# THEMBALETHU UPGRADED INFORMAL SETTLEMENT PROJECT (UISP):

# BULK SERVICES TERRESTRIAL FAUNA & FLORA SPECIALIST STUDY FOR BASIC ASSESSMENT

## DEA&DP Ref No: 16/3/1/1/D2/50/0060/12

**PRODUCED FOR CAPE EAPRAC**

**ON BEHALF OF GEORGE MUNICIPALITY**

**BY**

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***DECLARATION OF CONSULTANTS' INDEPENDENCE***

I Simon Todd, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

**Note:** The terms of reference must be attached.

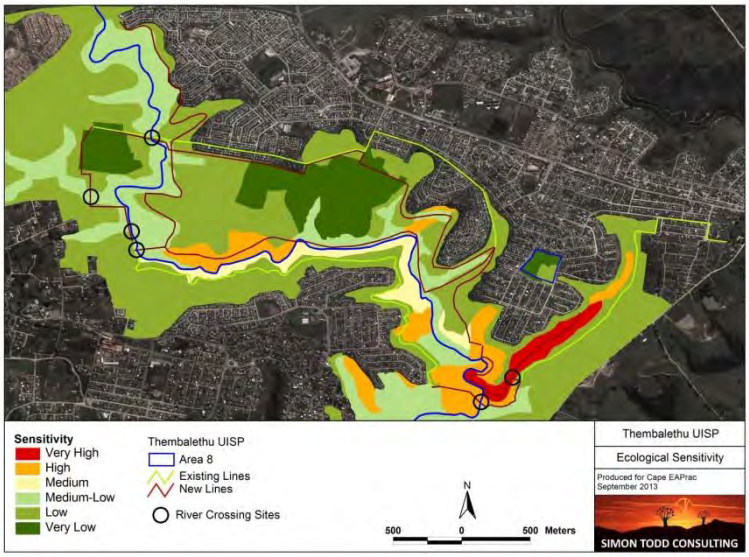
Simon Todd Pr.Sci.Nat 400425/11.

***EXECUTIVE SUMMARY***

This report details the impacts of the development of bulk sewer infrastructure, as well as the housing on Area 8a&b, at Thembalethu near George in the Western Cape on the fauna and flora of the area as part of the Basic Assessment process required for the development.

A three-day site visit and associated desktop review of the available ecological information was conducted to assess the presence and distribution of ecologically sensitive, species and habitats at the site. An ecological sensitivity map for the site was generated which is depicted below. The field assessment reveals that the site is largely highly degraded as a result of alien plant invasion, previous transformation and high levels of anthropogenic impact. Areas where the vegetation can be considered to be in a natural to near-natural condition are limited in extent.

*Ecological Sensitivity Map:*




The intact areas include fynbos and Afrotemperate Forest patches. Although these areas are considered sensitive and retain significant biodiversity, the long-term viability and persistence of these areas is uncertain due to the high alien plant invasion pressure as well as anthropogenic impacts such as hunting, livestock grazing and collection of plants for traditional medicine.

The most sensitive area identified during the site visit was a forest patch near to the Thembalethu No.6 Pump Station. The construction of the sewer access track will facilitate access to this area which currently represents a relatively safe refuges for fauna and flora. Options which can avoid impact this sensitive area should be investigated if possible. This might include investigating an alternative alignment of the sewer line onto the other side of the tributory which would avoid a greater portion of the forest, or if this is not feasible, building this section of line without the access track.

Mitigation at the site should focus on avoidance of sensitive areas where possible and reducing the development footprint as far as possible, as well as ensuring that the construction approach results in a robust end result which resists impacts such as erosion as the long-term maintenance of the access of the track by the municipality is unlikely.

Overall, the impacts of the development of the bulk sewer infrastructure at Thembalethu are likely to be of local extent, moderate to low intensity and of overall low significance. A summary of the impacts associated with the development is provided below.

Summary assessment of the pre- and post-mitigation impacts associated with the development of the bulk services infrastructure at Thembalethu.

| Phase | Pre Mitigation | Post Mitigation |
|---|---|---|
| **Construction** | | |
| Loss of Vegetation and Listed Species | Medium | Medium-Low |
| Faunal Impacts | Medium | Medium-Low |
| **Operation** | | |
| Alien Plant Invasion Risk | Medium | Low |
| Increased Erosion Risk | Medium | Low |
| **Cumulative Impact** | | |
| Reduced ability to meet conservation obligations & targets | Low | Very Low |
| Impact on Critical Biodiversity Areas and disruption of broad-scale ecological processes | Low | Low |

# 1 INTRODUCTION

Cape Environmental Assessment Practitioners (Cape EAPrac) has been appointed by the Applicant, George Local Municipality to facilitate the legally required Basic Assessment process in terms of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended) for the proposed Thembalethu Upgraded Informal Settlement Project – Area 8 A&B & Thembalethu Bulk Services. The components covered under the basic assessment include a new and upgraded sewerage reticulation system, as well as formalizing the housing and services within Area 8A and Area 8B (Erf 4056 & Erf 4055), within Thembalethu. As part of the BA process, a specialist ecological assessment is required and to these ends Cape EAPrac has appointed Simon Todd Consulting to provide an assessment of the likely impact of the development on the fauna and flora of the site. The full details of the development, as well as the scope of the current study are detailed below.

## *1.1 SCOPE OF STUDY*

The scope of the study includes the following activities

- a description of the environment that may be affected by the activity and the manner in which the environ mint may be affected by the proposed project
- a description and evaluation of environmental issues and potential impacts (incl. using direct, indirect and cumulative impacts) that have been identified
- a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts
- an indication of the methodology used in determining the significance of potential environmental impacts
- an assessment of the significance of direct indirect and cumulative impacts in terms of the following criteria :
    - the nature of the impact, which shall include a description of what causes the effect, what will be affected and how it will be affected
    - the extent of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international
    - the duration of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0-5 years), medium-term (5- 15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity) or permanent
    - the probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood) probable (distinct possibility),

highly probable (most likely), or definite (Impact will occur regardless of any preventable measures)
    - the severity/beneficial scale indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit) severe/beneficial (long-term impact that could be mitigated/long-term benefit) moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight or have no effect
    - the significance which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high
    - the status which will be described as either positive, negative or neutral
    - the degree to which the impact can be reversed
    - the degree to which the impact may cause irreplaceable loss of resources
    - the degree to which the impact can be mitigated

- a description and comparative assessment of all alternatives
- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMPr)
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- a description of any assumptions uncertainties and gaps in knowledge
- an environmental impact statement which contains :
    - a summary of the key findings of the environmental impact assessment;
    - an assessment of the positive and negative implications of the proposed activity;
    - a comparative assessment of the positive and negative implications of identified alternatives

**General Considerations:**

- Disclose any gaps in information or assumptions made.
- Recommendations for mitigatory measures to minimise impacts identified.
- An outline of additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the Environmental Management Plan (EMP) for flora & faunal related issues.

A description of the potential impacts of the development and recommended mitigation measures are to be provided which will be separated into the following project phases:

- Construction
- Operational phase

### 1.2 ASSESSMENT APPROACH & PHILOSOPHY

The assessment will be conducted according to the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 as well as within the best-practice guidelines and principles for biodiversity assessment as outlined by Brownlie (2005) and De Villiers et al. (2005).

This includes adherence to the following broad principles:

- That a precautionary and risk-averse approach be adopted towards projects which may result in substantial detrimental impacts on biodiversity and ecosystems, especially the irreversible loss of habitat and ecological functioning in threatened ecosystems or designated sensitive areas: i.e. Critical Biodiversity Areas (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans) and Freshwater Ecosystem Priority Areas.

- Demonstrate how the proponent intends complying with the principles contained in section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA), which, amongst other things, indicates that environmental management should.

    - In order of priority aim to: avoid, minimise or remedy disturbance of ecosystems and loss of biodiversity;
    - Avoid degradation of the environment;
    - Avoid jeopardising ecosystem integrity;
    - Pursue the best practicable environmental option by means of integrated environmental management;
    - Protect the environment as the people's common heritage;
    - Control and minimise environmental damage; and
    - Pay specific attention to management and planning procedures pertaining to sensitive, vulnerable, highly dynamic or stressed ecosystems.

These principles serve as guidelines for all decision-making concerning matters that may affect the environment. As such, it is incumbent upon the proponent to show how proposed activities would comply with these principles and thereby contribute towards the achievement of sustainable development as defined by the NEMA.

In order to adhere to the above principles and best-practice guidelines, the following approach forms the basis for the study approach and assessment philosophy:

The study will include data searches, desktop studies, site walkovers / field survey of the property and baseline data collection, describing:

- A description of the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of **pattern**, the following will be identified or described:

***Community and ecosystem level***

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
- Threatened or vulnerable ecosystems (*cf. new SA vegetation map/National Spatial Biodiversity Assessment1, fine-scale systematic conservation plans, etc*).

***Species level***

- Red Data Book species (giving location if possible using GPS)
- The viability of an estimated population size of the RDB species that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)
- The likelihood of other RDB species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

***Fauna***

- Describe and assess the terrestrial fauna present in the area that will be affected by the proposed development.
- Conduct a faunal assessment that can be integrated into the ecological study.
- Describe the existing impacts of current land use as they affect the fauna.
- Clarify species of special concern (SSC) and that are known to be:
- endemic to the region;
- that are considered to be of conservational concern;
- that are in commercial trade (CITES listed species);
- or, are of cultural significance.

- Provide monitoring requirements as input into the Environmental Management Plan (EMP) for faunal related issues.

***Other pattern issues***

- Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.

In terms of **process**, the following will be identified or described:

- The key ecological "drivers" of ecosystems on the site and in the vicinity, such as fire.
- Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. *corridors* such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and *vegetation boundaries* such as edaphic interfaces, upland-lowland interfaces or biome boundaries)
- Any possible changes in key processes e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
- Furthermore, any further studies that may be required during or after the EIA process will be outlined.
- All relevant legislation, permits and standards that would apply to the development will be identified.
- The opportunities and constraints for development will be described and shown graphically on an aerial photograph, satellite image or map delineated at an appropriate level of spatial accuracy.

### *1.3 RELEVANT ASPECTS OF THE DEVELOPMENT*

The aspects covered in this report include the new and upgraded sewerage reticulation system for Thembalethu as well as formalizing the housing within Area8A and B. The main components of the development consist of the following:

- New bulk gravity and rising mains totalling a distance of approximately 8km, mainly to provide service for UISP Areas 1, 5, 6A, 6B and 2.
- Upgrade to the Pacaltsdorp No.1 Sewer Pump Station as well as the Thembalethu No. 6 Sewer Pump Station.
- Upgrade to Pumpstations 3 and 5 and installation of associated rising main sewer lines.
- Several pipe bridges over the Schaapkop River or tributories.

A detailed description of the development is provided elsewhere and only the aspects pertinent to this study are described in detail here. Of revelance to the current study is the following:

- The bulk sewers will be installed by creating a bench along the side slope of the generally steep Schaapkop River valley. The bench provides an access track that can be used to service and maintain the sewer line which would run next to or beneath the access track with manholes at regular intervals. The cut slope will be stabilised with gabions where required. Both the track and the pipelines utilise the same tributary / stream crossings, but the access track does not traverse the main Schaapkop River.
- A number of pipe bridges are required to traverse the Schaapkop River, as well as the tributaries.
    - A 60m long concrete pipe bridge is proposed over the tributary of the Schaapkop River, near the Thembalethu No. 6 Pump Station, noted as Crossing 5 in the layout diagram below (No. 108429 GE 400 Rev.F).
    - Shorter concrete bridges are required at crossings labelled 2 and 3 below.
    - A 30m post-tensioned concrete pipe bridge, adjacent to Pacaltsdorp No.1 Pump station, noted as Crossing 6 in the layout diagram.
    - River Crossing 1 across the existing steel-bridge structure from Pump station 6.
    - A 50m concrete pipe bridge, from Thembalethu No.5 Pump station to the WWTW, noted as Crossing 4 in the layout diagram.
    - All of the pipe bridges are above the 1:100 year floodline and would be supported by concrete piles, located outside the 1:100 year flood level and the banks around the piles would be protected by gabions where necessary.
- A number of stream crossings would also be required. The important construction and design features of these includes the following:
    - Adequately sized box culverts are placed over the stream bed. Gabion walls are then constructed over the stream along the box culverts. The space is then filled with road fill material to create an access track and the bulk sewer is laid to the correct level beneath the road between the gabion walls. This design protects the pipeline from vandalism and avoids the need for numerous access tracks down the steep slope.

- Reno-mattresses are provided ahead and below the gabion walls to prevent under-mining and erosion of the soil on either side of the structure. Gabion walls are also constructed 5 to 10m downstream of the structure in the stream bed to prevent the river cutting back to the gabion structure and undermining it in the future.
- Silt traps are used through the construction process to ensure that silt dislodged by the construction activities is captured in the silt traps and once the flow has stabilised the silt is removed and used to rehabilitate the construction area

- The design and implementation of the stream crossings were observed on the existing bulk sewer line along the southern slope of the Schaapkop River. These structures appear to be robust and ecologically acceptable.


**Figure 1.** Layout of the Thembalethu UISP as provided by Aurecon, the project engineers. The bulk sewers and river crossings along the Schaapkop River are illustrated. Please note that the white and yellow lines on the above diagram indicate the existing sewer lines (not part of this

assessment), while the red, orange and blue lines indicate the proposed sewer gravity lines and rising mains.

# 2 METHODOLOGY

## 2.1 DATA SOURCING AND REVIEW

Data sources from the literature consulted and used where necessary in the study includes the following:

*Vegetation:*

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford 2006) as well as the National List of Threatened Ecosystems (2011), where relevant.
- Information on plant and animal species recorded for the Quarter Degree Square (QDS) 3422 AB was extracted from the SABIF/SIBIS database hosted by SANBI.
- The IUCN conservation status (Table 1) of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2013).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011).
- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).
- The Fine-Scale Conservation Plan for the Garden Route (Holness et al. 2010) was used to identify the Critical Biodiversity Areas and Ecological Support Areas within the site. The associated fine-scale vegetation map was also used to describe the vegetation units at the site in preference to the National Vegetation map with is very coarse in the study area.

*Fauna*

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and various spatial databases (SANBI's SIBIS and BGIS databases).

- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals.
- Apart from the literature sources, additional information on reptiles were extracted from the SARCA web portal, hosted by the ADU, http://vmus.adu.org.za
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site.
- The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria version 2013.1 (See Table 1) and where species have not been assessed under these criteria, the CITES status is reported where possible. These lists are adequate for mammals and amphibians, the majority of which have been assessed, however the majority of reptiles have not been assessed and therefore, it is not adequate to assess the potential impact of the development on reptiles, based on those with a listed conservation status alone. In order to address this shortcoming, the distribution of reptiles was also taken into account such that any narrow endemics or species with highly specialized habitat requirements occurring at the site were noted.

**Table 1.** The IUCN Red List Categories for fauna and flora. Species which fall within the categories in red and orange below, are of conservation concern.

| IUCN Red List Category |
|---|
| **Critically Endangered (CR)** |
| **Endangered (EN)** |
| **Vulnerable (VU)** |
| **Near Threatened (NT)** |
| **Critically Rare** |
| **Rare** |
| **Declining** |
| **Data Deficient - Insufficient Information (DDD)** |
| **Data Deficient - Taxonomically Problematic (DDT)** |
| **Least Concern** |

### *2.2 SITE VISIT*

The site visit took place over three days on the 26th–28th of March 2012. During the site visit, the whole pipeline route was walked and assessed in the field for the presence of sensitive habitats and species. Species lists of fauna and flora were compiled and sensitive locations were marked and mapped where possible with GPS. Specific attention was paid to the river crossings and other potentially sensitive areas.

### *2.3 SENSITIVITY MAPPING & ASSESSMENT*

An ecological sensitivity map of the site was produced by integrating the information collected on-site with the available ecological and biodiversity information available in the literature and various spatial databases. This includes delineating the different habitat units identified in the field and assigning sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed. In the current study mining activities are the major agent of transformation, but may also result from intensive agriculture. Most types of development can proceed within these areas with little ecological impact.
- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. These areas usually comprise the bulk of faunal habitats within an area. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- **Very High** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are highly sensitive and it is not

usually possible to adequately mitigate impacts to these areas due to their high or unique biodiversity value.

- In some situations, areas were also classified between the above categories, such as Medium-High, where it was deemed that an area did not fit well into a certain category but rather fell most appropriately between two sensitivity categories.

### 2.4 SAMPLING LIMITATIONS AND ASSUMPTIONS

The major potential limitation associated with the sampling approach is the narrow temporal window of sampling. Ideally, a site should be visited several times during different seasons to ensure that the full complement of plant and animal species present are captured. However, this is rarely possible due to time and cost constraints and therefore, the representivity of the species sampled at the time of the site visit should be critically evaluated. It was wet during the time of the site visit and the vast majority of plant species were growing and in seed or flower. The conditions at the time of the site visit can be considered near-optimal and this is not seen a limiting factor in the current study.

Faunal activity at the site was relatively low which can be accounted for largely by the location of the site along the urban fringe and fairly strong impacts on the natural parts of the site by human activity, livestock grazing pressure and alien plant invasion. The low level of activity at the site is ascribed to an actual low abundance of fauna at the site and is not considered to be a sampling artefact. The lists of amphibians, reptiles and mammals for the site are however based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. This represents a sufficiently conservative and cautious approach which takes the study limitations into account.

## *3 DESCRIPTION OF THE AFFECTED ENVIRONMENT*

### *3.1 BROAD-SCALE VEGETATION PATTERNS*

According to the national vegetation map (Mucina & Rutherford 2006), the entire site falls within the Garden Route Granite Renosterveld vegetation type. This vegetation type is listed as *Endangered* under the National List of Threatened Ecosystems. Less than 30% of the original extent remains due largely to transformation for agriculture and urbanisation. Although the original extent of this vegetation type is relatively extensive at 43 000ha, only four Red Data plant taxa are known from it.

The national vegetation map is however hopelessly inadequate at the scale of the site, and an abundance of plant communities and vegetation are present. A more accurate depiction of the

situation at the site is provided by the fine-scale vegetation map produced for the Garden Route by Vlok et al. (2008). Strictly speaking this map does not recognise vegetation types but rather habitat types which may consist of a mosaic of vegetation types. Three such habitats are recognised at the site, the valleys are dominated largely by the Groot Brak Rivier and Floodplain habitat type, while the north-facing slopes consist of Herolds Bay Thicket-Grassy Fynbos, and the areas outside of the Schaapkop River valley are all Wolwedans Grassy Fynbos.

In practice, the vegetation of the site consists of a mosaic of habitat types associated with the different aspects, slope positions and disturbance histories of the area. It is clear that many parts of the site are protected from fire by various physical barriers and have not been burnt for a long time and thicket and forest elements are invading these areas as a result. In addition, a large proportion of the river valley is heavily invaded be alien Black Wattle *Acacia mearnsii*, which has had a dramatic and clear impact on the biodiversity of the invaded areas. On some areas higher up the slopes, alien *Pinus spp*. are also a problem. The crests of the hills had generally all been cultivated in the past and currently consist of anthropogenic grasslands, usually with scattered *Pinus* trees. In addition there was very little actual riparian vegetation, probably as a result of the pollution that regularly enters the Schaapkop River from the waste water treatment works as well as the regular overflows from the existing sewer system caused by blockages. The vegetation within the stream and banks consists almost entirely of alien and weedy species such as *Rubus* spp., *Pennisetum clandestinum*, *Solanum mauritanicum* and *Xanthium strumarium*. Of particular significance for the current study is the presence of numerous patches of afrotemperate forest in sheltered sites along the Schaapkop Rvier valley. These varied in their extent of development and maturity, from developing forests dominated by pioneer species such as *Nuxia floribunda*, *Rapanea melanophloeos* and *Virgilia divaricata*, to more mature forests with species such as *Curtisia dentata*, *Cassine peragua*, *Podocarpus falcatus* and *Trimeria grandifolia* subsp. *grandifolia*.

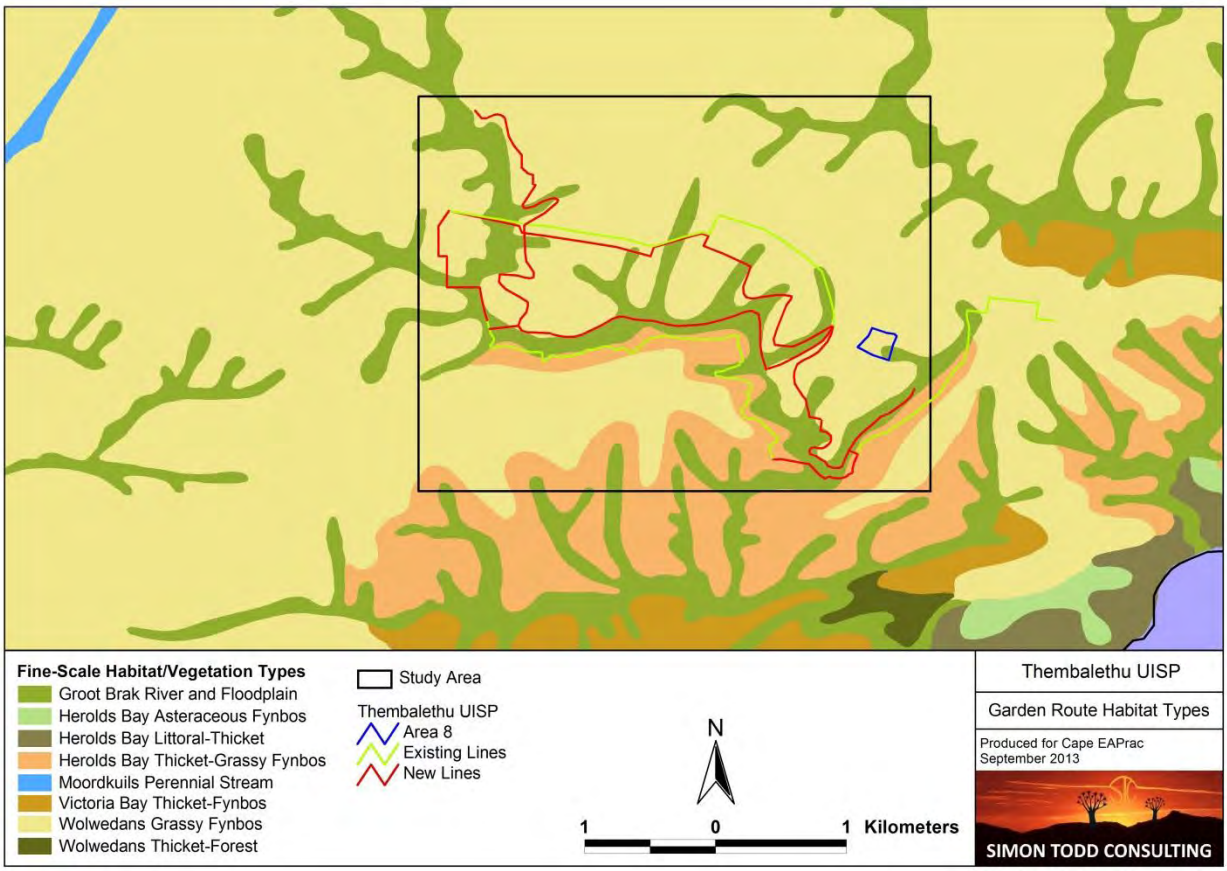



**Figure 2.** The fine-scale vegetation in and around the study area as mapped by Vlok et al. (2008).

The fine-scale habitat map produced for the site, based on the field assessment is depicted below in Figure 3. The map indicates that the majority of areas outside the steep Schaapkop River valley have been transformed and that a large proportion of the habitat within the valley is significantly impacted by alien plant invasion. Notable areas of intact habitat include some fragments of relatively intact Afrotemperate Forest towards the southern end of the site in the vicinity of the Thembalethu No.6 Pump Station, as well as some areas of intact fynbos southwest of the abandoned brickworks. The habitat within Area 8 A and B consists of informal housing or transformed habitat dominated largely by Kikuyu.

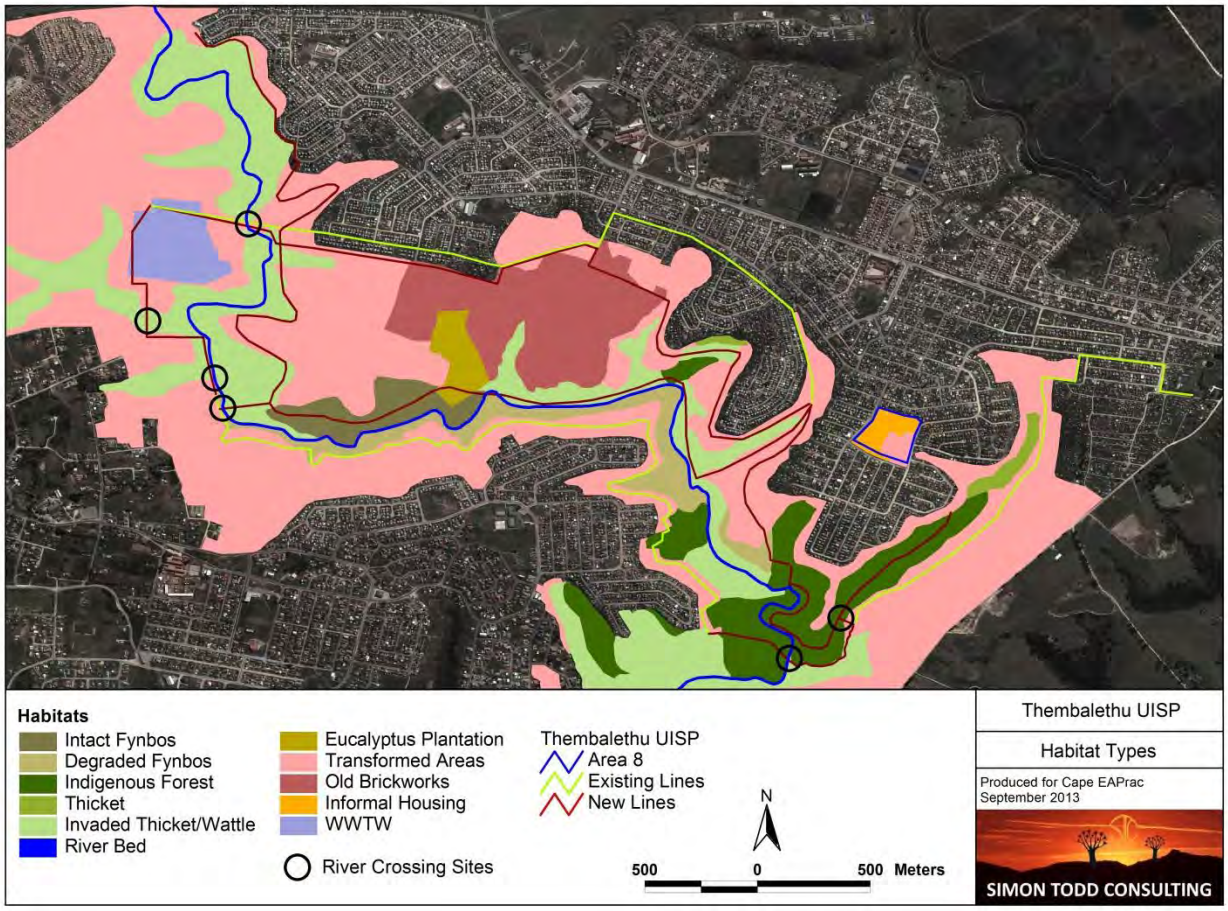



**Figure 3.** Fine-scale habitat map of the Thembalethu study area developed from the field assessment of the site.

### *3.2 EXAMPLES OF MAJOR HABITATS AT THEMBALETHU*

In this section photographs with descriptions of the different areas and major habitats observed at Thembalethu are provided.

### *3.2.1 Indigenous Forest*

The steeper and more sheltered slopes within the Schaapkop River valley consist of Afrotemperate Forest. Although these are degraded and invaded by Black Wattle in some areas, there are also some dense forests that have resisted invasion and are comprised of species such as *Curtisia dentata*, *Cassine peragua*, *Podocarpus falcatus* and *Trimeria grandifolia* subsp. *grandifolia*, with an understorey of ferns, geophytes and lianas.

### *3.2.2 Schaapkop River*


The Schaapkop River is badly degraded, firstly as a result of sewerage effluent entering the stream on a regular basis, and secondly as a result of extensive alien invasion. As can be seen in the images above, the stream banks do not have indigenous riparian vegetation but rather alien species such as kikuyu, wattle and *Xanthium strumarium*.

### *3.2.3 Transformed Areas*

The flatter crests of the hills flanking the Schaapkop River are mostly anthropogenic grasslands resulting from past cultivation and dominated by species such as *Eragrostis curvula*. These areas are also often invaded by wattle or pines. Some of the lower slopes may have small remnant fragments of fynbos present.

Other examples of transformed habitats at the site include Eucalyptus plantations near the old brickworks, as well as the Outeniqua waste water treatment works and surrounding environment. The trees in the drainage valley in the foreground all black wattle with occasional pines.

### *3.2.4 Intact Fynbos*

Example of intact fynbos southwest of the old brickworks. The vegetation is dense and dominated by dense stands of *Berzelia intermedia*. Although the diversity of this area is currently fairly low, it may be significantly higher following fire when it is open and more geophytes and forbs are present.

### *3.2.5 Area 8 A & B*

Area 8 A & B consists of an open area within the township dominated by kikuyu, with some informal houses towards the edges and a small broken earth dam towards the corner. Although the dam has some *Typha capensis* growing in it, it is not likely that the dam is very important for fauna due to the surrounding urbanisation. From an ecological standpoint it would be acceptable to fill the dam as it is not likely to be significantly used by fauna.

## *3.3 LISTED PLANT SPECIES*

Listed species known to occur in the vicinity of the Thembalethu UISP Project are listed below in Table 2. Of these species, two can be confirmed as being present and it is likely that a number of others are present as well. It appears that the forest patches are likely to represent the most important area for listed species as two trees can be confirmed as being present and two others are potentially present. It is also worth noting that *Podocarpus falcatus* which is a nationally protected species occurs in the forest patches. It is not likely that any of the succulent species are present as there did not appear to be any suitable habitat left for such species as the majority of the site was either invaded by aliens of densely vegetated. Although a number of listed fynbos shrubs are known from the area, it is also not highly likely that these are present at the site, as the fragments of fynbos present were very limited in extent and most have not burnt recently and have consequently become very densely vegetated and invaded by thicket species.

**Table 2.** IUCN status of plant species recorded from the vicinity of the Thembalethu UISP Project and the likelihood that they may occur at the site or can be confirmed as being present.

| FAMILY | SPECIES | STATUS | LIKELIHOOD |
|---|---|---|---|
| ASTERACEAE | *Cineraria lobata subsp. lobata* | Declining | Unlikely |
| CELASTRACEAE | *Elaeodendron croceum* | Declining | Possible |
| **MYRSINACEAE** | ***Rapanea melanophloeos*** | **Declining** | **Confirmed** |
| CRASSULACEAE | *Crassula decumbens var. brachyphylla* | NT | Unlikely |
| MESEMBRYANTHEMACEAE | *Cephalophyllum diversiphyllum* | NT | Unlikely |
| **CURTISIACEAE** | ***Curtisia dentata*** | **NT** | **Confirmed** |
| LAURACEAE | *Ocotea bullata* | EN | Likely |
| PROTEACEAE | *Leucospermum formosum* | EN | Possible |
| PROTEACEAE | *Leucospermum glabrum* | EN | Possible |
| RUTACEAE | *Euchaetis albertiniana* | EN | Possible |
| ERICACEAE | *Erica glandulosa subsp. fourcadei* | VU | Possible |
| MESEMBRYANTHEMACEAE | *Glottiphyllum linguiforme* | VU | Unlikely |
| MESEMBRYANTHEMACEAE | *Lampranthus sociorum* | VU | Unlikely |
| PROTEACEAE | *Leucospermum praecox* | VU | Possible |
| IRIDACEAE | *Gladiolus fourcadei* | CR | Possible |

### *3.4 Alien Plant Species Abundance*

Alien species abundance at the site as very high and the majority of areas were either invaded or dominated by alien and weedy species. The most conspicuous and significant alien present is Black Wattle *Acacia mearnsii*, which comprises the bulk of the vegetation within the Schaapkop River valley. Other conspicuous aliens include Bugweed *Solanum mauritanicum*, bramble *Rubus cuneifolius*, Cocklebur *Xanthium strumarium*, Kikuyu *Pennisetum clandestinum*, pines *Pinus radiata* and Bluegum *Eucalyptus grandis*.

### *3.5 Critical Biodiversity Areas & Broad-Scale Processes*

The site lies within the planning area of the Garden Route Initiative (GRI) which forms part of the C.A.P.E. Fine-Scale Biodiversity Planning (FSP) project. The Critical Biodiversity Areas and Ecological Support Areas map for the site is depicted below in Figure 4. As can be seen from the map a large proportion of the site consists of Ecological Support Areas and Critical Biodiversity Areas. The urban sprawl in the Thembalethu area appears to have expanded significantly since the CBA mapping was done as several areas of CBA/ESA are now within developed areas of formal or informal housing. It is also clear from the site visit that a large proportion of the areas under CBA/ESA are very heavily degraded on account of alien infestation, pollution and general degradation. Although there are some intact areas which

retain a significant proportion of the original biodiversity, many of the affected areas are transformed and the development would generate little impact in these areas. Indeed, the transformation layer which accompanies the CBA map (Figure 5) indicates that there are no parts of the site which are considered completely natural and the entire site is considered either degraded, transformed by aliens or farmland. This is not entirely correct as there some parts of the site which can still be considered largely intact with low levels of alien plant infestation. The transformation layer is however not designed for use at very fine scales and so at the scale of the current study, it serves only as a loose guide and does not replace actual field-based evidence.

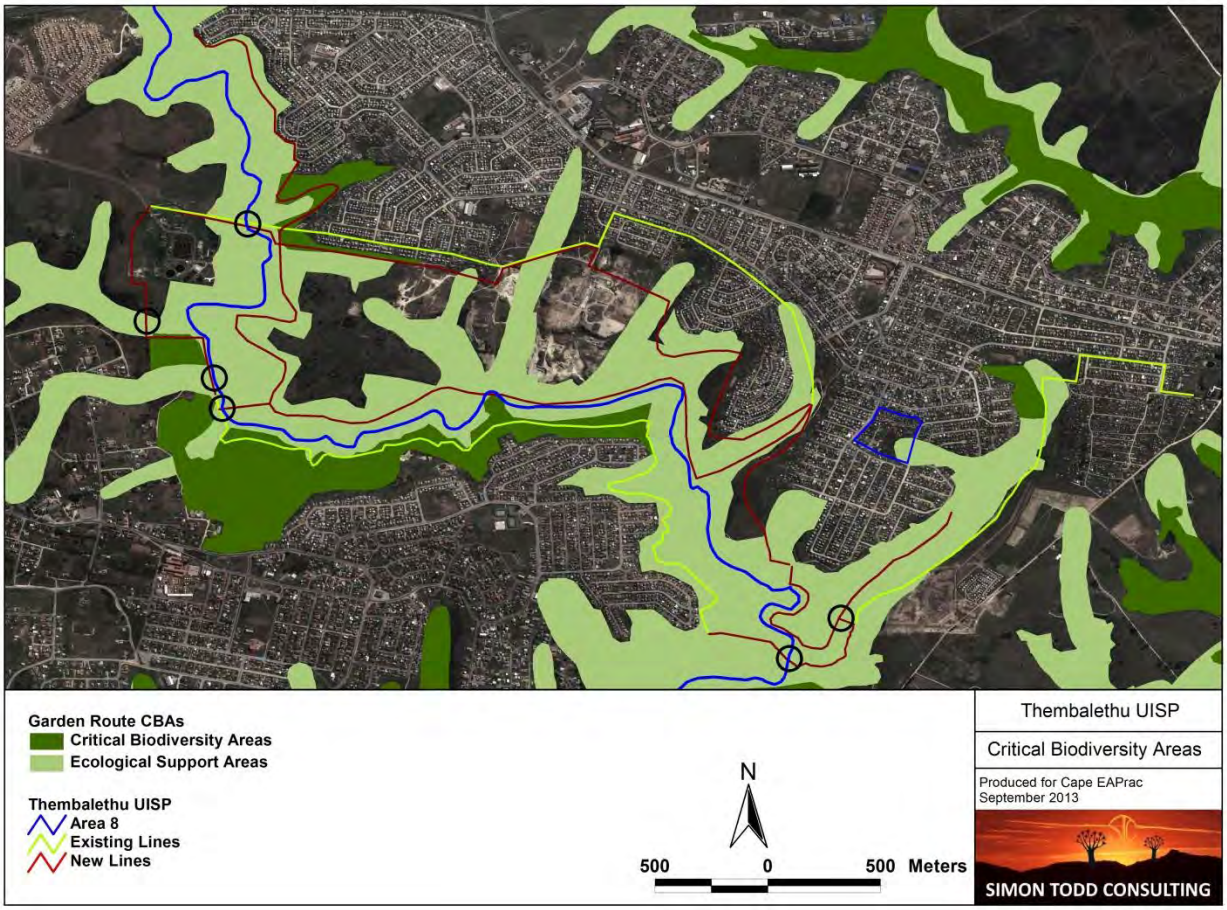



**Figure 4.** Critical Biodiversity and Ecological Support Areas identified by the Garden Route Initiative for the study area. The current development would be largely restricted to Ecological Support Areas and no CBAs would be significantly impacted.

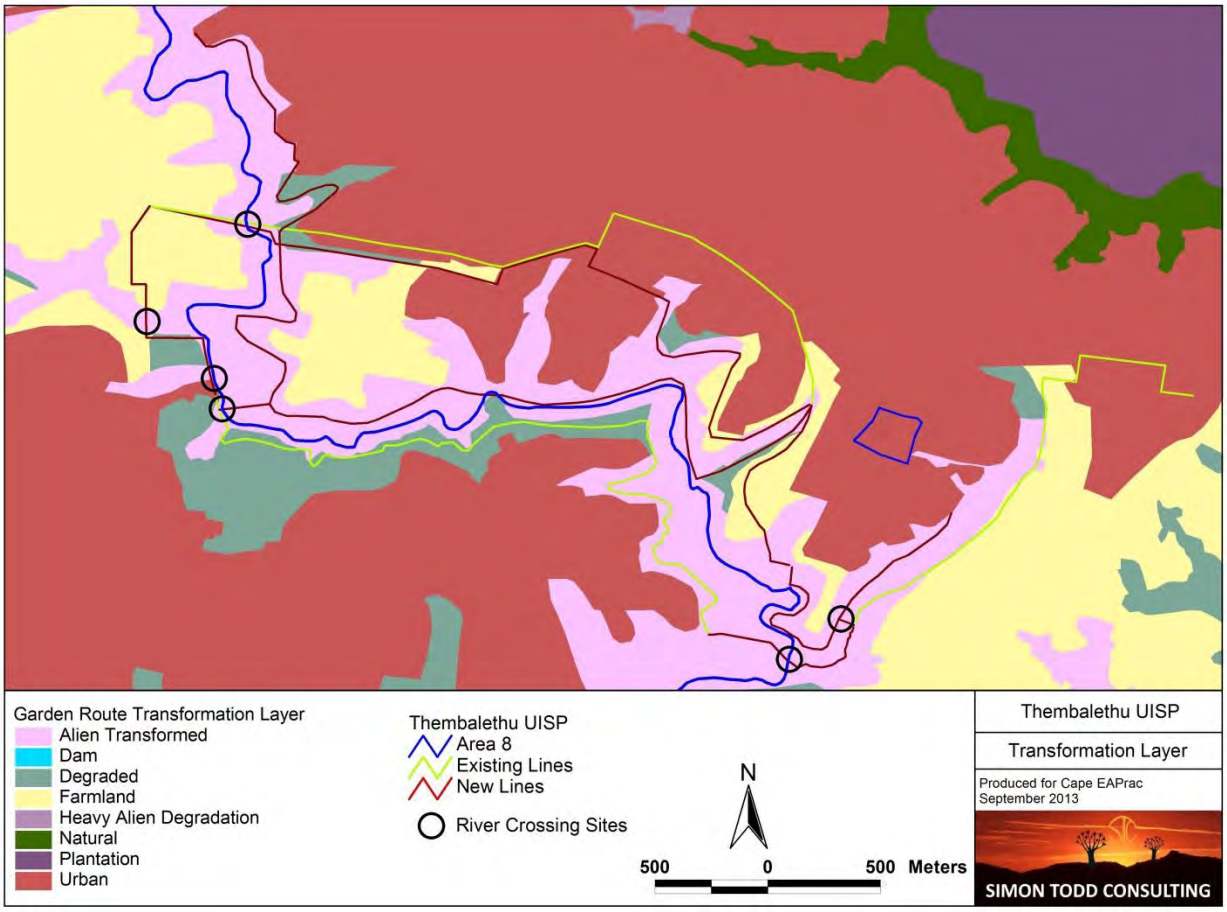



**Figure 5.** Transformation layer for the Thembalethu UISP Project area. The layer indicates that there are no parts of the study area which are considered completely natural, although the field assessment did reveal that there are some restricted areas that can still be considered intact.

### *3.6 FAUNAL COMMUNITIES*

#### *Mammals*

Although as many as 50 different terrestrial mammals are known from the broad area of the study site, a much smaller number would actually be present at the site itself. There is a lot of human activity at the site, including hunting with dogs and only species tolerant of such activity are likely to be present at the site. As such the majority or larger species are not likely to be present, while small or secretive species such rodents and small carnivores are likely to predominate. Species observed include Vervet Monkey, Common Duiker, Bushpig and Cape Porcupine. Three listed mammals may occur at the site, the Honey Badger *Mellivora capensis*,

White-tailed Mouse *Mystromys albicaudatus* and Duthie's Golden Mole *Chlorotalpa duthieae*. It is however unlikely that any of the listed species occur at the site on account of the high levels of human activity or a lack of suitable habitat. The development of the sewer line along the northern slope of the Schaapkop River is however likely to increase access to several areas that are currently inaccessible on account of dense vegetation and steep slopes. This is likely to increase the levels of persecution on mammals within areas that currently act as refuge sites and could result in the local extinction of affected species.

***Reptiles***

The site lies in or near the distribution range of at least 39 reptile species. This is a comparatively low total suggesting that the site has relatively low reptile species richness. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 3 chelonians, 22 snakes, 12 lizards and skinks, 1 chameleon and 1 gecko. The only species observed at the site was the Cape Skink *Mabuya capensis*. Due to the dense vegetation at the site, the abundance and diversity of snakes and other cover seeking species is likely to be relatively high. Species associated with rocky outcrops are not likely to occur within the development footprint as no significant exposed rocky outcrops were observed along the sewer pipeline route. Although the development is likely to result in some habitat loss for reptiles, this effect is not likely to be highly significant. The installation of rock/stone gabion structures associated with stabilisation of the slope benches, access roads and tributary crossings, may in fact create habitat for reptiles such as skinks which favour such habitats.

***Amphibians***

The Thembalethu site lies within or near the range of 15 amphibian species, indicating that the site potentially has a high frog diversity. However, the pollution entering the Schaapkop River from the water treatment works, as well as regular overflows from the sewer lines, is chronic and no amphibians are likely to persist in these areas. Some tadpoles of the Raucous Toad *Amietophrynus rangeri* were observed in one of the tributaries near the water treatment works, and such areas above the outlet from the water treatment works are likely to be the only suitable breeding habitat for water dependent species along the Schaapkop River. There are also some small earth dams outside the river valley that are less polluted and are likely to offer some breeding habitat for amphibians. Overall, the degradation and pollution of the site is likely to have a significant impact on amphibian diversity and it is unlikely that the development would create a significant additional impact on amphibians.

## 4 SITE SENSITIVITY ASSESSMENT

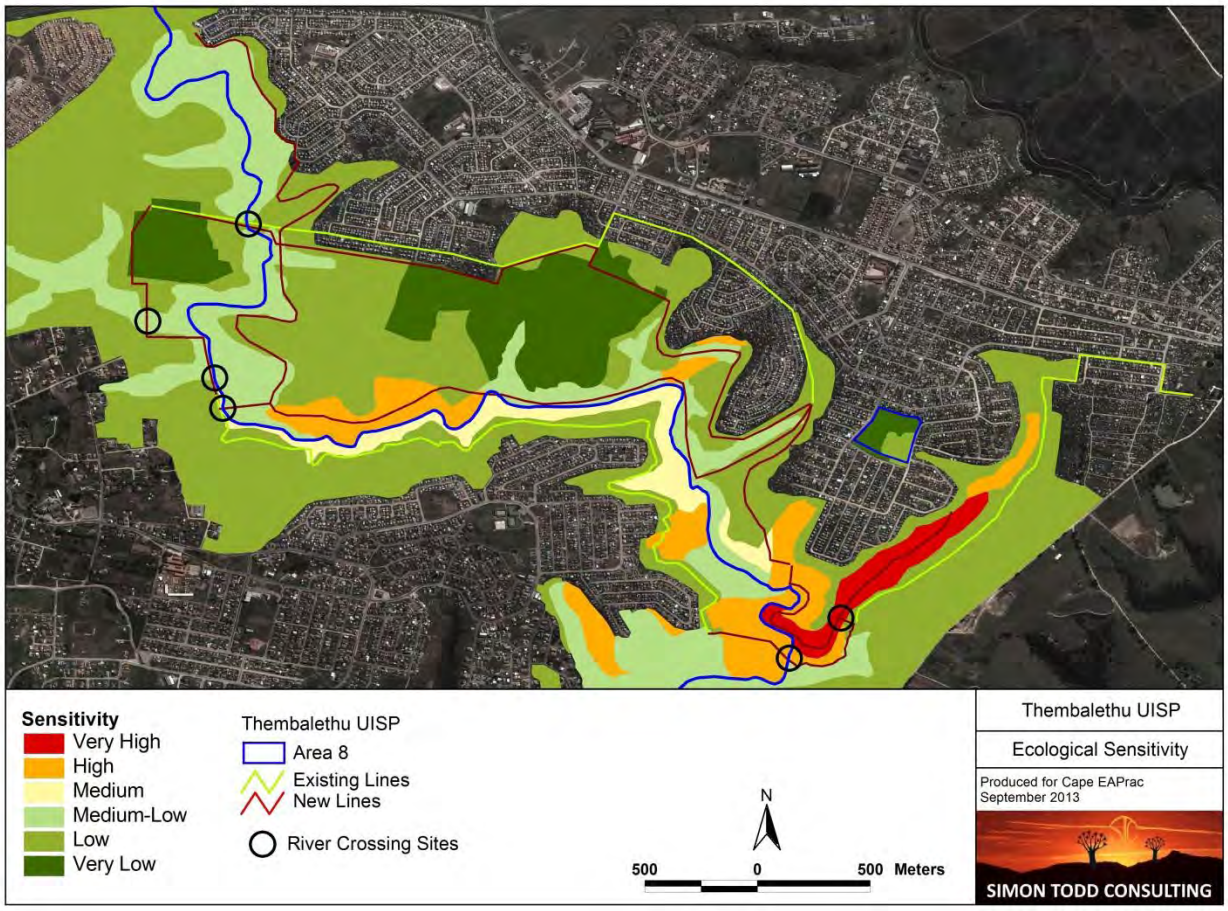



**Figure 6.** Ecological Sensitivity map of the Thembalethu study area. The intact forest patch near the No. 6 Pump Station is considered the most sensitive feature of the site. The circles illustrate the location of the river crossings which are described in more detail below.

The sensitivity map for the Thembalethu study area is depicted above in Figure 6. A large proportion of the site is considered low or very low sensitivity as a result of transformation and other destructive activities. There are however some areas of natural to semi-natural habitat present which are considered moderate to very high sensitivity depending on their condition and composition. Of particular concern is valley along the tributary adjacent to the Thembalethu No. 6 Pump Station. This area consists of dense, mature afrotemperate forest with protected and listed species present including *Curtisia dentata* and *Podocarpus falcatus*. Disturbance within this area should be minimised as much as possible and in particular access to this area should not be facilitated as it has maintained its current state largely through being inaccessible. The alternative option in which the pump stations No 3 is upgraded and a new rising main from the pump station to the Outeniqua WWTW is installed is depicted as the red line running along the northwestern urban edge in Figure 6 above. This option runs through an

extremely impacted environment and negative impacts on biodiversity are not considered a likely impact of this option, should it be used.

In terms of the river crossings required for the major sewer lines the following specific observations and sensitivities were observed at each site:

**River Crossing 1.** This river crossing near the No. 6 Pump Station, will use the existing steel pipe bridge across the Skaapkop River. There is significant disturbance on either side of the river and the vegetation is also dominated by wattle in the immediate area of the pipe bridge and no significant additional impacts are likely to occur as a result of the additional pipeline.

**River Crossing 2.** This river crossing is next to the Pacaltsdorp No.1 Pump Station, across a relatively small tributary. Compared to the Schaapkop River the tributary is in significantly better condition as the water is of a better quality and some aquatic vegetation and fauna are present. The crossing site is however not considered highly sensitive, as there is already a footpath across the river at the site and disturbance of the banks probably originating from the construction of an overflow dam next to the pump station. Within the affected area the vegetation is dominated by alien species such as Kukuyi and Bramble. The river bed is relatively flat and composed of gravel and with standard design and construction phase mitigation as described in the engineering report, the crossing is not likely to disrupt the flow or create significant additional impact.

**River Crossing 3.** This crossing of a small tributary of the Skaapkop River occurs below the Outeniqua WWTW. Although the woody vegetation along the drainage course is all wattle, there is still some fairly diverse grassland along the valley sides. The drainage line itself is probably the least polluted within the site and tadpoles of the Raucous Toad *Amietophrynus rangeri* were observed at the crossing site. The stream is however small and at the crossing site, it is on bedrock so the risk of erosion of the stream bed is very low. The position of the crossing high up the catchment also means that the peak flows will not be very high and so erosion of the banks is also not likely to occur.

**River Crossing 4.** This 50m crossing of the Skaapkop River east of the Outeniqua WWTW occurs within a heavily transformed environment. The river itself is incised with no indigenous riparian vegetation, which is dominated by Kikuyu along the river banks with scattered *Eragrostis curvula* tussocks. There is currently an existing 200mm rising main which is in the stream bed, but will be upgraded and moved to the proposed pipe bridge when it is built. The site is not sensitive and it is highly unlikely that the pipe bridge will generate any significant impacts.

**River Crossing 5.** Is located adjacent to the No. 6 Pump Station and crosses the small tributary to get to the pump station. As already described, this area is considered sensitive on

account of the intact forest. The stream itself is polluted due to untreated sewerage inputs, but the vegetation is sensitive and disturbance in this area would be undesirable. A large proportion of the impact in this area could be avoided by routing the pipeline to the other side of the stream en-route to the pump station.

**River Crossing 6.** Is a 30m concrete pipe bridge across the Schaapkop River near the Pacaltsdorp No.1 Pump station. This area is heavily invaded by Wattle and no significant biodiversity occurs within the footprint and with standard construction-stage mitigation, there are not likely to be significant impacts generated at this site.

In terms of the pump station upgrades the following details were noted:

**Pump Station 3.** The existing pump station will be upgraded or decommissioned. Currently, there are a lot of blockages occurring in this area and so any solution which addresses this problem would be beneficial. The location is not sensitive as it is adjacent to the urban environment and consists of an open slope dominated by Kikuyu. As there is virtually no indigenous biodiversity remaining in this area, upgrading the pump station will not have a negative effect on the local environment.

**Pump Station 5.** The existing pump station will be decommissioned and depending on the options that are followed, a new pump station may be built below the existing pump station. The situation is similar to that at Pump station 3, with the site being immediately adjacent to the urban fringe and within an area that has been transformed will little residual biodiversity. The area that would be affected by the new pump station is not sensitive.

# *5 IMPACT ASSESSMENT*

## *5.1 ASSESSMENT & SIGNIFICANCE CRITERIA*

In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed activity is well understood so that the impacts associated with the activity can be understood. The process of identification and assessment of impacts includes the following:

- Determine the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured.
- Determine future changes to the environment that will occur if the activity does not proceed.

- An understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

As per DEA *Guideline 5: Assessment of Alternatives and Impacts* the following methodology is applied to the predication and assessment of impacts. Potential impacts are rated in terms of direct, indirect and cumulative impacts:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

- **Spatial extent** – The size of the area that will be affected by the impact:
  - Site specific
  - Local (<2 km from site)
  - Regional (within 30 km of site)
  - National.

- **Intensity** –The anticipated severity of the impact:
  - High (severe alteration of natural systems, patterns or processes)
  - Medium (notable alteration of natural systems, patterns or processes)
  - Low (negligible alteration of natural systems, patterns or processes).

- **Duration –The timeframe during which the impact will be experienced:**
  - Temporary (less than 1 year)
  - Short term (1 to 6 years)
  - Medium term (6 to 15 years)

- Long term (the impact will cease after the operational life of the activity)
- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).

***Using the criteria above, the impacts are further assessed in terms of the following:***

**Probability** –The probability of the impact occurring:

- Improbable (little or no chance of occurring)
- Probable (<50% chance of occurring)
- Highly probable (50 – 90% chance of occurring)
- Definite (>90% chance of occurring).

**Significance** – Will the impact cause a notable alteration of the environment?

- Low to very low (the impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making)
- Medium (the impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated)
- High (the impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making).

**Status** - Whether the impact on the overall environment will be:

- positive - environment overall will benefit from the impact
- negative - environment overall will be adversely affected by the impact
- Neutral - environment overall not be affected.

**Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:

- Low
- Medium
- High

**Management Actions and Monitoring of the Impacts (EMP):**

- Where negative impacts are identified, mitigatory measures will be identified to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated

- Where positive impacts are identified, augmentation measures will be identified to potentially enhance positive impacts
- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.

**Cumulative Impact**

Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

## *6 IDENTIFICATION & NATURE OF POTENTIAL IMPACTS*

### *6.1 CONSTRUCTION PHASE*

The following impacts may or are likely to occur during the construction phase of the development:

*Impacts on vegetation and listed plant species*

Some loss of vegetation is an inevitable consequence of the development and cannot be fully mitigated as the access track will remain after the sewer line has been installed. Some listed or protected species are confirmed present within or near the development footprint and an impact on these species as well as any other listed species which may occur at the site is a possibility. Since the listed species observed at the site are all large trees the affected individuals cannot be translocated to mitigate this impact.

*Direct Faunal Impacts*

The construction of the sewer lines will require the operation of earthmoving and other heavy machinery at the site and will generate a lot of disturbance. Smaller fauna such as some reptiles or small mammals would either seek shelter or not be able to move away from construction activity sufficiently quickly during construction and would be killed by vehicles and earth-moving machinery. Although there are some listed fauna known from the area, an impact on such species is not likely given the low probability that they would occur at the site.

### *6.2 OPERATIONAL PHASE*

The following impacts may or are likely to occur during the operational phase of the development:

*Alien Plant Invasion Risk*

The large amount of disturbance created during construction will leave the site vulnerable to alien plant invasion. Large parts of the site are however already heavily invaded and disturbance in these areas would generate little additional impact. There are however some relatively intact parts of the site and it is highly likely that the disturbance in these areas will facilitate the spread and invasion of alien species into these areas, with negative impacts on biodiversity and ecosystem function.

*Increased Erosion Risk*

Increased erosion risk would result from soil disturbance and the loss of plant cover within cleared and disturbed areas. Parts of the site are very steep and although the bench created for the sewer line and access would be level, the disturbance would leave areas downslope vulnerable to erosion and runoff from the bench or water captured from upslope would also present a risk.

### *6.3 CUMULATIVE IMPACTS*

*Reduced ability to meet conservation obligations & targets*

The cumulative loss of currently intact habitat within listed vegetation types may impact the countries' ability to meet its conservation targets. The site lies within the Garden Route Granite Renosterveld vegetation type which is listed as Endangered under the National List of Threatened Ecosystems and any further loss of this vegetation type would be considered highly undesirable. The extent of intact habitat at the site is however low and the amount of habitat that would be lost within these areas would be similarly low. In addition, the fragmentation of the surrounding landscape and the high anthropogenic impact in the area suggests that the long-term viability of the remnant patches is probably compromised.

*Impact on Critical Biodiversity Areas and disruption of broad-scale ecological processes*

Transformation within CBAs and ESAs would potentially disrupt the functioning of the CBAs or result in biodiversity loss. In addition, the presence of the sewer line with access track will increase the fragmentation of habitat and increase access to a significant area of currently inaccessible areas which may have negative consequences for biodiversity in these areas due to increased levels of hunting or plant collection. The

area is already highly fragmented and impacted and the sewer line will fragment the major unfragmented portion of the site.

# 7 ASSESSMENT OF IMPACTS

## 7.1 CONSTRUCTION

| Nature of impact | Spatial Extent | Duration | Intensity | Probability | Reversibility | Mitigation/Management Actions | Significance and Status | | Confidence level |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Without Mitigation | With Mitigation | |
| Impacts on vegetation and listed or protected plant species resulting from construction activities | Local | Long-Term | Medium-High | Highly Probable | Low | • Preconstruction walk-through of the sewer line route within the identified sensitive areas for species of conservation concern that can be translocated or avoided in the case of especially large specimens of trees.<br>• Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.<br>• Eco to provide supervision and oversight of vegetation clearing activities within sensitive areas.<br>• Minimise the footprint of the development within the sensitive areas. In particular the option of not maintaining an access track along the forested section near the No. 6 Pump Station should be considered. | Medium Negative | Medium-Low Negative | High |

| Nature of impact | Spatial Extent | Duration | Intensity | Probability | Reversibility | Mitigation/Management Actions | Significance and Status | | Confidence level |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Without Mitigation | With Mitigation | |
| | | | | | | • The section through the forest could be built by hand if possible without the construction of a track.<br>• Alternatively, the possibility of a different route to the pump station could be investigated. | | | |

| Nature of impact | Spatial Extent | Duration | Intensity | Probability | Reversibility | Mitigation/Management Actions | Significance and Status | | Confidence level |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Without Mitigation | With Mitigation | |
| Direct Faunal Impacts During Construction | Local | Short-Term | Medium | High | High | • All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.<br>• Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer.<br>• All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.<br>• If trenches need to be dug for the sewer | Medium | Medium-Low | High |

| Nature of impact | Spatial Extent | Duration | Intensity | Probability | Reversibility | Mitigation/Management Actions | Significance and Status | | Confidence level |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Without Mitigation | With Mitigation | |
| | | | | | | lines, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. | | | |

### *7.2 OPERATION*

| Nature of impact | Spatial Extent | Duration | Intensity | Probability | Reversibility | Mitigation/Management Actions | Significance and Status | | Confidence level |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Without Mitigation | With Mitigation | |
| Alien Plant Invasion Risk During Operation | Local | Long-term | Medium-High | High | Low | • Topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.<br>• Seeding with grass along the steep banks with species such as *Eragrostis curvula* to create a perennial plant cover which discourages alien invasion.<br>• Regular alien clearing within the sensitive areas such as the intact forest patches along the access track. | Medium Negative | Low Negative | High |
| Soil Erosion Risk During Operation | Local | Long-term | Medium-High | High | Low | • Regular monitoring for erosion problems along the access track, especially in areas where runoff gets onto the bench from upslope.<br>• Erosion problems should be rectified on a regular basis.<br>• Culverts and pipe bridges should be inspected on a regular basis for erosion problems and rectified where necessary. | Medium Negative | Low Negative | High |

### 7.3 CUMULATIVE IMPACTS

| Nature of impact | Spatial Extent | Duration | Intensity | Probability | Reversibility | Mitigation/Management Actions | Significance and Status | | Confidence level |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Without Mitigation | With Mitigation | |
| Reduced ability to meet conservation obligations & targets | Regional | Long-Term | Low | Low | Moderate | • Minimise the development footprint as far as possible.<br>• Evaluate options for minimising the footprint within the currently intact areas, such as the possibility of certain sections with no access road or alternative methods of reducing the footprint. | Low Negative | Very Low Negative | Moderate-High |
| Impact on Critical Biodiversity Areas and disruption of broad-scale ecological processes | Local | Long-Term | Medium | High | Low | • Minimise the development footprint as far as possible.<br>• Avoid creating access through currently inaccessible areas such as the forest patches near the No. 6 Pump Station. | Low Negative | Low Negative | Moderate-High |

### 7.4 NO-GO ALTERNATIVE

The no-go alternative would result in the bulk sewer infrastructure not being built, which would give rise to a number of impacts. The existing system is overloaded and blockages which result in pollution and sewerage spilling into the Schaapkop River is currently a common occurrence. In addition, the lack of proper sewerage reticulation in the new extensions of Thembalethu would generate a range of environmental and health problems. Although the development of the bulk sewer system will have a negative impact on the receiving environment, in the long-term these are likely to be less than those generated by the no-go alternative. Therefore, the development must be viewed in a positive light when compared to the no-go alternative.

### 7.5 SUMMARY ASSESSMENT

The summary assessment for the impacts associated with the development of bulk-service sewer infrastructure at Thembalethu is provided below in Table 3. All of the impacts assessed can be reduced to a low level through mitigation and there are no impacts present which are likely to represent a red-flag for the development. The majority of impact is associated with the construction phase as a result of the large amount of disturbance that will occur at this time. The significance of these impacts is however moderate to low on account of the transient nature of the construction phase as well as the degraded nature of the receiving environment.

**Table 2.** Summary assessment of the pre- and post-mitigation impacts associated with the development of the bulk services infrastructure at Thembalethu.

| Phase | Pre Mitigation | Post Mitigation |
|---|---|---|
| **Construction** | | |
| Loss of Vegetation and Listed Species | Medium | Medium-Low |
| Faunal Impacts | Medium | Medium-Low |
| **Operation** | | |
| Alien Plant Invasion Risk | Medium | Low |
| Increased Erosion Risk | Medium | Low |
| **Cumulative Impact** | | |
| Reduced ability to meet conservation obligations & targets | Low | Very Low |
| Impact on Critical Biodiversity Areas and disruption of broad-scale ecological processes | Low | Low |

# *8 CONCLUSION & RECOMMENDATIONS*

The area affected by the construction of the bulk-service sewer infrastructure at Thembalethu is largely highly ecologically degraded and the prospects for rehabilitation of the affected areas would be very low. If the affected ecosystems were intact, then the impact of the proposed development would be considered to be very high and the development would likely be considered to be fatally flawed. However, the current state of the affected habitats is generally very poor and areas which can be considered to be reasonably intact are limited in extent. Although some of these, such as the forest patches, are considered sensitive and retain significant biodiversity, the long-term viability and persistence of these areas is uncertain due to the high alien plant invasion pressure as well as the anthropogenic impacts such as hunting, livestock grazing and collection of plants for traditional medicine. Given the landscape context of these areas and their proximity to Thembalethu, there do appear to be many viable conservation options that could improve the long-term conservation value and ecological functioning of these areas. In addition, standard mitigation measures such as alien clearing along the access track are of limited value in the current context due to the overwhelmingly degraded and already invaded nature of the surrounding landscape. Consequently, mitigation should focus on avoidance of sensitive areas where possible and reducing the development footprint as far as possible, as well as ensuring that the construction approach results in a robust end result which resists erosion as the long-term maintenance of the access of the track by the municipality is unlikely.

The Schaapkop River itself appears to be largely sterile as a result of regular pollution from the existing sewer system which is overloaded as well as input from the waste water treatment works. Only the upper reaches of the stream above the inlet from the waste water treatment works appears to be ecologically functional. Consequently, the stream itself is not considered highly sensitive in its current state and the development is not likely create a significant impact on the in-stream biota.

The most sensitive area identified during the site visit was the forest patch near to the No.6 Pump Station. This area is exceptionally steep and densely vegetated, traversing this area on foot is exceptionally difficult, which may be why this area remains relatively free of anthropogenic impact. The construction of the sewer access track will facilitate access to this area which currently represents a relatively safe refuge for fauna and flora in this area. Options for avoiding this area should be investigated and alternative solutions should be found if possible, which can avoid impact this sensitive area. This might include investigating an alternative alignment of the sewer line which avoids a greater portion of the forest, or if this is not feasible, building the line without the access track.

Overall, the impacts of the development of the bulk sewer infrastructure at Thembalethu are likely to be of local extent, moderate to low intensity and of overall low significance.

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## *10 ANNEX 1. LIST OF MAMMALS*

List of mammals which are likely to occur in the vicinity of Thembalethu. Habitat notes and distribution records are based on Skinner & Chimimba (2005), while conservation status is from the IUCN Red Lists 2013.

| Scientific Name | Common Name | Status | Habitat | Likelihood |
|---|---|---|---|---|
| **Afrosoricida (Golden Moles):** | | | | |
| *Amblysomus corriae* | Fynbos Golden Mole | LC | Restricted to fynbos, forest and rensoterveld | High |
| *Chlorotalpa duthieae* | Duthie's Golden Mole | VU | Coastal belt between George and Port Elizabeth | Low |
| Macroscledidea (Elephant Shrews): | | | | |
| *Macroscelides proboscideus* | Round-eared Elephant Shrew | LC | Species of open country, with preference for shrub bush and sparse grass cover, also occur on hard gravel plains with sparse boulders for shelter, and on loose sandy soil provided there is some bush cover | High |
| *Elephantulus myurus* | Eastern Rock Elephant Shrew | LC | Confined to rocky koppies and piles of boulders | High |
| Hyracoidea (Hyraxes) | | | | |
| *Procavia capensis* | Rock Hyrax | LC | Outcrops of rocks, especially granite formations and dolomite intrusions in the Karoo. Also erosion gullies | High |
| **Lagomorpha (Hares and Rabbits):** | | | | |
| *Lepus saxatilis* | Scrub Hare | LC | Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development. | High |
| *Pronologus saundersiae* | Hewitt's Red Rock Rabbit | LC | Closely confined to rocky koppies, rocky kloofs and gorges. | Low |
| Rodentia (Rodents): | | | | |
| *Cryptomys hottentotus* | African Mole Rat | LC | Wide diversity of substrates, from sandy soils to heavier compact substrates such as decomposed schists and stony soils | High |
| *Georychus capensis* | Cape Mole Rat | LC | Sandy soils, in coastal dunes, in sandy alluvium along river systems and montane regions of the Western Cape | High |
| *Hystrix africaeaustralis* | Cape Porcupine | LC | Catholic in habitat requirements. | Confirmed |
| *Graphiurus murinus* | Woodland Dormouse | LC | Woodland, rocky areas and srubland within grassland areas | High |
| *Acomys subspinosus* | Cape Spiny Mouse | LC | Assocaited with rocky areas on mountain slopes in Fynbos | Low |
| *Rhabdomys pumilio* | Four-striped Grass Mouse | LC | Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover. | High |
| *Mus minutoides* | Pygmy Mouse | LC | Wide habitat tolerance | High |
| *Myomyscus verreauxii* | Verreaux's Mouse | LC | Scrub on grassy hillsides and riverine forest | High |
| *Aethomys* | Namaqua Rock | LC | Catholic in their habitat requirements, but where there are | High |

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|---|---|---|---|---|
| *namaquensis* | Mouse | | rocky koppies, outcrops or boulder-strewn hillsides they use these preferentially | |
| *Otomys irroratus* | Vlei Rat | LC | Abundant in habitats associated with damp soil in vleis or along streams and rivers. | High |
| *Gerbillurus paeba* | Hairy-footed Gerbil | LC | Gerbils associated with Nama and Succulent Karoo preferring sandy soil or sandy alluvium with a grass, scrub or light woodland cover | High |
| *Mystromys albicaudatus* | White-tailed Mouse | EN | Variable vegetation, but live in cracks or burrows in the soil | Low |
| *Saccostomus campestris* | Pouched Mouse | LC | Catholic habitat requirements, commoner in areas where there is a sandy substrate. | High |
| *Dendromus melanotis* | Grey Climbing Mouse | LC | Often associated with stands of tall grass especially if thickened with bushes and other vegetation | High |
| *Dendromus mesomelas* | Brants' Climbing Mouse | LC | Associated with rank vegetation, especially tall grass and scrub | High |
| *Steatomys krebsii* | Krebs's Fat Mouse | LC | Prefer a sandy substrate. | High |
| **Primates:** | | | | |
| *Papio ursinus* | Chacma Baboon | LC | Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges. | Low |
| *Cercopithecus mitis* | Vervet Monkey | LC | Most abundant in and near riparian vegetation of savannahs | Confirmed |
| **Eulipotyphla (Shrews):** | | | | |
| **Myossorex longicaudatus** | Long-tailed Forest Shrew | LC | Essentially forest but also ventures into fynbos and other moist habitats | High |
| *Myosorex varius* | Forest Shrew | LC | Prefers moist, densely vegetated habitat | High |
| *Crocidura flavescens* | Greater Red Musk Shrew | LC | Wide habitat tolerance | High |
| **Carnivora:** | | | | |
| *Caracal caracal* | Caracal | LC | Caracals tolerate arid regions, occur in semi-desert and karroid conditions | Low |
| *Felis silvestris* | African Wild Cat | LC | Wide habitat tolerance. | Low |
| *Genetta genetta* | Small-spotted genet | LC | Occur in open arid associations | High |
| *Genetta tigrina* | Large-spotted genet | LC | Fynbos and savanna particularly along riverine areas | High |
| *Cynictis penicillata* | Yellow Mongoose | LC | Semi-arid country on a sandy substrate | Low |
| *Herpestes ichneumon* | Large Grey Mongoose | LC | Associated with riparian conditions | Low |
| *Herpestes pulverulentus* | Cape Grey Mongoose | LC | Wide habitat tolerance | High |
| *Atilax paludinosus* | Marsh Mongoose | LC | Associated with well-watered terrain, living in close association with rivers, streams, marshes, etc. | High |
| *Vulpes chama* | Cape Fox | LC | Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub | Low |
| *Canis mesomelas* | Black-backed Jackal | LC | Wide habitat tolerance, more common in drier areas. | Low |
| *Aonyx capensis* | African Clawless Otter | LC | Predominantly aquatic and do not occur far from permanenet water | Low |

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|---|---|---|---|---|
| *Lutra maculicollis* | Spotted-necked Otter | LC | Confined to larger rivers, lakes ans swamps | Low |
| *Poecilogale albinucha* | African Striped Weasel | LC | Primarily a savanna species that have an annual rainfall of more than 600 mm, although they have been recorded from drier areas. | High |
| *Ictonyx striatus* | Striped Polecat | LC | Widely distributed throughout the sub-region | High |
| *Mellivora capensis* | Ratel/Honey Badger | IUCN LC/SA RDB EN | Catholic habitat requirements | Low |
| **SUIFORMES (Pigs):** | | | | |
| *Potamochoerus larvatus* | Bushpig | LC | Forest, thickets, riparian undercover, reed beds etc | Confirmed |
| **Rumanantia (Antelope):** | | | | |
| *Tragelaphus scriptus* | Bushbuck | LC | Riverine or other types or underbrush near water | High |
| *Philantomba monticola* | Blue Duiker | LC | Confined to forests, thickets and dense coastal bush. | Low |
| *Sylvicapra grimmia* | Common Duiker | LC | Presence of bushes is essential | Confirmed |
| *Pelea capreolus* | Grey Rhebok | LC | Associated with rocky hills, rocky mountainsides, mountain plateaux with good grass cover. | Low |
| *Raphicerus campestris* | Steenbok | LC | Inhabits open country, | Low |
| *Raphicerus melanotis* | Cape Grysbok | LC | Thick scrub bush, particularly along the lower levels of hills | Low |

## *11 ANNEX 2. LIST OF REPTILES*

List of reptiles which are likely to occur in the vicinity of Thembalethu. Habitat notes and distribution records are based on Branch (1998) and Alexander and Marais (2007), while conservation status is from the IUCN Red Lists 2013.

| Scientific Name | Common Name | Distribution | Status | Habitat | Likelihood |
|---|---|---|---|---|---|
| **Tortoises and Terrapins:** | | | | | |
| *Geochelone pardalis* | Leopard Tortoise | Widespread | Least Concern | Varied: not restricted to montane grassland, also occurring in fynbos, valley bushveld, and arid & mesic savannah | Low |
| *Chersina angulata* | Angulate Tortoise | Endemic | Least Concern | Sandy coastal regions, incl valley bushveld & coastal fynbos, scarcer in arid hinterland | High |
| *Pelomedusa subrufa* | Marsh Terrapin | Widespread | Least Concern | Slow-moving & still water, incl temporary pans | High |
| **Snakes:** | | | | | |
| *Rhinotyphlops lalandei* | Delalande's Beaked Blind Snake | Endemic | Least Concern | Varied: semi-desert, coastal bush, fynbos & savannah | High |
| *Rhinotyphlops nigricans* | Black Thread Snake | Endemic | | Fynbos, thicket, grassland and sananna | High |
| *Lycodonomorphus rufulus* | Common Water Snake | Endemic | Least Concern | Temperate distribution from the southwestern Cape | High |
| *Lamprophis capensis* | Brown House Snake | Widespread | Least Concern | Common in highveld grassland & arid karroid regions, but found everywhere & tolerant of urban sprawl | High |
| *Lamprophis inornatus* | Olive House Snake | Widespread | Least Concern | Moist savanna, lowland forest and fynbos | High |
| *Lamprophis guttatus* | Spotted Rock Snake | Endemic | Least Concern | Inland mnts of Cape & Cape fold mnts, extending into S.Namibia | High |
| *Lycophidion capense* | Common Wolf Snake | Widespread | Least Concern | Lowland forest and fynbos to moist savanna, grassland and karoo scrub | Moderate |
| *Pseudaspis cana* | Mole Snake | Widespread | Least Concern | Sandy scrubland in SW Cape, highveld grassland & mountainous & desert regions | High |
| *Duberria lutrix* | Common Slug Eater | Widespread | LC | Largely grassland but also moist savanna, lowland forest and fynbos | High |
| *Amplorhinus multimaculatus* | Many-spotted Snake | Widespread | Least Concern | Reed beds and riverside vegetation in fynbos | High |
| *Prosymna sundevalli* | Sundevall's Shovel-Snout | Endemic | Least Concern | Dry areas, incl savannah woodlands, highveld & karroid areas, entering valley bushved & fynbos in the Cape | High |

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|---|---|---|---|---|---|
| *Psammophylax rhombeatus* | Spotted Or Rhombic Skaapsteker | Widespread | Least Concern | Highland grassveld & fynbos, entering karroid areas | High |
| *Psammophis notostictus* | Karoo Sand or Whip Snake | Widespread | Least Concern | Arid scrubland & karroid regions | High |
| *Psammophis crucifer* | Montane Grass Snake | Endemic | Least Concern | Highveld and montane grassland entering fynbos | High |
| *Dasypeltis scabra* | Common/Rhombic Egg Eater | Widespread | LC | Absent only from true desert & closed-canopy forest | High |
| *Crotaphopeltis hotamboeia* | Herald Snake | Widespread | Least Concern | Terrestrial but more common in wetlands | High |
| *Dispholidus typus* | Boomslang | Widespread | Least Concern | Widespread arboreal species | High |
| *Homoroselaps lacteus* | Spotted Harlequin Snake | Endemic | Least Concern | Deserted termite mounds or under rocks in fynbos, coastal scrub, sananna and grassland | High |
| *Naja nivea* | Cape Cobra | Widespread | Least Concern | Arid karroid regions, particularly along river courses, entering well drained open areas along the southern coast | High |
| *Hemachatus haemachatus* | Rinkhals | Endemic | LC | Grassland from the coast up to 2500 m | High |
| *Bitis arietans* | Puff Adder | Widespread | Least Concern | Absent only from desert & mnt tops | High |
| *Bitis atropos* | Berg Adder | Widespread | LC | Mountain fynbos to montane grassland, from sea level to 3000m | Moderate |
| **Lizard and Skinks:** | | | | | |
| *Acontias meleagris* | Cape Legless Skink | Endemic | Least Concern | Coastal & fynbos vegetation & richer soils associated with dr river courss & inland escarpment | High |
| *Mabuya capensis* | Cape Skink | Widespread | Least Concern | Very varied: arid karroid veld, moist coastal bush, montane grassland, etc | High |
| *Mabuya homalocephala* | Red-sided Skink | Widespread | Least Concern | coastal bush, fynbos and riverine vegetation | High |
| *Pedioplanis lineoocellata* | Spotted Sand Lizard | Endemic | Least Concern | Very varied: karroid veld, valley bushveld & arid & mesic savannah | High |
| *Tropidosaura montana* | Common Mountain Lizard | Widespread | Least Concern | Fynbos and montane grassland | Low |
| *Gerrhosaurus flavigularis* | Yellow-throated Plated Lizard | Widespread | Least Concern | Montane grassland, savanna, bushveld and low open coastal forest | High |
| *Tetradactylus seps* | Short-legged Seps | Widespread | Least Concern | Coastal forests or montain plateaus | High |
| *Chmaesaura anguina* | Cape Grass Lizard | Endemic | Least Concern | Grassy or fynbos covered slopes | High |

| | | | | | |
|---|---|---|---|---|---|
| *Cordylus coeruleopunctatus* | Blue-spotted Girdled Lizard | Narrow Endemic | Least Concern | Rock outcrops in fynbos and forest fringes | Low |
| *Cordylus cordylus* | Cape Girdled Lizard | Endemic | Least Concern | Diverse, coastal cliffs, rock plateaus in fynbos and montane grassland. | High |
| *Pseudocordylus microlepidotus* | Cape Crag Lizard | Endemic | Least Concern | Mountain plateaus & upper slopes in fynbos or montane grassland | Low |
| *Agama atra* | Southern Rock Agama | Endemic | Least Concern | Semi-desert to fynbos, from sea level to mountain tops | High |
| **Chameleons:** | | | | | |
| *Bradypodion damaranum* | Knysna Dwarf Chameleon | Endemic | | Wet coastal forest | High |
| **Geckos:** | | | | | |
| *Afrogecko porphyreus* | Marbled Leaf-toed Gecko | Endemic | Least Concern | Coastal and montane fynbos | Low |

## *12 ANNEX 3. LIST OF AMPHIBIANS*

List of amphibians which are likely to occur in the vicinity of Thembalethu. Habitat notes and distribution records are based on Du Preez and Carruthers (2009), while conservation status is from the IUCN Red Lists 2013.

| Scientific Name | Common Name | Status | Habitat | Distribution | Likelihood |
|---|---|---|---|---|---|
| *Amietophrynus pardalis* | Eastern Leopard Toad | Not Threatened | Thornveld and open savanna in the Eastern Cape | Endemic | Low |
| *Amietophrynus rangeri* | Raucous Toad | Not Threatened | Rivers and stream in grassland and fynbos | Endemic | Confirmed |
| *Vandijkophrynus gariepensis* | Karoo Toad | Not Threatened | Karoo Scrub | Widespread | Low |
| *Vandijkophrynus angusticeps* | Cape Sand Toad | Not Threatened | Temporary rain-filled depressions in sandy soils | Endemic | High |
| *Hyperolius horstockii* | Arum Lily Frog | Not Threatened | Large or small pans, dams. Vleis and slow-flowing streams in coastal fynbos | Endemic | Low |
| *Hyperolius marmoratus* | Painted Reed Frog | Not Threatened | Reeds and other vegetation around water in savanna, grassland and forest | Widespread | Low |
| Semnodactylus wealii | Rattling Frog | Not Threatened | Well vegetated areas around pans and vleis | Widespread | Low |
| *Xenopus laevis* | Common Platanna | Not Threatened | Any more or less permanent water | Widespread | High |
| *Amietia fuscigula* | Cape River Frog | Not Threatened | Large still bodies of water or permanent streams and rivers. | Widespread | Low |
| *Cacosternum nanum* | Bronze Caco | Not Threatened | Breeds in small ponds, dams, vleis, streams, roadside pools or flooded grassland | Endemic | Low |
| *Strongylopus bonaespei* | Banded Stream Frog | Not Threatened | Mountain ranges of the Western Cape | Endemic | Low |
| *Strongylopus fasciatus* | Striped Stream Frog | Not Threatened | Open grassy areas near dams, ponds, or streams | Widespread | Low |
| *Strongylopus grayii* | Clicking Stream Frog | Not Threatened | Winter and summer rainfall areas in the fynbos, Succulent and Nama Karoo | Widespread | Low |
| *Tomopterna delalandii* | Cape Sand Frog | Not Threatened | Lowlands in fynbos and Succulent Karoo | Endemic | High |
| *Tomopterna tandyi* | Tandy's Sand Frog | Not Threatened | Nama karoo grassland and savanna | Widespread | Low |

## *13 ANNEX 4. LIST OF PLANTS*

List of plants which are known to occur in the vicinity of Thembalethu according to the SIBIS database, including their status according to the Red List of South African Plants (2013).

| Family | Species | IUCN Status | Family | Species | IUCN Status |
|---|---|---|---|---|---|
| ACANTHACEAE | *Barleria pungens* | LC | ACANTHACEAE | *Hypoestes aristata var. aristata* | LC |
| ACANTHACEAE | *Hypoestes aristata var. thiniorum* | LC | AIZOACEAE | *Tetragonia decumbens* | LC |
| AIZOACEAE | *Tetragonia fruticosa* | LC | AIZOACEAE | *Tetragonia spicata* | LC |
| AIZOACEAE | *Tetragonia virgata* | LC | ANACARDIACEAE | *Searsia crenata* | LC |
| ANACARDIACEAE | *Searsia glauca* | LC | ANEMIACEAE | *Mohria caffrorum* | LC |
| ANTHERICACEAE | *Chlorophytum cooperi* | LC | APIACEAE | *Berula erecta subsp. thunbergii* | LC |
| APIACEAE | *Centella asiatica* | LC | APIACEAE | *Centella virgata var. virgata* | LC |
| APIACEAE | *Heteromorpha arborescens var. arborescens* | LC | APIACEAE | *Sonderina hispida* | LC |
| APOCYNACEAE | *Acokanthera oppositifolia* | LC | APOCYNACEAE | *Astephanus triflorus* | LC |
| APOCYNACEAE | *Carissa bispinosa* | LC | APOCYNACEAE | *Cynanchum ellipticum* | LC |
| APOCYNACEAE | *Cynanchum obtusifolium* | LC | APOCYNACEAE | *Sarcostemma viminale subsp. viminale* | LC |
| APOCYNACEAE | *Tylophora cordata* | LC | ARALIACEAE | *Cussonia thyrsiflora* | LC |
| ASPARAGACEAE | *Asparagus aethiopicus* | LC | ASPARAGACEAE | *Asparagus falcatus* | LC |
| ASPARAGACEAE | *Asparagus volubilis* | LC | ASPHODELACEAE | *Aloe arborescens* | LC |
| ASPHODELACEAE | *Bulbine lagopus* | LC | ASPLENIACEAE | *Asplenium adiantum-nigrum var. adiantum-nigrum* | LC |
| ASPLENIACEAE | *Asplenium aethiopicum* | LC | ASPLENIACEAE | *Asplenium rutifolium* | LC |
| **ASTERACEAE** | ***Cineraria lobata subsp. lobata*** | **Declining** | ASTERACEAE | *Arctotheca prostrata* | LC |
| ASTERACEAE | *Athanasia juncea* | LC | ASTERACEAE | *Athanasia microcephala* | LC |
| ASTERACEAE | *Athanasia trifurcata* | LC | ASTERACEAE | *Athrixia capensis* | LC |
| ASTERACEAE | *Berkheya armata* | LC | ASTERACEAE | *Chrysanthemoides monilifera subsp. canescens* | LC |
| ASTERACEAE | *Chrysanthemoides monilifera subsp. pisifera* | LC | ASTERACEAE | *Cineraria geifolia* | LC |
| ASTERACEAE | *Conyza scabrida* | LC | ASTERACEAE | *Corymbium glabrum var. glabrum* | LC |
| ASTERACEAE | *Cotula coronopifolia* | LC | ASTERACEAE | *Cotula nigellifolia var. nigellifolia* | LC |
| ASTERACEAE | *Cullumia aculeata var. aculeata* | LC | ASTERACEAE | *Didelta carnosa var. tomentosa* | LC |
| ASTERACEAE | *Dimorphotheca fruticosa* | LC | ASTERACEAE | *Disparago kraussii* | LC |
| ASTERACEAE | *Eriocephalus africanus var.* | LC | ASTERACEAE | *Felicia aethiopica subsp.* | LC |

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|---|---|---|---|---|---|
| | *africanus* | | | *ecklonis* | |
| ASTERACEAE | *Felicia amoena subsp. latifolia* | LC | ASTERACEAE | *Felicia filifolia subsp. bodkinii* | LC |
| ASTERACEAE | *Gazania jurineifolia subsp. scabra* | LC | ASTERACEAE | *Gazania rigens var. leucolaena* | LC |
| ASTERACEAE | *Gazania rigens var. uniflora* | LC | ASTERACEAE | *Gerbera ambigua* | LC |
| ASTERACEAE | *Gerbera cordata* | LC | ASTERACEAE | *Gerbera piloselloides* | LC |
| ASTERACEAE | *Gerbera serrata* | LC | ASTERACEAE | *Gerbera tomentosa* | LC |
| ASTERACEAE | *Helichrysum anomalum* | LC | ASTERACEAE | *Helichrysum asperum var. glabrum* | LC |
| ASTERACEAE | *Helichrysum cymosum subsp. cymosum* | LC | ASTERACEAE | *Helichrysum felinum* | LC |
| ASTERACEAE | *Helichrysum patulum* | LC | ASTERACEAE | *Helichrysum petiolare* | LC |
| ASTERACEAE | *Helichrysum spiralepis* | LC | ASTERACEAE | *Helichrysum teretifolium* | LC |
| ASTERACEAE | *Metalasia acuta* | LC | ASTERACEAE | *Metalasia densa* | LC |
| ASTERACEAE | *Metalasia muricata* | LC | ASTERACEAE | *Metalasia pungens* | LC |
| ASTERACEAE | *Oedera capensis* | LC | ASTERACEAE | *Oedera imbricata* | LC |
| ASTERACEAE | *Oldenburgia paradoxa* | LC | ASTERACEAE | *Plecostachys polifolia* | LC |
| ASTERACEAE | *Plecostachys serpyllifolia* | LC | ASTERACEAE | *Printzia polifolia* | LC |
| ASTERACEAE | *Pseudognaphalium undulatum* | LC | ASTERACEAE | *Relhania calycina subsp. apiculata* | LC |
| ASTERACEAE | *Relhania calycina subsp. calycina* | LC | ASTERACEAE | *Relhania pungens subsp. pungens* | LC |
| ASTERACEAE | *Senecio angulatus* | LC | ASTERACEAE | *Senecio burchellii* | LC |
| ASTERACEAE | *Senecio crenatus* | LC | ASTERACEAE | *Senecio deltoideus* | LC |
| ASTERACEAE | *Senecio ilicifolius* | LC | ASTERACEAE | *Senecio oxyodontus* | LC |
| ASTERACEAE | *Senecio pterophorus* | LC | ASTERACEAE | *Seriphium plumosum* | LC |
| ASTERACEAE | *Stoebe alopecuroides* | LC | ASTERACEAE | *Stoebe microphylla* | LC |
| ASTERACEAE | *Syncarpha paniculata* | LC | ASTERACEAE | *Tarchonanthus camphoratus* | LC |
| ASTERACEAE | *Tarchonanthus littoralis* | LC | ASTERACEAE | *Ursinia chrysanthemoides* | LC |
| ASTERACEAE | *Ursinia heterodonta* | LC | BRASSICACEAE | *Heliophila subulata* | LC |
| BRASSICACEAE | *Lepidium africanum subsp. africanum* | LC | BUDDLEJACEAE | *Buddleja salviifolia* | LC |
| CAMPANULACEAE | *Wahlenbergia desmantha* | LC | CAMPANULACEAE | *Wahlenbergia uitenhagensis var. debilis* | LC |
| CAPPARACEAE | *Capparis sepiaria var. citrifolia* | LC | CAPPARACEAE | *Maerua racemulosa* | LC |
| CARYOPHYLLACEAE | *Pollichia campestris* | LC | CARYOPHYLLACEAE | *Silene eckloniana* | LC |
| CARYOPHYLLACEAE | *Silene undulata* | LC | **CELASTRACEAE** | ***Elaeodendron croceum*** | **Declining** |
| CELASTRACEAE | *Cassine peragua subsp. peragua* | LC | CELASTRACEAE | *Gymnosporia harveyana subsp. harveyana* | LC |
| CELASTRACEAE | *Lauridia tetragona* | LC | CELASTRACEAE | *Maytenus procumbens* | LC |
| CELASTRACEAE | *Mystroxylon aethiopicum subsp. aethiopicum* | LC | CELASTRACEAE | *Pterocelastrus tricuspidatus* | LC |
| CELASTRACEAE | *Putterlickia pyracantha* | LC | CELASTRACEAE | *Putterlickia verrucosa* | LC |

| | | | | | |
|---|---|---|---|---|---|
| CHENOPODIACEAE | *Atriplex semibaccata var. appendiculata* | LC | CHENOPODIACEAE | *Atriplex suberecta* | LC |
| CHENOPODIACEAE | *Bassia diffusa* | LC | CHENOPODIACEAE | *Exomis microphylla var. axyrioides* | LC |
| CHENOPODIACEAE | *Sarcocornia natalensis var. natalensis* | LC | COLCHICACEAE | *Ornithoglossum vulgare* | LC |
| COMMELINACEAE | *Commelina africana var. africana* | LC | CONVOLVULACEAE | *Falkia repens* | LC |
| CRASSULACEAE | *Adromischus caryophyllaceus* | LC | CRASSULACEAE | *Cotyledon velutina* | LC |
| CRASSULACEAE | *Crassula atropurpurea var. atropurpurea* | LC | CRASSULACEAE | *Crassula biplanata* | LC |
| CRASSULACEAE | *Crassula cultrata* | LC | CRASSULACEAE | *Crassula lactea* | LC |
| CRASSULACEAE | *Crassula macowaniana* | LC | CRASSULACEAE | *Crassula nudicaulis var. nudicaulis* | LC |
| CRASSULACEAE | *Crassula orbicularis* | LC | CRASSULACEAE | *Crassula perforata subsp. perforata* | LC |
| CRASSULACEAE | *Crassula rubricaulis* | LC | CRASSULACEAE | *Crassula rupestris subsp. rupestris* | LC |
| CRASSULACEAE | *Crassula southii subsp. sphaerocephala* | LC | CRASSULACEAE | *Crassula subulata var. fastigiata* | LC |
| CRASSULACEAE | *Crassula tetragona subsp. robusta* | LC | CRASSULACEAE | *Crassula tetragona subsp. rudis* | LC |
| **CRASSULACEAE** | ***Crassula decumbens var. brachyphylla*** | **NT** | CUCURBITACEAE | *Kedrostis nana var. nana* | LC |
| CYPERACEAE | *Bulbostylis humilis* | LC | CYPERACEAE | *Carex glomerabilis* | LC |
| CYPERACEAE | *Cyperus congestus* | LC | CYPERACEAE | *Cyperus thunbergii* | LC |
| CYPERACEAE | *Ficinia gracilis* | LC | CYPERACEAE | *Ficinia laciniata* | LC |
| CYPERACEAE | *Ficinia lateralis* | LC | CYPERACEAE | *Ficinia nigrescens* | LC |
| CYPERACEAE | *Ficinia repens* | LC | CYPERACEAE | *Ficinia tristachya* | LC |
| CYPERACEAE | *Isolepis cernua var. cernua* | LC | CYPERACEAE | *Isolepis prolifera* | LC |
| CYPERACEAE | *Isolepis tenuissima* | LC | CYPERACEAE | *Pycreus polystachyos var. polystachyos* | LC |
| CYPERACEAE | *Schoenoxiphium sparteum* | LC | CYPERACEAE | *Tetraria bolusii* | LC |
| CYPERACEAE | *Tetraria cuspidata var. cuspidata* | LC | CYPERACEAE | *Tetraria microstachys* | LC |
| CYPERACEAE | *Tetraria robusta* | LC | CYTINACEAE | *Cytinus sanguineus* | LC |
| EBENACEAE | *Diospyros dichrophylla* | LC | EBENACEAE | *Diospyros lycioides subsp. lycioides* | LC |
| EBENACEAE | *Euclea tomentosa* | LC | EBENACEAE | *Euclea undulata* | LC |
| ERICACEAE | *Erica axillaris* | LC | ERICACEAE | *Erica canaliculata* | LC |
| ERICACEAE | *Erica cerinthoides var. cerinthoides* | LC | ERICACEAE | *Erica copiosa var. copiosa* | LC |
| ERICACEAE | *Erica curviflora* | LC | ERICACEAE | *Erica densifolia* | LC |
| ERICACEAE | *Erica discolor var. discolor* | LC | ERICACEAE | *Erica ericoides* | LC |
| ERICACEAE | *Erica formosa* | LC | ERICACEAE | *Erica glandulosa subsp. glandulosa* | LC |
| ERICACEAE | *Erica gracilis* | LC | ERICACEAE | *Erica hispidula var. hispidula* | LC |

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|---|---|---|---|---|---|
| ERICACEAE | *Erica imbricata* | LC | ERICACEAE | *Erica opulenta* | LC |
| ERICACEAE | *Erica peltata* | LC | ERICACEAE | *Erica quadrangularis* | LC |
| ERICACEAE | *Erica scabriuscula* | LC | ERICACEAE | *Erica sessiliflora* | LC |
| ERICACEAE | *Erica sparsa var. sparsa* | LC | ERICACEAE | *Erica speciosa* | LC |
| ERICACEAE | *Erica triceps* | LC | ERICACEAE | *Erica uberiflora* | LC |
| **ERICACEAE** | ***Erica glandulosa subsp. fourcadei*** | **VU** | ERIOSPERMACEAE | *Eriospermum cordiforme* | LC |
| EUPHORBIACEAE | *Adenocline acuta* | LC | EUPHORBIACEAE | *Clutia laxa* | LC |
| EUPHORBIACEAE | *Clutia pulchella var. franksiae* | LC | EUPHORBIACEAE | *Clutia pulchella var. pulchella* | LC |
| EUPHORBIACEAE | *Euphorbia heptagona var. heptagona* | LC | EUPHORBIACEAE | *Euphorbia kraussiana var. erubescens* | LC |
| FABACEAE | *Amphithalea fourcadei* | LC | FABACEAE | *Aspalathus alopecurus* | LC |
| FABACEAE | *Aspalathus asparagoides subsp. asparagoides* | LC | FABACEAE | *Aspalathus asparagoides subsp. rubro-fusca* | LC |
| FABACEAE | *Aspalathus cerrhantha* | LC | FABACEAE | *Aspalathus ciliaris* | LC |
| FABACEAE | *Aspalathus divaricata subsp. divaricata* | LC | FABACEAE | *Aspalathus florifera* | LC |
| FABACEAE | *Aspalathus hirta subsp. hirta* | LC | FABACEAE | *Aspalathus kougaensis* | LC |
| FABACEAE | *Aspalathus laricifolia subsp. laricifolia* | LC | FABACEAE | *Aspalathus opaca subsp. pappeana* | LC |
| FABACEAE | *Dipogon lignosus* | LC | FABACEAE | *Hypocalyptus oxalidifolius* | LC |
| FABACEAE | *Indigofera foliosa* | LC | FABACEAE | *Indigofera heterophylla* | LC |
| FABACEAE | *Indigofera procumbens* | LC | FABACEAE | *Indigofera stricta* | LC |
| FABACEAE | *Lotononis umbellata* | LC | FABACEAE | *Otholobium sericeum* | LC |
| FABACEAE | *Podalyria burchellii* | LC | FABACEAE | *Psoralea pinnata var. pinnata* | LC |
| FABACEAE | *Psoralea triflora* | LC | FABACEAE | *Rhynchosia capensis* | LC |
| FABACEAE | *Rhynchosia caribaea* | LC | FABACEAE | *Rhynchosia totta var. totta* | LC |
| FABACEAE | *Tephrosia capensis var. acutifolia* | LC | FABACEAE | *Virgilia divaricata* | LC |
| FABACEAE | *Virgilia oroboides subsp. oroboides* | LC | | | |
| GENTIANACEAE | *Chironia baccifera* | LC | GENTIANACEAE | *Chironia melampyrifolia* | LC |
| GERANIACEAE | *Geranium incanum var. incanum* | LC | GERANIACEAE | *Monsonia emarginata* | LC |
| GERANIACEAE | *Pelargonium candicans* | LC | GERANIACEAE | *Pelargonium capitatum* | LC |
| GERANIACEAE | *Pelargonium caucalifolium subsp. convolvulifolium* | LC | GERANIACEAE | *Pelargonium fruticosum* | LC |
| GERANIACEAE | *Pelargonium longicaule var. longicaule* | LC | GERANIACEAE | *Pelargonium peltatum* | LC |
| GERANIACEAE | *Pelargonium triste* | LC | GERANIACEAE | *Pelargonium zonale* | LC |
| HAEMODORACEAE | *Dilatris ixioides* | LC | HYACINTHACEAE | *Lachenalia bulbifera* | LC |
| HYACINTHACEAE | *Lachenalia rubida var. rubida* | LC | HYACINTHACEAE | *Ornithogalum dubium* | LC |
| HYACINTHACEAE | *Ornithogalum longibracteatum* | LC | HYPOXIDACEAE | *Spiloxene flaccida* | LC |

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|---|---|---|---|---|---|
| ICACINACEAE | *Apodytes dimidiata subsp. dimidiata* | LC | **IRIDACEAE** | ***Gladiolus fourcadei*** | **CR** |
| IRIDACEAE | *Babiana fourcadei* | LC | IRIDACEAE | *Babiana patersoniae* | LC |
| IRIDACEAE | *Bobartia aphylla* | LC | IRIDACEAE | *Bobartia robusta* | LC |
| IRIDACEAE | *Chasmanthe aethiopica* | LC | IRIDACEAE | *Dietes iridioides* | LC |
| IRIDACEAE | *Freesia alba* | LC | IRIDACEAE | *Gladiolus carneus* | LC |
| IRIDACEAE | *Gladiolus cunonius* | LC | IRIDACEAE | *Gladiolus grandiflorus* | LC |
| IRIDACEAE | *Gladiolus gueinzii* | LC | IRIDACEAE | *Gladiolus liliaceus* | LC |
| IRIDACEAE | *Hesperantha falcata* | LC | IRIDACEAE | *Ixia orientalis* | LC |
| IRIDACEAE | *Lapeirousia anceps* | LC | IRIDACEAE | *Melasphaerula ramosa* | LC |
| IRIDACEAE | *Micranthus alopecuroides* | LC | IRIDACEAE | *Moraea reticulata* | LC |
| IRIDACEAE | *Romulea atrandra var. lewisiae* | LC | IRIDACEAE | *Tritoniopsis antholyza* | LC |
| IRIDACEAE | *Tritoniopsis caffra* | LC | IRIDACEAE | *Watsonia laccata* | LC |
| JUNCACEAE | *Juncus acutus subsp. leopoldii* | LC | JUNCACEAE | *Juncus capensis* | LC |
| JUNCACEAE | *Juncus dregeanus subsp. dregeanus* | LC | JUNCAGINACEAE | *Triglochin striata* | LC |
| LAMIACEAE | *Stachys aethiopica* | LC | LAMIACEAE | *Stachys graciliflora* | LC |
| LAURACEAE | *Ocotea bullata* | EN | LAURACEAE | *Cassytha ciliolata* | LC |
| LOBELIACEAE | *Lobelia coronopifolia* | LC | LOBELIACEAE | *Lobelia erinus* | LC |
| LOBELIACEAE | *Lobelia patula* | LC | LOBELIACEAE | *Monopsis unidentata subsp. unidentata* | LC |
| MALVACEAE | *Anisodontea scabrosa* | LC | MALVACEAE | *Grewia occidentalis var. occidentalis* | LC |
| MALVACEAE | *Hermannia althaeifolia* | LC | MALVACEAE | *Hermannia angularis* | LC |
| MALVACEAE | *Hermannia holosericea* | LC | MALVACEAE | *Hermannia hyssopifolia* | LC |
| MALVACEAE | *Hermannia lavandulifolia* | LC | MALVACEAE | *Hermannia salviifolia var. salviifolia* | LC |
| MALVACEAE | *Hermannia velutina* | LC | MALVACEAE | *Hibiscus aethiopicus var. aethiopicus* | LC |
| MALVACEAE | *Hibiscus aethiopicus var. ovatus* | LC | MALVACEAE | *Sida ternata* | LC |
| MESEMBRYANTHEMACEAE | *Lampranthus conspicuus* | DDT | MESEMBRYANTHEMACEAE | *Lampranthus deflexus* | DDT |
| MESEMBRYANTHEMACEAE | *Lampranthus dependens* | DDT | MESEMBRYANTHEMACEAE | *Lampranthus prominulus* | DDT |
| MESEMBRYANTHEMACEAE | *Acrodon bellidiflorus* | LC | MESEMBRYANTHEMACEAE | *Aptenia cordifolia* | LC |
| MESEMBRYANTHEMACEAE | *Aptenia lancifolia* | LC | MESEMBRYANTHEMACEAE | *Carpobrotus deliciosus* | LC |
| MESEMBRYANTHEMACEAE | *Carpobrotus edulis subsp. edulis* | LC | MESEMBRYANTHEMACEAE | *Delosperma inconspicuum* | LC |
| MESEMBRYANTHEMACEAE | *Delosperma multiflorum* | LC | MESEMBRYANTHEMACEAE | *Drosanthemum brevifolium* | LC |
| MESEMBRYANTHEMACEAE | *Lampranthus stayneri* | LC | MESEMBRYANTHEMACEAE | *Lampranthus stipulaceus* | LC |
| MESEMBRYANTHEMACEAE | *Mesembryanthemum aitonis* | LC | **MESEMBRYANTHEMACEAE** | ***Cephalophyllum diversiphyllum*** | **NT** |
| **MESEMBRYANTHEMACEAE** | ***Glottiphyllum linguiforme*** | **VU** | **MESEMBRYANTHEMACEAE** | ***Lampranthus sociorum*** | **VU** |
| MOLLUGINACEAE | *Pharnaceum incanum* | LC | MONTINIACEAE | *Montinia caryophyllacea* | LC |
| **MYRSINACEAE** | ***Rapanea melanophloeos*** | **Declining** | MYRSINACEAE | *Myrsine africana* | LC |

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|---|---|---|---|---|---|
| OLEACEAE | *Chionanthus foveolatus subsp. foveolatus* | LC | OLEACEAE | *Olea capensis subsp. capensis* | LC |
| OLEACEAE | *Olea exasperata* | LC | OLINIACEAE | *Olinia ventosa* | LC |
| ORCHIDACEAE | *Ceratandra grandiflora* | LC | ORCHIDACEAE | *Disa hians* | LC |
| ORCHIDACEAE | *Disa sagittalis* | LC | ORCHIDACEAE | *Disperis capensis var. capensis* | LC |
| ORCHIDACEAE | *Holothrix burchellii* | LC | ORCHIDACEAE | *Holothrix parviflora* | LC |
| ORCHIDACEAE | *Satyrium outeniquense* | LC | ORCHIDACEAE | *Satyrium rupestre* | LC |
| ORCHIDACEAE | *Satyrium stenopetalum subsp. stenopetalum* | LC | OROBANCHACEAE | *Cycnium tubulosum subsp. tubulosum* | LC |
| OROBANCHACEAE | *Graderia scabra* | LC | OXALIDACEAE | *Oxalis incarnata* | LC |
| OXALIDACEAE | *Oxalis polyphylla var. polyphylla* | LC | PHYLLANTHACEAE | *Lachnostylis hirta* | LC |
| PITTOSPORACEAE | *Pittosporum viridiflorum* | LC | PLANTAGINACEAE | *Plantago crassifolia var. crassifolia* | LC |
| PLANTAGINACEAE | *Plantago lanceolata* | LC | PLUMBAGINACEAE | *Limonium scabrum var. avenaceum* | LC |
| PLUMBAGINACEAE | *Limonium scabrum var. scabrum* | LC | POACEAE | *Aristida junciformis subsp. galpinii* | LC |
| POACEAE | *Brachiaria serrata* | LC | POACEAE | *Brachypodium flexum* | LC |
| POACEAE | *Cynodon dactylon* | LC | POACEAE | *Ehrharta calycina* | LC |
| POACEAE | *Ehrharta capensis* | LC | POACEAE | *Ehrharta erecta var. erecta* | LC |
| POACEAE | *Eleusine coracana subsp. africana* | LC | POACEAE | *Eragrostis capensis* | LC |
| POACEAE | *Eragrostis curvula* | LC | POACEAE | *Eragrostis plana* | LC |
| POACEAE | *Heteropogon contortus* | LC | POACEAE | *Hyparrhenia hirta* | LC |
| POACEAE | *Hyparrhenia poecilotricha* | LC | POACEAE | *Panicum deustum* | LC |
| POACEAE | *Paspalum distichum* | LC | POACEAE | *Pennisetum thunbergii* | LC |
| POACEAE | *Setaria sphacelata var. sphacelata* | LC | POACEAE | *Sporobolus africanus* | LC |
| POACEAE | *Sporobolus virginicus* | LC | POACEAE | *Stenotaphrum secundatum* | LC |
| POACEAE | *Stipa dregeana var. elongata* | LC | POACEAE | *Themeda triandra* | LC |
| POACEAE | *Tribolium uniolae* | LC | POACEAE | *Triraphis andropogonoides* | LC |
| POACEAE | *Tristachya leucothrix* | LC | PODOCARPACEAE | *Podocarpus falcatus* | LC |
| POLYGALACEAE | *Muraltia ericoides* | LC | POLYGALACEAE | *Muraltia pungens* | LC |
| POLYGALACEAE | *Polygala bracteolata* | LC | POLYGALACEAE | *Polygala ericaefolia* | LC |
| POLYGALACEAE | *Polygala fruticosa* | LC | POLYGALACEAE | *Polygala leptophylla var. leptophylla* | LC |
| POLYGALACEAE | *Polygala levynsiana* | LC | POLYGALACEAE | *Polygala myrtifolia var. myrtifolia* | LC |
| POLYGALACEAE | *Polygala umbellata* | LC | POLYGONACEAE | *Persicaria attenuata subsp. africana* | LC |
| POLYGONACEAE | *Rumex sagittatus* | LC | **PROTEACEAE** | ***Leucospermum formosum*** | **EN** |
| **PROTEACEAE** | ***Leucospermum glabrum*** | **EN** | PROTEACEAE | *Aulax cancellata* | LC |
| PROTEACEAE | *Leucadendron eucalyptifolium* | LC | PROTEACEAE | *Leucadendron laureolum* | LC |

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|---|---|---|---|---|---|
| PROTEACEAE | *Leucadendron salignum* | LC | PROTEACEAE | *Leucospermum cuneiforme* | LC |
| PROTEACEAE | *Protea eximia* | LC | PROTEACEAE | *Protea mundii* | LC |
| PROTEACEAE | *Protea neriifolia* | LC | PROTEACEAE | *Protea repens* | LC |
| PROTEACEAE | *Protea speciosa* | LC | **PROTEACEAE** | ***Leucospermum praecox*** | **VU** |
| PTERIDACEAE | *Adiantum capillus-veneris* | LC | PTERIDACEAE | *Cheilanthes viridis var. viridis* | LC |
| RANUNCULACEAE | *Knowltonia vesicatoria subsp. grossa* | LC | RANUNCULACEAE | *Knowltonia vesicatoria subsp. vesicatoria* | LC |
| RESTIONACEAE | *Calopsis burchellii* | LC | RESTIONACEAE | *Elegia equisetacea* | LC |
| RESTIONACEAE | *Hypodiscus willdenowia* | LC | RESTIONACEAE | *Ischyrolepis capensis* | LC |
| RESTIONACEAE | *Restio triticeus* | LC | RESTIONACEAE | *Thamnochortus cinereus* | LC |
| RESTIONACEAE | *Thamnochortus glaber* | LC | RHAMNACEAE | *Phylica axillaris var. axillaris* | LC |
| RHAMNACEAE | *Phylica axillaris var. maritima* | LC | RHAMNACEAE | *Phylica confusa* | LC |
| RHAMNACEAE | *Phylica propinqua* | LC | RHAMNACEAE | *Phylica rubra* | LC |
| RHAMNACEAE | *Phylica willdenowiana* | LC | RHAMNACEAE | *Scutia myrtina* | LC |
| ROSACEAE | *Cliffortia falcata* | LC | ROSACEAE | *Cliffortia glauca* | LC |
| ROSACEAE | *Cliffortia ilicifolia var. ilicifolia* | LC | ROSACEAE | *Cliffortia linearifolia* | LC |
| ROSACEAE | *Cliffortia serpyllifolia* | LC | ROSACEAE | *Cliffortia strobilifera* | LC |
| RUBIACEAE | *Anthospermum aethiopicum* | LC | RUBIACEAE | *Anthospermum prostratum* | LC |
| RUBIACEAE | *Galopina circaeoides* | LC | **RUTACEAE** | ***Euchaetis albertiniana*** | **EN** |
| RUTACEAE | *Agathosma apiculata* | LC | RUTACEAE | *Agathosma capensis* | LC |
| RUTACEAE | *Agathosma elegans* | LC | RUTACEAE | *Agathosma ovata* | LC |
| RUTACEAE | *Clausena anisata var. anisata* | LC | RUTACEAE | *Euchaetis burchellii* | LC |
| RUTACEAE | *Vepris lanceolata* | LC | SALICACEAE | *Dovyalis rhamnoides* | LC |
| SALICACEAE | *Scolopia zeyheri* | LC | SALICACEAE | *Trimeria grandifolia subsp. grandifolia* | LC |
| SANTALACEAE | *Thesium lisae-mariae* | DDT | SANTALACEAE | *Thesium sertulariastrum* | DDT |
| SANTALACEAE | *Osyris compressa* | LC | SANTALACEAE | *Thesium nigromontanum* | LC |
| SANTALACEAE | *Thesium phyllostachyum* | LC | SANTALACEAE | *Thesium virgatum* | LC |
| SAPOTACEAE | *Sideroxylon inerme subsp. inerme* | LC | SCHIZAEACEAE | *Schizaea pectinata* | LC |
| SCROPHULARIACEAE | *Chaenostoma caeruleum* | LC | SCROPHULARIACEAE | *Chaenostoma integrifolium* | LC |
| SCROPHULARIACEAE | *Jamesbrittenia tenuifolia* | LC | SCROPHULARIACEAE | *Phyllopodium rustii* | LC |
| SCROPHULARIACEAE | *Selago glomerata* | LC | SCROPHULARIACEAE | *Selago luxurians* | LC |
| SCROPHULARIACEAE | *Selago luxurians* | LC | SOLANACEAE | *Solanum africanum* | LC |
| SOLANACEAE | *Solanum africanum* | LC | SOLANACEAE | *Solanum rigescens* | LC |
| SOLANACEAE | *Solanum rigescens* | LC | SOLANACEAE | *Solanum sodomaeodes* | LC |
| SOLANACEAE | *Solanum sodomaeodes* | LC | THEOPHRASTACEAE | *Withania somnifera* | LC |
| SOLANACEAE | *Withania somnifera* | LC | THEOPHRASTACEAE | *Samolus porosus* | LC |
| THEOPHRASTACEAE | *Samolus porosus* | LC | THYMELAEACEAE | *Samolus valerandi* | LC |
| THEOPHRASTACEAE | *Samolus valerandi* | LC | THYMELAEACEAE | *Lachnaea diosmoides* | LC |

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|---|---|---|---|---|---|
| THYMELAEACEAE | *Lachnaea diosmoides* | LC | THYMELAEACEAE | *Passerina corymbosa* | LC |
| THYMELAEACEAE | *Passerina corymbosa* | LC | THYMELAEACEAE | *Passerina montivaga* | LC |
| THYMELAEACEAE | *Passerina montivaga* | LC | THYMELAEACEAE | *Passerina obtusifolia* | LC |
| THYMELAEACEAE | *Passerina obtusifolia* | LC | THYMELAEACEAE | *Struthiola parviflora* | LC |
| THYMELAEACEAE | *Struthiola parviflora* | LC | VITACEAE | *Struthiola striata* | LC |
| THYMELAEACEAE | *Struthiola striata* | LC | ZYGOPHYLLACEAE | *Rhoicissus digitata* | LC |
| VITACEAE | *Rhoicissus digitata* | LC | | *Zygophyllum morgsana* | LC |
| ZYGOPHYLLACEAE | *Zygophyllum morgsana* | LC | | | |