

# PLANT SEARCH & RESCUE PLAN

## N2 Wild Coast Toll Highway, Eastern Cape



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# Executive Summary

This document provides a management plan for the rescue of listed plants for the greenfields sections of the N2 Wild Coast Toll Highway Project, Eastern Cape.

The first section provides an introduction to the Plant Rescue Plan, including responsible persons for different parts of the process, and legal requirements related to plant species removal.

The next section provides a description and discussion of the Record of Decision requirements, especially in terms of limitations that have been identified in meeting these requirements. Conservation principles for the handling of species of conservation concern are also outlined. This provides a framework for the actions required for plant rescue.

The next section provides a list of all the species of concern that have been recorded to date on site.

The penultimate section provides detailed steps for the rescue and handling of listed plants. Responsible parties are also identified for each step.

The final section gives an outline of monitoring requirements for determining the success of the plant rescue operation.



# Contents

|   |           |
|---|-----------|
| <b>Executive Summary</b> .....  | <b>1</b>  |
| <b>Introduction</b> .....   | <b>4</b>  |
| <i>Purpose of the Plant Rescue Plan</i> .....   | 4         |
| <i>Responsible persons</i> .....  | 4         |
| The Developer.....  | 4         |
| The Project Environmental Manager.....  | 5         |
| The Environmental Control Officer (ECO).....  | 5         |
| The Contractor.....   | 5         |
| <i>Legal Requirements</i> .....   | 5         |
| <b>Discussion of RoD requirements</b> .....   | <b>6</b>  |
| <i>Conditions of the Record of Decision related to the Plant Rescue Plan</i> .....  | 6         |
| <i>Ecological principles for plant rescue</i> .....   | 6         |
| <i>Principles</i> .....   | 7         |
| <i>Planning considerations</i> .....  | 9         |
| <i>Identified limitations in meeting RoD requirements</i> .....   | 10        |
| <i>Recommendations</i> .....  | 11        |
| <b>Species of conservation concern that occur on site</b> .....   | <b>12</b> |
| <i>Listing of Red and Orange List plant species</i> .....   | 12        |
| <i>Nationally protected species</i> .....   | 12        |
| <i>Provincially protected species</i> .....   | 12        |
| <i>Listed species observed on site</i> .....  | 13        |
| <b>Plant rescue plan</b> .....  | <b>16</b> |
| <i>Plant rescue activities required</i> .....   | 16        |
| <b>Monitoring requirements</b> .....  | <b>19</b> |
| <i>Indicators and Targets</i> .....   | 19        |
| <b>References</b> .....   | <b>20</b> |
| <i>Appendix 1: Flora protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)</i> ..... | 21        |
| <i>Appendix 2: Tree species protected under the National Forests Act (Act 30 of 1998)</i> .....                               | 23        |



*Appendix 3: Flora protected under the Transkei Environmental Conservation Decree (Decree No 9 of 1992). ..... 24*



# Introduction

This document presents the Plant Rescue Plan for the authorized N2 Wild Coast Toll Highway, Eastern Cape. The Environmental Impact Assessment (EIA) process for the authorized facility was undertaken by CCA Environmental (Pty) Ltd and all post-authorization aspects are being handled by the same company.

## Purpose of the Plant Rescue Plan

The purpose of the Plant Rescue Plan is:

- to provide practical guidance on search and rescue of threatened or protected plant species (TOPS), as specified in the Record of Decision (RoD) issued for the project on 19 April 2010.

The objective is to identify, remove and, where possible, rescue or relocate species of concern, as required by the conditions attached to the RoD. The area to which this Plan refers is the greenfields sections of the project within the Eastern Cape (Figure 1).

The Plant Rescue Plan will form part of the broader Environmental Management Programme.

## Responsible persons

Rescue of sensitive plant species during the construction phase of the project will be dependent on a number of project personnel. These are listed below:

### The Developer

This refers to the project proponent, the South African National Roads Agency Limited (SANRAL). It will be responsible for the following:

1. Ensure that the requirements set out in this Plan are adhered to and implemented;
2. Allocate the responsibilities assigned to the Environmental Control Officer (ECO) to an independent suitably qualified individual prior to the start of construction activities on site; and
3. Provide all principal contractors working on the project with a copy of this management plan as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts or alternatively, commission a suitable service provider to undertake the required Search and Rescue independent from any contract documentation with individual contractors.



### **The Project Environmental Manager**

The Project Environmental Manager of the proposed development will be responsible for the overall implementation of the Plan during the construction phase of the project. To effectively implement the plant rescue plan, the Project Environmental Manager must be aware of the findings, mitigation measures and conclusions of the Final EIA report, the requirements of the EA, the EMPr, and this Plan.

### **The Environmental Control Officer (ECO)**

The ECO is responsible for monitoring and verifying the implementation of the Plan during the construction phase of the project. To effectively implement the Plan, the ECO must be aware of the findings, mitigation measures and conclusions of the Final EIA Report, the EA, and this Plan.

### **The Contractor**

The contractor, being any directly appointed company or individual undertaking the implementation of works, may be responsible for complying with the Plan at all times during the construction phase. Alternatively, an independent Nursery Contractor/Horticulturalist may be appointed to undertake the Search and Rescue. If such a contractor is appointed, they require competency in horticulture, and possibly landscaping.

The RoD requires that a forest ecologist be appointed as part of the project team, but based on the permit application and the ongoing involvement of DAFF in the process, this appointment is considered to be unnecessary.

### **Legal Requirements**

- National Environmental Management: Biodiversity Act (Act 10 of 2004), including Threatened or Protected Species Regulations;
- National Environmental Management Act (Act 107 of 1998);
- National Forests Act (Act 30 of 1998);
- Transkei Environmental Conservation Decree (Decree No 9 of 1992).



## Discussion of RoD requirements

This section provides some basic ecological principles that must be considered when undertaking a plant search and rescue operation and that may affect the removal of plants from the wild. These principles are discussed in relation to the specific requirements in the Record of Decision (RoD).

### Conditions of the Record of Decision related to the Plant Rescue Plan

The objectives and proposed outcomes of the Plant Rescue Plan are guided by conditions of the RoD for the project. According to the conditions, the following related to plant rescue and relocation must be complied with:

1. *"A botanist must be employed to conduct a search and rescue of threatened or protected species (TOPS) before construction of the project, and in the forest areas suitable tree seedlings and understorey plants inside the servitude must be rescued and kept in a nursery for re-planting in suitable sites after construction"* (Item 6.2.7.2, third bullet point);
2. *"All rare, endangered and endemic species and species of conservation value in the road reserve must be translocated, in close cooperation with the National Botanical Institute (NBI), to a suitable nursery with the aim to be re-established in a national botanical garden that is to be created in the Pondoland Centre of Endemism or a suitable existing conservation area"* (Item 6.2.12.3).

Note that the National Botanical Institute (NBI) is now called the South African National Biodiversity Institute (SANBI).

These requirements are discussed in detail in the section that follows.

### Ecological principles for plant rescue

Plant rescue is considered to be a last resort to conserve individual plants, when authorization for development has been obtained and construction is imminent. The ecosystem within the footprint of the development, with all its species diversity, genetic variation and ecological interrelationships will be lost and the objective is to salvage something prior to the destruction. Some considerations are as follows:

1. Plant rescue can usually only salvage a small proportion of the plants on site. This is due to two main factors, firstly, the fact that different species appear at different times and some species will almost certainly be dormant at the time that the Search and Rescue is undertaken, and secondly, there may be practical limitations in terms of how much plant material can be salvaged.



2. Globally, it has been recognised that the selection of plants to rescue is based on criteria that may have little to do with conservation, for example, ease of access, horticultural value and probability of survival. However, in the case of the current project, it has been specified in the RoD which species are to be targeted for Search and Rescue.
3. Plants chosen for rescue may not thrive or even survive. It is highly unlikely that all rescued plants will survive. This is based on the fact that it is virtually impossible to predict without experimentation and research exactly what artificial conditions will be required for the management of each species in order to ensure survival.
4. Various agencies globally (e.g IUCN) and nationally (e.g. SANBI) have expressed concern regarding the concept of plant rescue. The concern is that the implementation of a plant Search and Rescue can weaken support for habitat conservation by fostering the perception that rescuing selected plants can compensate for destruction of an entire habitat, or that landscape plantings can substitute for natural areas.
5. Plant rescue can divert time, energy, resources and leadership from tasks that may be more effective in protecting natural habitats.
6. Plants can be used for rehabilitation of affected areas, thereby restoring something resembling the natural vegetation.
7. It can also make a long-term contribution to public education by providing native plants for public gardens and nature centers.

## Principles

- *In situ* conservation is preferable to *ex situ* conservation. Removing a population from its natural habitat and placing it under artificial conditions results in the erosion of the inherent genetic diversity and characteristics of that species. This principle is very strongly emphasized on the SANBI websites "Guidelines for Environmental Impact Assessments" ([www.redlist.sanbi.org/eiaguidelines.php](http://www.redlist.sanbi.org/eiaguidelines.php)) where the following is stated:

*"In situ conservation is vital and should be recommended as the only option for conserving species of conservation concern. Ex situ conservation, i.e. the removal of a subpopulation from its natural habitat to an artificial environment, a practice often termed 'search and rescue', will result in the erosion of the inherent genetic diversity and characteristics of that species and increase its extinction risk in the wild. Similarly, translocation of subpopulations is an unacceptable conservation measure."*

- In order to ensure the persistence of a population, it is imperative that the ecological processes maintaining that population persist. This requires that natural habitats are maintained in an ecologically functional condition.
- Translocation of Red List species is an unacceptable conservation measure since the translocated species may have undesirable ecological effects, as follows:
  - Alterations to habitat by translocated species may be harmful to other species,





- Translocations may lead to transmission of pathogens or parasites (Hodder & Bullock, 1997).
- Translocation may result in rapid changes in the species itself (Conant, 1988).
- Translocations are expensive and rarely successful (Griffith et al., 1989).
- Success entails not only survival of the translocated individuals but also establishment of a self-sustaining, viable population able to reproduce and adapt to changing environmental conditions (Milton et al., 1999).
- Relocation of rescued plants to undisturbed habitats falsifies the local history of natural dispersal and alters the natural species composition of the target site.

Once again, this has been emphasized on the SANBI websites "Guidelines for Environmental Impact Assessments" ([www.redlist.sanbi.org/eiaguidelines.php](http://www.redlist.sanbi.org/eiaguidelines.php)) where the following is stated:

*"Translocations are expensive and rarely successful. Even if they are successful, translocated individuals may harm other species within the receiving environment, the translocated individuals may transmit pathogens and/or parasites, and translocation may result in rapid changes in the species itself."*

The requirement in the RoD therefore contradicts principles espoused by the South African National Biodiversity Institute (SANBI) and IUCN.

The implications of these principles are as follows:

- It is highly preferable not to replant rescued plants into other natural habitats. The RoD specifically states that "*all rare, endangered and endemic species and species of conservation value in the road reserve must be translocated ... to a suitable nursery... or a suitable existing conservation area*". Based on scientific evidence and concerns directly from SANBI, translocation to an existing conservation area cannot be supported as a management measure.
- Rescued plants, if re-planted back in the wild, should be placed as close as possible to where they were originally removed. As stated in the previous paragraph, re-planting into natural areas is not supported as a management measure.
- Re-planting into the wild must cause as little disturbance and harm as possible to existing natural ecosystems. As stated in the previous paragraph, re-planting into natural areas is not supported as a management measure.
- Rescue must be limited to only those areas where plants will be destroyed by the development. No plants should be removed from areas that will otherwise not be disturbed.
- Rescue should not be undertaken from any site where there is a significant risk that well-established invasive alien plants or other pests will be spread by the relocation of native plants.



- The solution would be for rescued plants to only be replanted into disturbed areas after construction for rehabilitation purposes.

## Planning considerations

The following factors affect planning of plant rescue:

- Adequate time must be allowed to obtain the necessary information about the site and its flora. This is usually achieved during the EIA stage and/or follow-up surveys. A reliable inventory of the plants found on a site is a key factor in determining whether a rescue is appropriate and, if it is, how the plants will be used. In general, a rescue should not be undertaken if an appropriate use of the rescued plants is not ready at hand or easily found. Where invasive alien species are present, the numbers and concentrations must be known. If there are large concentrations of alien invasive species, this may rule out any rescue and limits the choice of relocation sites or eventual use of the rescued plants.
- There must be adequately qualified and equipped personnel to undertake a plant rescue. Personnel undertaking the rescue should have the knowledge and skills to ensure that the rescue operation is a success. A trained and qualified botanist is required to identify the species to be rescued, but horticultural skills are required for nursery establishment and for the actual planning and management of a nursery.
- In principle, rescued plants should be utilized for public benefit, not private gain. Acceptable uses are therefore replanting in rehabilitated areas, providing stock for propagation and providing plant material for a scientific project. Problematic uses are selling rescued plants to the public and providing plants for private gardens. This is because additional permits would be required for transport and trade of protected species. An incentive is also created to remove plants from the wild, which is not supported.
- Rescuing plants that are listed as protected under National or Provincial legislation is subject to requirements that cover the collection and use of whole plants, their progeny and plant parts, including seeds. A permit is usually required to possess, transport or propagate such species. The general permit for removal of TOPS will cover these components. Any trader would be required to get their own permits.
- A priority for replanting is to maintain the ecological integrity of the target habitat. Appropriate target sites include a managed wildflower garden, such as a botanical garden, and an interpretative nature trail. Botanical gardens offer programs to help visitors identify and learn about native plants and can make it clear that plants have been rescued, not wild collected, especially for those species that are not commercially available. Inappropriate target sites are natural habitats in which ecological integrity is currently uncompromised.



## Identified limitations in meeting RoD requirements

There are components of the RoD requirements for which various limitations have been identified. These are as follows:

1. The conditions of the RoD, as provided in the Introduction to this Plan, specify that rescued plants must be "*kept in a nursery...*". This requires that a nursery must be established and staff appointed for management of the nursery. The location and size of the nursery or nurseries needs to be determined. Based on the size of the project and the inaccessibility of the site, it is probable that such a nursery or nurseries would need to be located close to the construction area/s.
2. The conditions state that rescued plants must be planted "*in suitable sites after construction*". It has been argued in the sections above that the only suitable sites would be rehabilitation areas or some equivalent of a botanical garden. Transplanting into other natural areas is not supported by scientific evidence nor by any organizations that are concerned with conservation in South Africa.
3. A further component of the conditions states that "*all ... species ... in the road reserve must be translocated, in close cooperation with the National Botanical Institute (NBI), to a suitable nursery...*". Informal communication on 7 March 2016 with senior nursery staff at SANBI (previously known as NBI), indicates that they do not have the staff, resources, mandate or will to be involved in such a project. They are specifically, in principle, unsupportive of Search and Rescue as a management measure, and are of the opinion that any involvement would provide the incorrect appearance that they endorse the process of Search and Rescue.
4. The conditions state that "*all rare, endangered and endemic species and species of conservation value in the road reserve must be translocated...*". There is a high probability that many of these species will not be located during a Search and Rescue operation, due to factors such as differing times of appearance, seasonal dormancy and ecological conditions at the time of the operation.
5. The conditions state that "*...with the aim to be re-established in a national botanical garden that is to be created in the Pondoland Centre of Endemism...*". No such botanical garden currently exists and, according to senior nursery staff at SANBI that would be aware of such projects, there are no known plans for establishing such a botanical garden. There is therefore no indication given in terms of how long rescued plants must be looked after before they are handed over to a new custodian. It is not possible to maintain temporary nurseries for an unlimited period of time.

Based on the limitations provided above, it is proposed that the following activities should be undertaken to address the conditions that can be met:

1. All TOPS that can be located within the footprint of the development zone, as identified by a botanist, should be rescued. This includes suitable tree seedlings and understory plants inside the servitude in the forest areas. A rescue operation should be undertaken



- by the horticultural contractor / plant rescue team to remove as many of these as possible.
2. Temporary nurseries should be established in close proximity to the construction areas, as far as possible, and should be located in non-sensitive areas.
  3. An invitation should be sent to CREW<sup>1</sup> to remove any plants within the footprint of the development zone prior to construction. Whether or not they respond positively to this or not will be based on policies and discussions which they will need to develop internally, but it is important to maintain communications with them in this regard.
  4. Topsoil removed from the footprint of the construction path should be carefully managed to ensure that propagules within the soil mass also have an opportunity to survive. This will include any geophytes or plants with underground parts that will grow after soil translocation.
  5. Stockpiled soil should be used for rehabilitation and any plants within the soil that have survived should become established.
  6. Rescued plants within temporary nurseries that are appropriate to transplant into rehabilitated areas should be planted out during rehabilitation.
  7. Remaining plants not used in rehabilitation should be kept in temporary nurseries for a limited period of time. Thereafter, these remaining plants should be handed over to new custodians, which may include public and educational institutions.
  8. No translocation to other natural areas should take place.

## Recommendations

1. The authorities should be notified of the inability to meet some of the conditions of the RoD.

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<sup>1</sup> The Custodians of Rare and Endangered Wildflowers (CREW) programme involves volunteers from the public in the monitoring and conservation of South Africa's threatened plants. The programme is a partnership between SANBI and the Botanical Society of South Africa (BotSoc).



# Species of conservation concern that occur on site

This section provides an outline of the existing status of the study area with respect to the occurrence of any species of conservation concern or any other plant species that are deemed worthy of rescue prior to construction. The purpose is to provide an indication of the identity of such species.

The species included here have been identified from various field surveys for the project, including botanical studies for the first EIA (Lubke & Avis 2002), the Environmental Management Plans for the Mtentu Bridge (Dold 2003b) and the Msikaba Bridge (Dold 2003a) and the botanical study for the approved EIA (Hoare 2008). This list provides an expectation of what could potentially occur on site in terms of TOPS. There is a possibility that additional TOPS could occur on site, but the process followed to arrive at the current list was comprehensive and it is not expected that there would be any major omissions.

## Listing of Red and Orange List plant species

Species listed as threatened on the Red List change with time as new information becomes available and as threats to different species are re-evaluated over time. The list is therefore not static.

## Nationally protected species

These are species listed in the Appendices of the National Environmental Management: Biodiversity Act (Act 10 of 2004, as updated in R. 1187, 14 December 2007). A copy of this list is attached as Appendix 1. There are also species protected according to the National Forests Act (Act 30 of 1998). A copy of this list is attached as Appendix 2. The species shown in bold in Appendix 2 are those that have a geographical range that includes the entire project. Not all these species necessarily occur within the project footprint.

## Provincially protected species

The Transkei Environmental Conservation Decree (Decree No 9 of 1992) contains lists of species protected within the Eastern Cape and for which permits for removal are required. These are according to Schedule 5 and Schedule 6 of the Transkei Environmental Conservation Decree (Decree No 9 of 1992). A copy of this list is attached as Appendix 3.



### Listed species observed on site

A number of protected and/or listed plant species were encountered on site or could potentially occur there, sometimes within the footprint of proposed infrastructure and other times in nearby areas. These species are listed in the table below. Note that this list may increase according to what is found during the plant rescue survey and/or some species on this list may not be found at the time of the survey. The protection status indicates species protected according to the Transkei Environmental Conservation Decree (Decree No 9 of 1992), indicated as TECD 9 of 1992 in the table, and the National Environmental Management: Biodiversity Act (Act 10 of 2004), indicated as NEM:BA 10 of 2004 in the table.

| <b>Taxon</b>                    | <b>Protection Status</b>   | <b>Conservation Status</b> | <b>Endemnicity</b>     |
|---------------------------------|----------------------------|----------------------------|------------------------|
| <i>Angraecum pusillum</i>       | Protected (TECD 9 of 1992) | LC (Least Concern)         |                        |
| <i>Aristea ecklonii</i>         | Protected (TECD 9 of 1992) | LC                         |                        |
| <i>Bonatea porrecta</i>         | Protected (TECD 9 of 1992) | LC                         |                        |
| <i>Boophone disticha</i>        | Protected (TECD 9 of 1992) | Declining                  |                        |
| <i>Brachystelma australe</i>    | Protected (TECD 9 of 1992) | LC                         | Pondoland endemic      |
| <i>Bulbine sp. nov.</i>         | Protected (TECD 9 of 1992) |                            | Pondoland endemic      |
| <i>Cryptocarya wyliei</i>       | Protected (TECD 9 of 1992) | Near threatened            |                        |
| <i>Cyrtanthus brachyscyphus</i> | Protected (TECD 9 of 1992) | LC                         |                        |
| <i>Cyrtanthus breviflorus</i>   | Protected (TECD 9 of 1992) | LC                         |                        |
| <i>Cyrtanthus contractus</i>    | Protected (TECD 9 of 1992) | LC                         |                        |
| <i>Dalbergia multijuga</i>      |                            | LC                         | Pondoland near-endemic |
| <i>Delosperma carterae</i>      | Protected (TECD 9 of 1992) | LC                         |                        |

|   |                            |                 |                   |
|---|----------------------------|-----------------|-------------------|
|   | 1992)                      |                 |                   |
| <i>Delosperma lineare</i>                                   | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Delosperma obtusum</i>                                   | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Dierama argyreum</i>                                     | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Dierama igneum</i>                                       | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Dietes butcheriana</i>                                   | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Disa sagittalis</i>                                      | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Disa tripetaloides</i>                                   | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Erica caffra</i>   | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Erica cubica</i>   | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Eulophia hians</i>                                       | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Eulophia parviflora</i>                                  | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Gladiolus inandensis</i>                                 | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Gladiolus longicollis</i>                                | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Hesperantha baurii</i>                                   | Protected (TECD 9 of 1992) | LC              |                   |
| <i>Kniphofia coddiana</i>                                   | Protected (TECD 9 of 1992) | Near threatened |                   |
| <i>Leucadendron spissifolium</i><br><i>subsp. natalense</i> | Protected (TECD 9 of 1992) | Near threatened | Pondoland endemic |



|   |   |                 |                        |
|---|---|-----------------|------------------------|
| <i>Mitriostigma axillare</i>                        |   | LC              | Pondoland near-endemic |
| <i>Ornithogalum juncifolium</i>                     | Protected (TECD 9 of 1992)                                  | LC              |                        |
| <i>Polystachya pubescens</i>                        | Protected (TECD 9 of 1992)                                  | LC              |                        |
| <i>Psoralea abbottii</i>                            | Protected (TECD 9 of 1992)                                  | Vulnerable      | Pondoland endemic      |
| <i>Putterlickia retrospinosa</i>                    | Protected (TECD 9 of 1992)                                  | Near threatened | Pondoland endemic      |
| <i>Searsia pondoensis</i>                           | Protected (TECD 9 of 1992)                                  | LC              | Pondoland near-endemic |
| <i>Satyrium sp.</i>                                 | Protected (TECD 9 of 1992)                                  |                 |                        |
| <i>Senecio rhyncholaenus</i>                        |   | LC              | Pondoland near-endemic |
| <i>Stangeria eriopus</i>                            | Protected (TECD 9 of 1992)<br>Protected (NEM:BA 10 of 2004) | Vulnerable      |                        |
| <i>Tarchonanthus trilobus</i> var. <i>trilobus</i>  |   | LC              | Pondoland near-endemic |
| <i>Tridactyle bicaudata</i> subsp. <i>rupestris</i> | Protected (TECD 9 of 1992)                                  | LC              |                        |
| <i>Tridactyle tridentata</i>                        | Protected (TECD 9 of 1992)                                  | LC              |                        |
| <i>Tritonia gladiolaris</i>                         | Protected (TECD 9 of 1992)                                  | LC              |                        |
| <i>Watsonia pillansii</i>                           | Protected (TECD 9 of 1992)                                  | LC              |                        |
| <i>Watsonia densiflora</i>                          | Protected (TECD 9 of 1992)                                  | LC              |                        |

A detailed description of each of these species is provided in a separate "Field Guide".





# Plant rescue plan

This section provides details on the actions that are required to rescue any TOPS and/or listed plant species from the path of development and what steps are to be taken to house them temporarily and then to place them back into suitable habitats.

## Plant rescue activities required

Before construction commences at the site, the following actions must be taken:

| <b>Action</b>  | <b>Responsible person</b>                   |
|--|---|
| <p><b><u>Collate information on potential species of concern</u></b></p> <p><i>Initial identification of all listed species that may occur within the project area. This is covered in this report and other survey reports related to this project. The action is therefore complete.</i></p>   | Botanist                                    |
| <p><b><u>Mark footprint of proposed construction area</u></b></p> <p><i>The footprint of proposed development must be marked out prior to breaking ground. (It is assumed that this will follow a phased approach and that not all areas will be marked simultaneously. An example would be pegging out the route of a section of road to be constructed prior to earth-moving equipment beginning work on construction, but could also include provision of a GPS track or GIS polygon file that depicts the affected areas.)</i></p> | Contractor /<br>Engineer /<br>Developer     |
| <p><b><u>Species search and rescue</u></b></p> <p><i>Location and rescue of all plants to be rescued that may occur within marked out areas (within the footprint of proposed infrastructure). The marked out area must be walked and required species rescued.</i></p>  | Botanist                                    |
| <p><b><u>Plant marking and information requirements</u></b></p> <p><i>For all plants that are rescued, relevant information should be collected, as is determined by the horticulturalist as being adequate for reporting and monitoring. This information could include the number of individuals/clumps and date collected, as well as where they came from.</i></p>   | Qualified<br>botanist /<br>horticulturalist |
| <p><b><u>Establishment of nurseries</u></b></p> <ul style="list-style-type: none"> <li><i>Nursery facilities must be established within either the proposed</i></li> </ul>   |   |

|   |  |
|---|--|
| <p><i>site office area or in a construction laydown area or in any other suitable site where additional natural habitat will not be affected and where there is access to water.</i></p> <ul style="list-style-type: none"> <li>• <i>Permits to collect, relocate and propagate plant material and to collect seed or cuttings for the contract must be obtained from the relevant authorities. This should be a single permit application that covers all components of the project.</i></li> <li>• <i>The landscaping contractor must provide a comprehensive method statement relating to the nursery locality, layout, structures, operations and security. The method statement must also cover all aspects of operation, including sources of water and growing medium and a description of the intended practices to be used. The intended use of all horticultural practices should be described, as well as the intended use of additives such as polymer gels and resins. The proposed practices must be suited to the list of rescued species and should take specialized growing requirements into consideration.</i></li> <li>• <i>The nursery must include a storage area. The nursery and storage area must be of adequate capacity to provide an amount of material stored (of whatever sort required for the completion of the works) sufficient to ensure that no interruption to the progress of the work is occasioned by lack of seeds, plants and other materials. The facility must also be cool and dry and rodent free.</i></li> <li>• <i>The horticulturist / landscaping contractor must inspect all plant materials weekly to locate any diseased or insect pest infestations or weeds. If any are identified, appropriate control measures must be applied.</i></li> </ul> |  |
| <p><b><u>Plant rescue</u></b></p> <ul style="list-style-type: none"> <li>• <i>Appoint an experienced horticulturist or landscaping contractor to undertake the rescue operation, manage the rescued plant material and operate the nursery.</i></li> <li>• <i>From information gathered during the process of marking plants, establish the resource requirements for the plant rescue team workforce and the methodology to be employed to maximize the likelihood of success.</i></li> <li>• <i>A multipronged approach to plant rescue should be followed to maximize the likelihood of success. This should take into account overall genetic variability and alternatives to preserving genetic variability. In addition to transplanting of whole plants, seed can be collected to sow in situ in suitable habitats. For plants that can be successfully grown in a nursery environment, seed and other</i></li> </ul>  |  |



|   |                          |
|---|--------------------------|
| <p><i>propagules (cuttings, wildlings) must be propagated to supplement the plant rescue effort.</i></p> <ul style="list-style-type: none"> <li>• <i>Habitats that are currently disturbed/transformed and that are outside the development footprint are possible sites for rehabilitation where a positive biodiversity outcome can be locally achieved.</i></li> <li>• <i>Rescued plants must be planted into a container to be housed within a temporary nursery on site or immediately planted into the target habitat. If planted into natural habitat, it must be protected from construction activities and monitored to ensure survival.</i></li> <li>• <i>Where appropriate, it may be possible to directly transplant individuals from areas about to be cleared backwards to areas that are already undergoing rehabilitation.</i></li> </ul> |                          |
| <p><b><u>Control of impacts on adjacent areas</u></b></p> <ul style="list-style-type: none"> <li>• <i>Any listed plants close to the development servitude that will remain in place may not be defaced, disturbed, destroyed or removed. They should be cordoned off with construction tape or similar barrier and marked as no-go areas.</i></li> <li>• <i>The collecting of plants by unauthorized persons should be prevented.</i></li> <li>• <i>ECO to monitor that vegetation clearing only happens once all search and rescue operations have been completed.</i></li> <li>• <i>The ECO should monitor construction activities in sensitive habitats to ensure that impacts within these areas are kept to a minimum.</i></li> </ul>   | ECO / qualified botanist |



## Monitoring requirements

The following monitoring activities are recommended as part of the plant rescue plan:

- Post-relocation monitoring of plants relocated during search and rescue to evaluate whether the intervention was successful or not. This should be undertaken on a three-monthly basis over a period of two years in order to evaluate the success thereof.
- Provision of a detailed record, including photographs, that indicates the success of the plant rescue operation.

### Indicators and Targets

| Indicator   | Target   |
|---|--|
| Written and photographic records from all search and rescue operations. | All species of conservation concern identified or removed prior to clearing. |
| Survival rate of translocated plants                                    | 50-80% (based on probable survival rate of grassland species)                |



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## **Appendix 1: Flora protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)**

(as updated in R. 1187, 14 December 2007)

### **CRITICALLY ENDANGERED SPECIES**

Adenium swazicum  
Aloe pillansii  
Diaphananthe millarii  
Dioscorea ebutsniorum  
Encephalartos aemulans  
Encephalartos brevifoliolatus  
Encephalartos cerinus  
Encephalartos dolomiticus  
Encephalartos heenanii  
Encephalartos hirsutus  
Encephalartos inopinus  
Encephalartos latifrons  
Encephalartos middelburgensis  
Encephalartos nubimontanus  
Encephalartos woodii

### **ENDANGERED SPECIES**

Angraecum africae  
Encephalartos arenarius  
Encephalartos cupidus  
Encephalartos horridus  
Encephalartos laevifolius  
Encephalartos lebomboensis  
Encephalartos msinganus  
Jubaeopsis caffra  
Siphonochilus aethiopicus  
Warburgia salutaris  
Newtonia hilderbrandi

### **VULNERABLE SPECIES**

Aloe albida  
Encephalartos cycadifolius  
Encephalartos Eugene-maraisii  
Encephalartos ngovanus  
Merwillia plumbea  
Zantedeschia jucunda

### **PROTECTED SPECIES**

Adenia wilmsii  
Aloe simii  
Clivia mirabilis  
Disa macrostachya  
Disa nubigena  
Disa physodes  
Disa procera



Disa sabulosa  
Encephelartos altensteinii  
Encephelartos caffer  
Encephelartos dyerianus  
Encephelartos frederici-guilielmi  
Encephelartos ghellinckii  
Encephelartos humilis  
Encephelartos lanatus  
Encephelartos lehmannii  
Encephelartos longifolius  
Encephelartos natalensis  
Encephelartos paucidentatus  
Encephelartos princeps  
Encephelartos senticosus  
Encephelartos transvenosus  
Encephelartos trispinosus  
Encephelartos umbeluziensis  
Encephelartos villosus  
Euphorbia clivicola  
Euphorbia meloformis  
Euphorbia obesa  
Harpagophytum procumbens  
Harpagophytum zeyherii  
Hoodia gordonii  
Hoodia currorii  
Protea odorata  
Stangeria eriopus



## Appendix 2: Tree species protected under the National Forests Act (Act 30 of 1998)

|   |   |
|---|---|
| <i>Vachellia (Acacia) erioloba</i>                      | <i>Vachellia (Acacia) haematoxylon</i>                  |
| <i>Adansonia digitata</i>                               | <i>Afzelia quanzensis</i>                               |
| <i>Balanites</i> subsp. <i>maughamii</i>                | <b><i>Barringtonia racemosa</i></b>                     |
| <i>Boscia albitrunca</i>                                | <i>Brachystegia spiciformis</i>                         |
| <i>Breonadia salicina</i>                               | <b><i>Bruguiera gymnorhiza</i></b>                      |
| <i>Cassipourea swaziensis</i>                           | <b><i>Catha edulis</i></b>                              |
| <i>Ceriops tagal</i>                                    | <i>Cleistanthus schlechteri</i> var. <i>schlechteri</i> |
| <b><i>Colubrina nicholsonii</i></b>                     | <i>Combretum imberbe</i>                                |
| <b><i>Curtisia dentata</i></b>                          | <i>Elaeodendron (Cassine) transvaalensis</i>            |
| <i>Erythrophysa transvaalensis</i>                      | <i>Euclea pseudebenus</i>                               |
| <i>Ficus trichopoda</i>                                 | <i>Leucadendron argenteum</i>                           |
| <i>Lumnitzera racemosa</i> var. <i>racemosa</i>         | <b><i>Lydenburgia abottii</i></b>                       |
| <i>Lydenburgia cassinoides</i>                          | <b><i>Mimusops caffra</i></b>                           |
| <i>Newtonia hildebrandtii</i> var. <i>hildebrandtii</i> | <b><i>Ocotea bullata</i></b>                            |
| <i>Ozoroa namaensis</i>                                 | <i>Philenoptera violacea (Lonchocarpus capassa)</i>     |
| <b><i>Pittosporum viridiflorum</i></b>                  | <i>Podocarpus elongatus</i>                             |
| <b><i>Podocarpus falcatus</i></b>                       | <b><i>Podocarpus henkelii</i></b>                       |
| <b><i>Podocarpus latifolius</i></b>                     | <i>Protea comptonii</i>                                 |
| <i>Protea curvata</i>                                   | <b><i>Prunus africana</i></b>                           |
| <i>Pterocarpus angolensis</i>                           | <b><i>Rhizophora mucronata</i></b>                      |
| <i>Sclerocarya birrea</i> subsp. <i>caffra</i>          | <i>Securidaca longependunculata</i>                     |
| <b><i>Sideroxylon inerme</i> subsp. <i>inerme</i></b>   | <b><i>Tephrosia pondoensis</i></b>                      |
| <i>Warburgia salutaris</i>                              | <i>Widdringtonia cedarbergensis</i>                     |
| <i>Widdringtonia schwarzii</i>                          |   |

Species indicated in bold have a geographical distribution that coincides with the study area.



### Appendix 3: Flora protected under the Transkei Environmental Conservation Decree (Decree No 9 of 1992).

#### SCHEDULE 5: ENDANGERED FLORA (section 23)

| SCIENTIFIC NAME   | COMMON NAME               |
|---|---------------------------|
| <i>Aloe reynoldsii</i>  | Bashee Aloe               |
| <i>Aristea platycaulis</i>  |                           |
| <i>Catha abbottii</i>   | Pondo Bushman's Tea       |
| <i>Colubrina nicholsonii</i>  |                           |
| <i>Crassula streyi</i>  |                           |
| <i>Cyathea</i> , all species  | Tree Ferns, all species   |
| <i>Cyphostemma umtamuvunensis</i>   | Pondo Cobas               |
| <i>Dahlgrenodendron natalense</i>   | Natal Quince              |
| <i>Encephalartos</i> , all species  | Cycads, all species       |
| <i>Eugenia erythrophylla</i>  | Large-leaved Myrtle       |
| <i>Eugenia simii</i>  | Pondo Myrtle              |
| <i>Eugenia umtamuvunensis</i>   | Mtamvuna Myrtle           |
| <i>Eugenia verdoorniae</i>  | Small-leaved Myrtle       |
| <i>Impatiens flanaganii</i>   |                           |
| <i>Indigofera braamtonyi</i>  |                           |
| <i>Indigofera gogosa</i>  |                           |
| <i>Indigofera herrstreyi</i>  |                           |
| <i>Jubaeopsis caffra</i>  | Pondo Coconut             |
| <i>Kniphofia coddiana</i>   |                           |
| <i>Leucadendron pondoense</i>   | Pondo Conebush            |
| <i>Leucadendron spissifolium subsp. oribinum</i>  |                           |
| <i>Manikara nicholsonii</i>   | South Coast Milkberry     |
| <i>Maytenus abbottii</i>  | Rock Silky Bark           |
| <i>Maytenus oleosa</i>  |                           |
| <i>Ochna chilversii</i>   |                           |
| <i>Plectranthus ernstii</i>   |                           |
| <i>Plectranthus hilliardiae</i>   |                           |
| <i>Plectranthus praetermissus</i>   |                           |
| <i>Polygala esterae</i>   |                           |
| <i>Pseudosalacia streyi</i>   | Rock Lemon                |
| <i>Psoralea abbottii</i>  | Pondo Fountain Bush       |
| <i>Raspalia trigyna</i>   |                           |
| <i>Rhynchoscalyx lawsonioides</i>   | Natal Privet              |
| <i>Rinorea domatiosa</i>  | Bearded White Violet Bush |
| <i>Species novae</i> , new species, any described after 1 January 1990 from a specimen collected in Southeastern Africa except any mentioned in Schedule 6. |                           |
| <i>Streptocarpus porphyrostachys</i>  |                           |
| <i>Streptocarpus primulifolius</i>  |                           |
| <i>Syzygium pondoense</i>   | Pondo Waterwood           |
| <i>Tephrosia pondoensis</i>   | Pondo Poison Pea          |
| <i>Tricalysia africana</i>  | Pondo Coffee              |
| <i>Turraea pegleri</i>  |                           |
| <i>Umtiza listeriana</i>  | Umtiza                    |
| <i>Watsonia bachmannii</i>  |                           |
| <i>Watsonia confusa</i>   |                           |
| <i>Watsonia inclinata</i>   |                           |
| <i>Watsonia mtamvunae</i>   |                           |
| <i>Watsonia pondoensis</i>  |                           |

**SCHEDULE 6: PROTECTED FLORA**

|   |   |
|---|---|
| <i>Adiantum</i> , all species   | Maidenhair Ferns, all species   |
| <i>Alberta magna</i>  | Natal Flame Bush  |
| <i>Allophylus natalensis</i>  | Dune False Currant  |
| <i>Aloe</i> , all species except <i>arborescens</i> , <i>ferox</i> and any mentioned in Schedule 5. | Aloes, all species except Krantz Aloe, Bitter aloe and any mentioned in Schedule 5. |
| <i>Ammocharis coranica</i>  |   |
| <i>Anomotheca laxa</i>  | Small Red Iris  |
| <i>Anthospermum streyi</i>  |   |
| <i>Apodytes abbottii</i>  | Pondoland white Pear  |
| <i>Aristea</i> , all species, except any mentioned in Schedule 5.                                   |   |
| <i>Asplenium simii</i>  |   |
| <i>Atalaya natalensis</i>   | Natal Krantz Ash  |
| <i>Bauhinia bowkeri</i>   | Kei Neat's Foot   |
| <i>Boophane disticha</i>  | Sore Eye Flower   |
| <i>Brachystelma australe</i>  |   |
| <i>Brunsvigia gregaria</i>  |   |
| <i>Canthium vanwykii</i>  | Pondo Rock Alder  |
| <i>Cassipourea flanaganii</i>   | Cape Onionwood  |
| <i>Cephalanthus natalensis</i>  | Strawberry Bush   |
| <i>Ceropegia</i> , all species  | Snake Plants, all species   |
| <i>Chasmanthe peglerae</i>  | Flames  |
| <i>Chironia laxa</i>  |   |
| <i>Clivia miniata</i>   | St John's Lily  |
| <i>Clivia nobilis</i>   | Cape Clivia   |
| <i>Combretum erythrophyllum</i>   | River Bushwillow  |
| <i>Crassula falcata</i>   |   |
| <i>Crassula planifolia</i>  |   |
| <i>Crinum macowanii</i>   | Cape Coast Lily   |
| <i>Crinum moorei</i>  |   |
| <i>Crocasmia masonarum</i>  |   |
| <i>Cryptocarya myrtifolia</i>   | Myrtle Quince   |
| <i>Cryptocarya wyliei</i>   | Red Quince  |
| <i>Cyrtanthus</i> , all species   | Fire Lilies, all species  |
| <i>Dierama</i> , all species  | Hairbells, all species  |
| <i>Dietes bicolor</i>   |   |
| <i>Dietes butcheriana</i>   |   |
| <i>Elaphoglossum angustatum</i>   |   |
| <i>Erica</i> , all species  | Ericas, all species   |
| <i>Eriosema dregei</i>  |   |
| <i>Eriosema latifolium</i>  |   |
| <i>Eriosema luteopetalum</i>  |   |
| <i>Eriosema umtanvumense</i>  |   |
| <i>Eriosemopsis subanisophylla</i>  |   |
| <i>Erythrina humeana</i>  | Dwarf Coral Tree  |
| <i>Erythrina latissima</i>  | Broad-leaved Coral Tree   |
| <i>Eucomis</i> , all species  | Pineapple Flowers, all species  |
| <i>Euphorbia bupleurifolia</i>  |   |
| <i>Euphorbia meloformis</i>   |   |

|   |  |
|---|--|
| <i>Euryops leiocarpus</i>   |  |
| <i>Ficus bizanae</i>  | Pondo Fig  |
| <i>Gasteria</i> , all species   |  |
| <i>Geranium subglabrum</i>  |  |
| <i>Gladiolus</i> , all species  | Gladioli, all species  |
| <i>Gloriosa</i> , all species   | Flame Lilies, all species  |
| <i>Grewia pondoensis</i>  | Pondo Raisin   |
| <i>Haemanthus</i> , all species   | Snake Lilies, all species  |
| <i>Harveya</i> , all species  | Harveyas, all species  |
| <i>Hesperantha</i> , all species  |  |
| <i>Huernia</i> , all species  |  |
| <i>Hypodematium crenatum</i>  |  |
| <i>Indigofera pondoensis</i>  |  |
| <i>Indigofera rubro-glandulosa</i>  |  |
| <i>Kalanchoe thyrsiflora</i>  |  |
| <i>Kniphofia drepanophylla</i>  | White Lady   |
| <i>Kniphofia uvaria</i>   |  |
| <i>Littonia modesta</i>   |  |
| <i>Lotononis bachmanniana</i>   |  |
| <i>Lygodium kerstenii</i>   |  |
| <i>Maytenus bachmannii</i>  |  |
| <i>Memecylon bachmannii</i>   |  |
| MESEMBRYANTHEMACEAE, all species  | Mesems, all species  |
| <i>Microloma tenuifolium</i>  | Wax Twiner   |
| <i>Microsorium ensiforme</i>  |  |
| <i>Millettia sutherlandii</i>   | Giant Umzimbeet  |
| <i>Moraea</i> , all species   |  |
| <i>Nectaropetalum capense</i>   | Kei Coca Tree  |
| <i>Nectaropetalum zuluense</i>  | Natal Coca Tree  |
| <i>Nerine</i> , all species   | Nerines, all species   |
| <i>Nymphaea capensis</i>  | Water Lily   |
| <i>Ocotea kenyensis</i>   | Transvaal stinkwood  |
| ORCHIDACEAE, all species  | Orchids, all species   |
| <i>Ornithogalum</i> , all species   |  |
| <i>Osteospermum imbricatum</i>  |  |
| <i>Pachycarpus</i> , all species  |  |
| <i>Phyllica natalensis</i>  | Natal Hard-leaf  |
| <i>Phyllica tysonii</i>   | Pondo Hard-leaf  |
| <i>Phyllanthus cedrelifolius</i>  | Forest Potato Bush   |
| <i>Podranea ricasoliana</i>   | Port St John's Creeper   |
| <i>Polystichum</i> , all species  | Seven Weeks Fern, all species  |
| <i>Prionium serratum</i>  | Palmiet  |
| PROTEACEAE, all species, except <i>Protea nitens</i> and any mentioned in Schedule 5. | Proteas, all species, except Wagon Tree and any mentioned in Schedule 5. |
| <i>Pseudoscolopia polyantha</i>   | False Red Pear   |
| <i>Psilotum nudum</i>   |  |
| <i>Psychotria capensis</i>  | Black Bird-berry   |
| <i>Putterlickia retrospinosa</i>  |  |
| <i>Relhania pungens</i>   |  |
| <i>Rhus acocksii</i>  |  |
| <i>Rhus pondoense</i>   | Pondo Currant  |
| <i>Sandersonia aurantiaca</i>   | Chinese Lantern, Christmas Bell  |

|   |   |
|---|---|
| <i>Schizostylis coccinea</i>  | Xhosa Lily  |
| <i>Stangeria</i> , all species  |   |
| <i>Stapelia</i> , all species   | Stapelias, all species  |
| <i>Strelitzia nicolae</i>   | Natal Wild Banana   |
| <i>Strelitzia reginae</i>   | Crane Flower  |
| <i>Streptocarpus</i> , all species, except any mentioned in Schedule 5. | Streptocarpus, all species, except any mentioned in Schedule 5. |
| <i>Struthiola pondoensis</i>  |   |
| <i>Syncolostemon densiflorus</i>  |   |
| <i>Thamnocalamus tessellata</i>   | Mountain Bamboo   |
| <i>Trichomanes reptans</i>  |   |
| <i>Tritonia</i> , all species   | Tritonias, all species  |
| <i>Turraea pulchella</i>  |   |
| <i>Veltheimia bracteata</i>   |   |
| <i>Voacanga thouarsii</i>   | Wild Frangipani   |
| <i>Watsonia</i> , all species, except any mentioned in Schedule 5.      | Watsonias, all species, except any mentioned in Schedule 5.     |
| <i>Widdringtonia nodiflora</i>  | Mountain cypress  |
| <i>Zantedeschia elliotiana</i>  | Kei Arum  |

