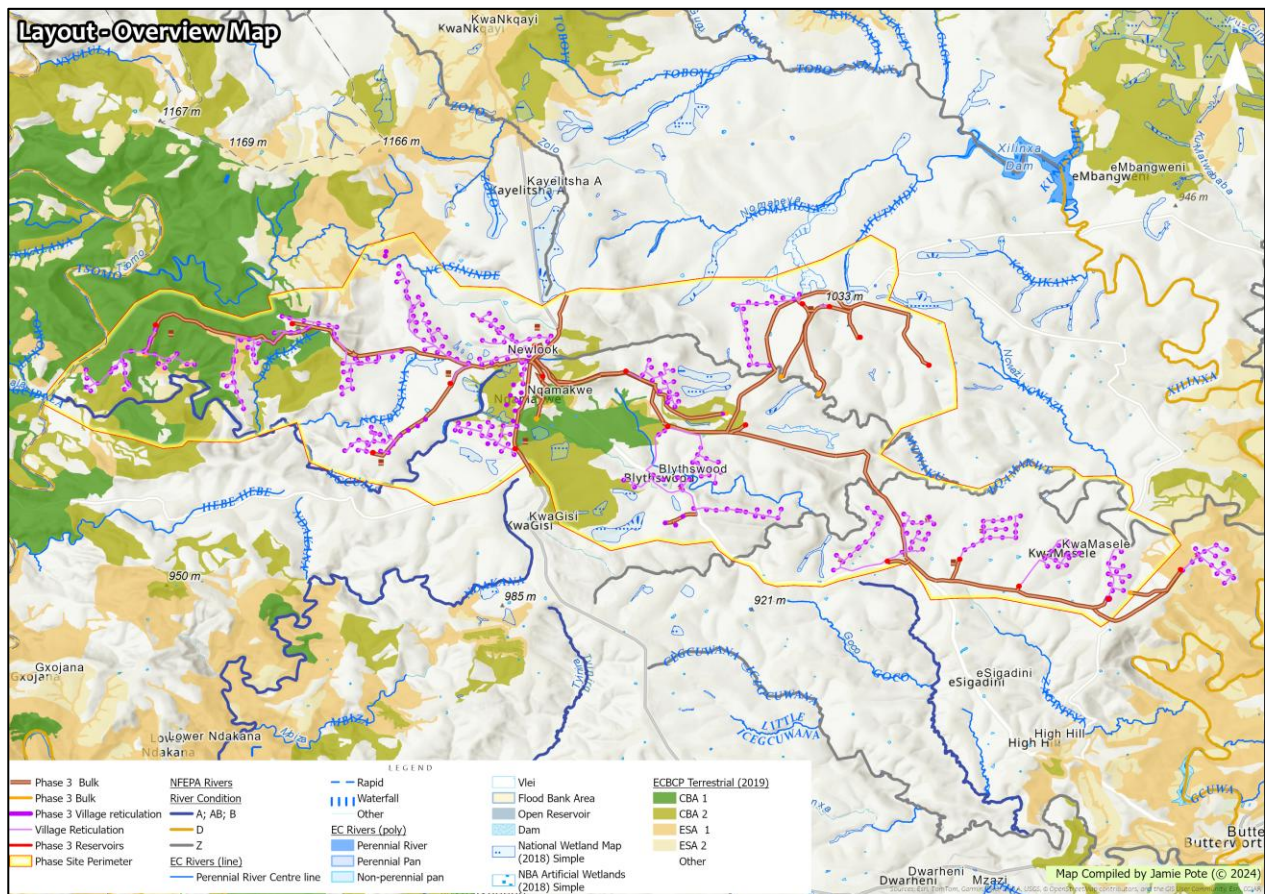


Figure 23: Eastern Cape Biodiversity Sector Plan (2019) – site does overlap with ESA designated areas.

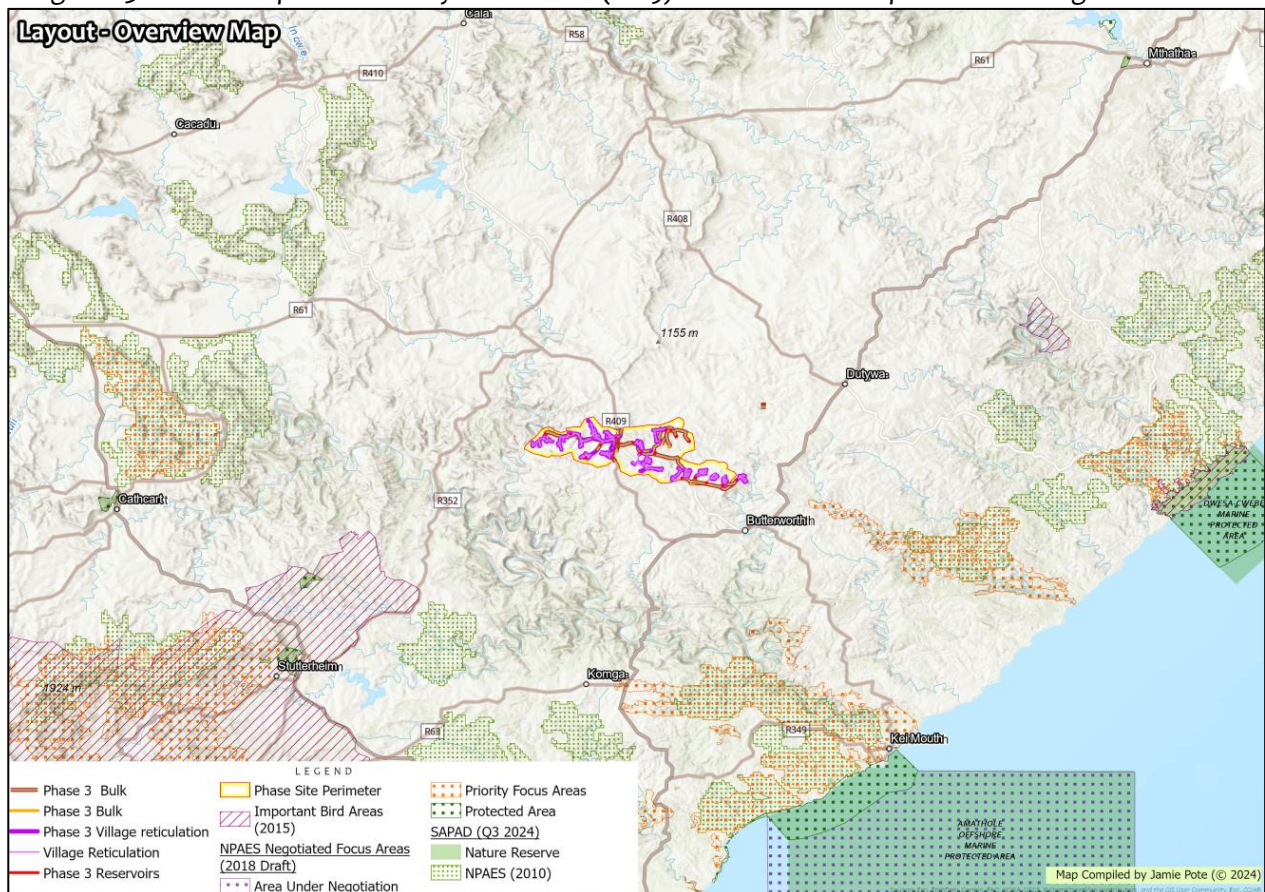


Figure 24: Protected Areas and NPAES in vicinity.

Plant Species (Flora)

National Environmental Screening Tool flagged several flora species. The proposed pipeline & associated infrastructure (reservoir) is situated in degraded grassland and disturbed areas adjacent to existing roads and tracks and through settlements. The flagged species are not present along the pipeline route, in the vicinity of the reservoirs, nor in proximity. Several of the listed Sensitive Species (flora) are also species that are harvested for traditional medicinal purposes, and if any were present historically, they are no longer present.

The specialist thus disputes the medium flora ('plant') species sensitivity designation, and the specialist designates a low plant species sensitivity.

Animal Species (Fauna)

National Environmental Screening Tool flagged several fauna species. The proposed pipeline & associated infrastructure (reservoir) is situated in degraded grassland and disturbed areas adjacent to existing roads and tracks and through settlements and no suitable habitat remains for faunal species of conservation concern nor were any recorded. No faunal species of conservation concern are thus present along the pipeline route and nor in proximity to associated infrastructure (reservoirs).

The specialist thus disputes the medium fauna ('animal') species sensitivity, and the specialist designates a low animal species sensitivity.

Aquatic

The pipeline traverses a watercourse; however Aquatic aspects are beyond the scope of this Terrestrial Biodiversity assessment but is given consideration to terrestrial processes that may be influenced by nearby aquatic component. No impact of consequence is expected as riparian vegetation is degraded, and no significant loss of intact riparian vegetation is likely.

8.7.9 Conclusions

The site verification thus confirms that the pipeline & associated infrastructure (reservoirs) do not fall within any sensitive terrestrial biodiversity habitat, it is within a degraded rural settlement landscape. The degraded nature of the footprint is also unlikely to provide suitable habitat for any flagged flora (plant) or fauna (animal) species of conservation concern, and no fauna (animal) or flora (plant) species of conservation concern were recorded nor are likely to occur in proximity due to the degraded nature of the route. Several of the listed Sensitive Species (flora) are also species that are harvested for traditional medicinal purposes, and if any were present historically, they are no longer present.

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