PROPOSED HOUSING DEVELOPMENT ON ERVEN 2954, 2955 & 2956 KINGSBURGH EXTENSION 9

eThekwini Municipality, KZN

Protected Plant Rescue & Translocation Plan

Version 1.0
Rev 0

Date: 17th November 2021

Compiled by:

Eco-Pulse Environmental Consulting Services cc

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PLAN DETAILS

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KEY REFERENCES

Numerous key documents and resources were reviewed and used in the compilation of this Plan and Protocol. These documents and resources are not cited in the text but where used in the understanding the ecology of each plant species. These include the following:

i. Eco-Pulse Consulting, 2021. Proposed Housing Development on Erven 2954, 2955 & 2956 Kingsburgh Ext 9, eThekwini Local Municipality, Kwazulu-Natal: **Forest Conservation Management Plan**. No. EP557-01 (version 1.0). March 2021.

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1 INTRODUCTION

1.1 Background and Location

The planned development of a housing project on Erven 2954, 2955 & 2956 Kingsburgh Extension 9 (eThekwini Municipality, KZN) is situated within a steep valley comprising mixed woodland, thicket, grassland and forest vegetation communities that are likely to be impacted to varying degrees. A locality map showing the development site and properties is included below in Figure 1.

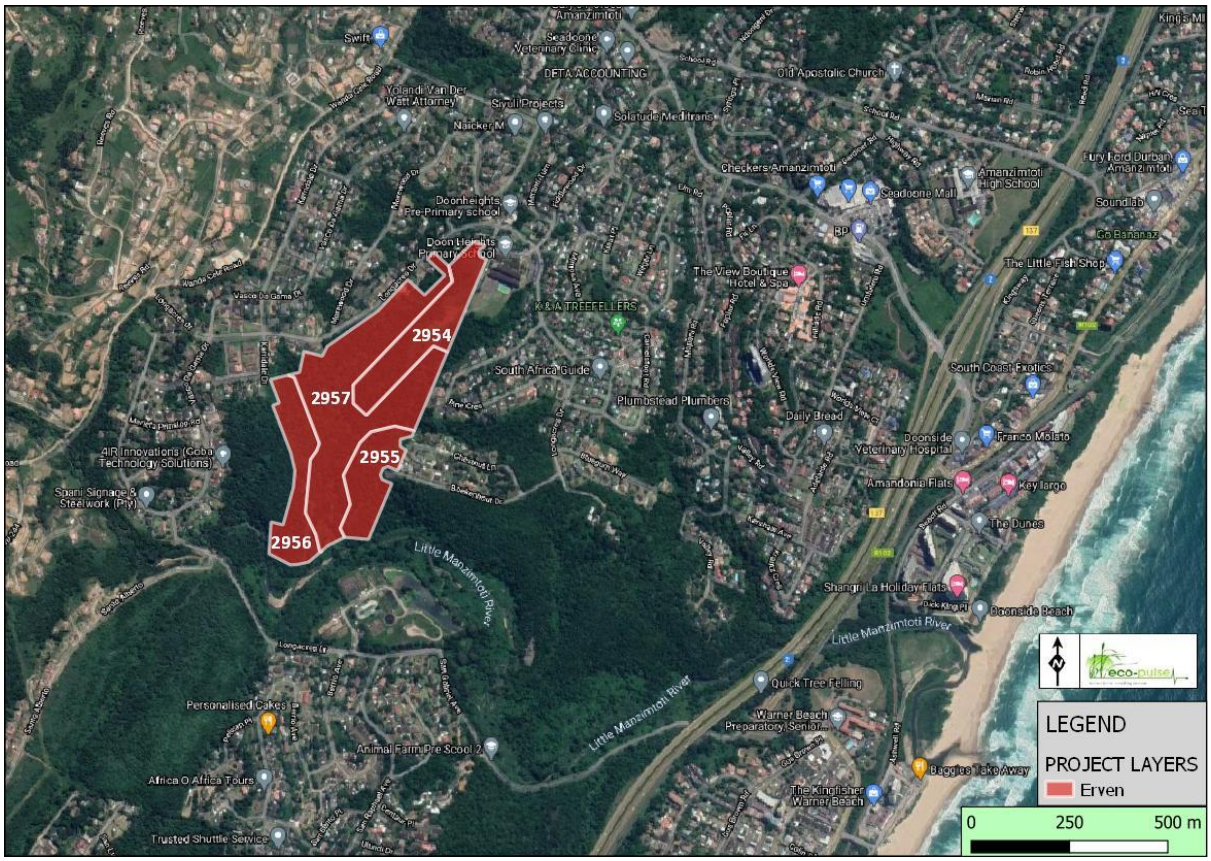

Figure 1 Locality map showing Erven 2954, 2955, 2956 & 2957 Kingsburgh Extension 9 on the 'Little Manzimtoti' River west of Amanzimtoti town off the National Route N2.

1.2 Need and Purpose of the Plan

There are three key pieces of legislation in South Africa applicable to the Province of KwaZulu-Natal that provide for the protection of threatened plant species in need of protection to ensure their survival in the wild. Furthermore, they provide for the protection of ecosystems that are threatened or in need of protection. These include:

1. National Environmental Management: Biodiversity Act No. 10 of 2004;
2. National Forest Act No. 84 of 1998; and
3. Natal Nature Conservation Ordinance No. 15 of 1974.

Protected plants require permits should there be a risk that these could be damaged, destroyed or relocated due to human activities / development.

According to the specialist Vegetation Assessment Report for the development project (Styles, 2018), several protected plant and tree species occur on the property where development is planned. Whilst

the latest revised development layout (shown below on the map in Figure 2) intends to avoid the more mature / older forest growth and the majority of the identified protected plants and trees, there remains one Provincially Protected Plant, *Dioscorea cotinifolia* (Elephant's foot) located on ERF 2956 Kingsburgh Ext 9 (indicated on the map in Figure 2 below by the 'green' marker point on the western most side of the property). All other protected plants have been avoided.

The potential impact to a single individual plant of the species *Dioscorea cotinifolia* (Specially Protected under Schedule 12 of the Natal Nature Conservation Ordinance), this necessitated investigations into protected plant rescue and translocation (where possible) or replacement where relocation of species is not practically possible.

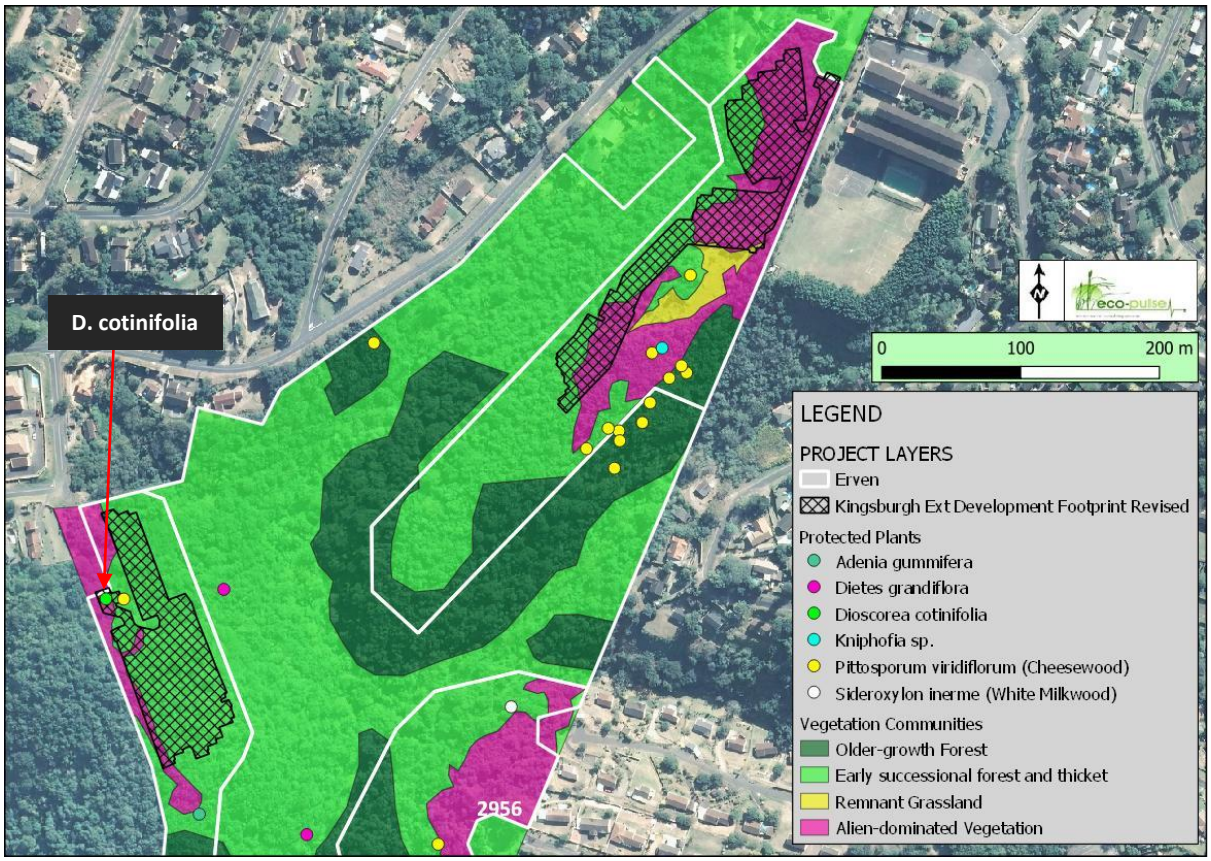

Figure 2 Map showing the revised development layout in relation to mapped forest vegetation communities and protected plant species (after D. Styles, 2018).

1.3 Overview of Plant Rescue and Translocation

Plant rescue and translocation refers to the intentional relocation of organisms from one site to another (IUCN, 1987, 1998 and IUCN/SSC, 2013). In this instance, it is a process aimed at salvaging threatened and nationally/provincially protected plant species from the footprint of the development project (where plant losses/mortalities are likely to occur) and then establishing them in adjoining habitat outside of the development footprint/impact zone but within the road servitude, for the purposes of preserving/conserving biodiversity.

2 ROLES, RESPONSIBILIES & FINANCIAL PROVISIONS

2.1 Roles and Responsibilities

For the successful implementation of the protected plant rescue and translocation plan, it is necessary upfront to define the roles and responsibility of each party / stakeholder involved (Table 1, below). The ultimate responsibility for the implementation of the plan with the developer and applicant, who will need to be closely involved in the implementation of this plan and protocol.

Table 1. Key roles and responsibilities of each stakeholder / party involved.

Stakeholder / Party Involved	Roles and Responsibility
Applicant / Developer	Shall be responsible for: i. funding the implementation of the tree replacement protocol; ii. securing all relevant licences and permits require for the implementation of the plan; iii. appointing relevant specialists and sub-consultants required to realise the implementation of the plan (where relevant); iv. ensuring that the plan is implemented successfully; and v. monitoring the actions of the main contractor.
Main Contractor	Shall be responsible for: i. appointing relevant specialists and sub-consultants required to realise the implementation of the plant rescue and translocation plan; ii. the actions of all appointed specialists and sub-consultants; iii. setting up of an onsite nursery to receive rescued plant species and care for them; iv. monitoring the recovery of rescued plants, planted trees and plants; v. disseminating information to relevant parties involved in the project.
Sub-contractor	Shall be responsible for: i. undertaking the physical work involve with plant rescue and replanting, etc.

2.2 Financial Provisions

Financial provision and budgets required to undertake the plant rescue, translocation and planting has not been established as part of the scope of work for developing this plan and protocol. This will need to be established jointly by the developer and the appointed contractor undertaking the implementation of the plan and programme.

3 PROTECTED PLANT SPECIES

3.1 Target Plant Species

The following single (one) protected plant species has been identified within the planned development footprint and are therefore at risk of being damaged or destroyed:

- ***Dioscorea cotinifolia*** (Perennial-Geophyte, climber)

Detailed information on the protected plant species is provided in Table 2 and the location of individual trees is shown spatially on the map in Figure 3. Geographical (GPS) coordinates have also been provided for the protected plant in question.

Table 2. Detailed information on protected plants species.

Species Name	No. Plants Impacted	Property	Status	Permit Required	Original Habitat Occurring on Site	Geographical Coordinates
Dioscorea cotinifolia	1	ERF 2956 Kingsburgh Ext 9	Specially Protected Plant (Schedule 12 of Natal Conservation Ordinance)	EKZNW: ordinary permit	Alien dominated vegetation	-30º 04' 12.7'' S 30º 51' 16.3'' E

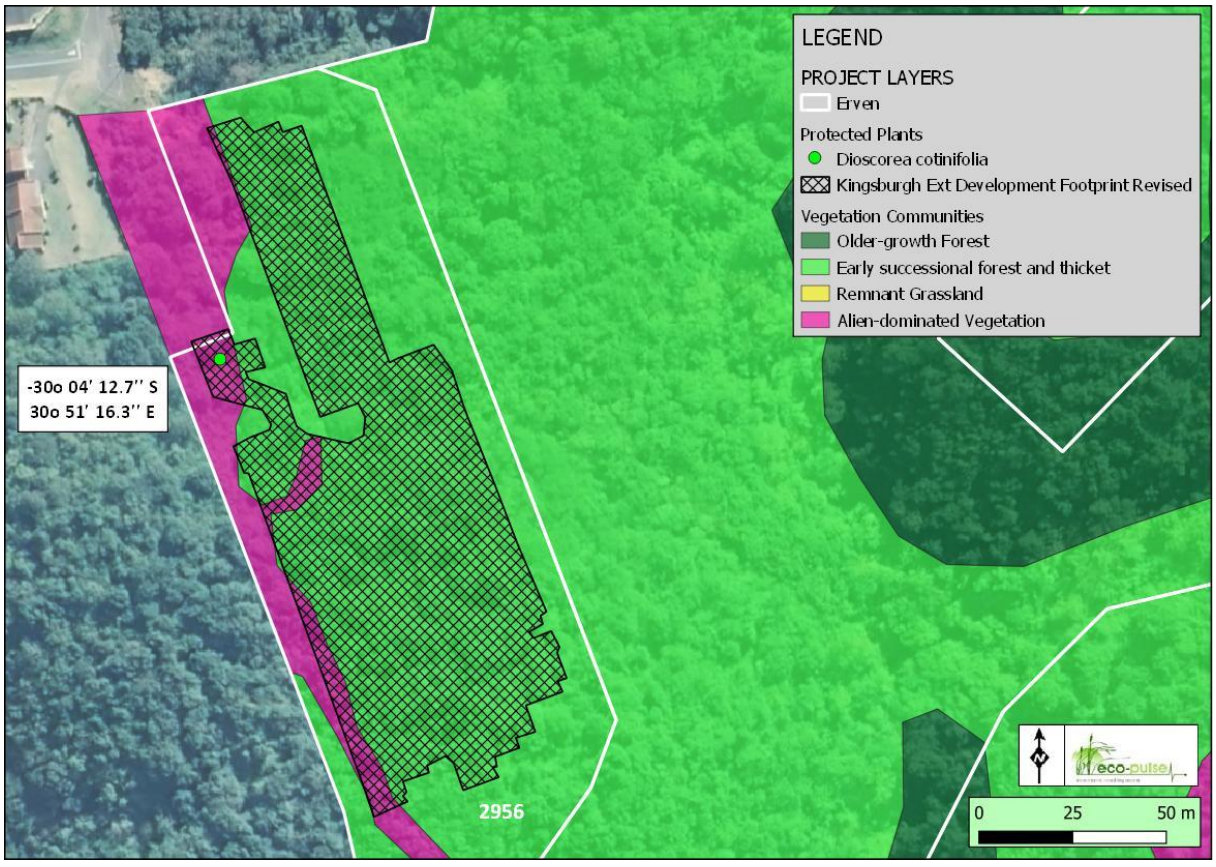

Figure 3 Map showing the location of the single, provincially protected *Dioscorea cotinifolia* plant requiring rescue and translocation and permitting.

Photographs of selected protected plant species:



Dioscorea cotinifolia
Photos obtained online courtesy of: http://www.bihrmann.com/caudiciforms/subs/dio-cot-sub.asp

3.2 Plant Species Ecological Requirements

To undertake plant translocation or tree replacement successfully, knowledge of the target species, its habitat requirements, and ecological interactions is needed (Gordon, 1996; Parsons and Zedler, 1997). The species-specific habitat requirements and propagation recommendations are summarised in Table 3, with the recommendation for plant rescue and translocation also discussed in the same table.

Table 3. Detailed information on protected plants species ecological requirements and recommendations.

Species	Habitat Preferences (SANBI[1])	Able to translocate?	Propagation (SANBI)	Recommendation
Dioscorea cotinifolia	Occurs in open dry forest; forest margins; scrubby vegetation; rocky places. 0-400 m altitude. Rich but drained soil.	Yes	Can be propagated via seeds or rhizomes transplanted.	Rescue and relocate to existing dry, semi- shaded open forest or forest margins of older growth forest, well outside of the development footprint.

3.3 Plant Receiving Areas

Intact habitat is a prerequisite, with limited ecological disruptions to prevent further disturbance of translocated or planted trees (IUCN, 2013). 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. Suitable sites nearest to the donor site (i.e. the development site/footprint where plant losses are anticipated) are ideal, as too great a distance could impair genetic variation and potential exchange. Suitable habitat should meet

[1] Plant species habitat preferences and propagation requirements adapted from the South African National Biodiversity Institute (SANBI) online plant species database, online at: http://pza.sanbi.org/

the candidate species' total biotic and abiotic needs through space and time and for all life stages (IUCN, 2013).

In line with the species-specific ecological/habitat requirements and recommendations in Table 3, the following plant receiving areas (see Table 4 below and the corresponding map in Figure 4 for locations) have been identified on the property such that suitable sites nearest to the location of rescue and removal is ensured. Any of the three sites (A, B or C) would be a suitable receiving area for transplantation of *D. cotinifolia,* which prefers light shade but not deep shade.

Table 4. Identified plant receiving sites identified.

Site	Description
A	Early successional, open forest growth to the north-east, outside of the planned development.
B	Early successional, open forest growth to the south0east, outside of the planned development.
C	Early successional, open forest growth to the south, outside of the planned development.

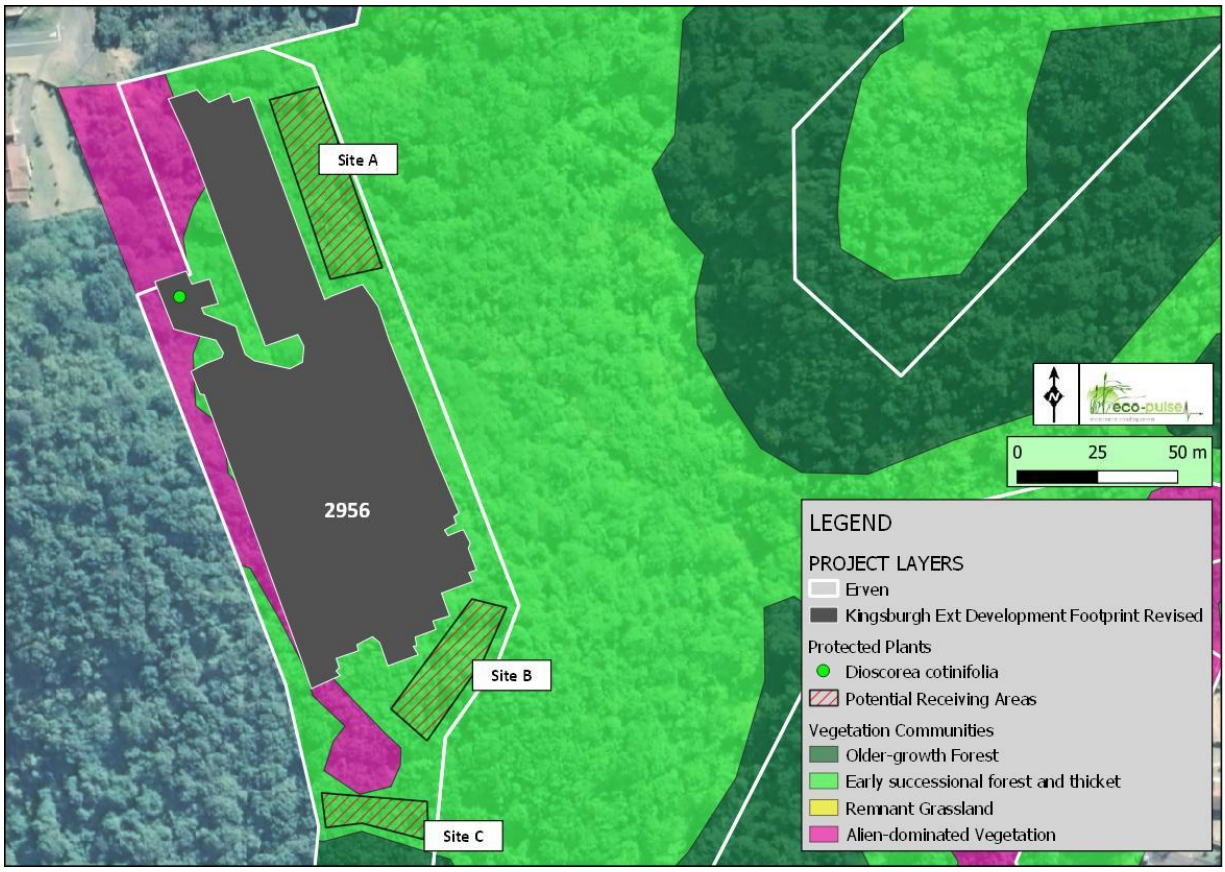

Figure 4 Map showing potentially suitable plant translocation receiving areas A, B and C, within the drier, more open canopy early successional forest growth and forest margins.

4 IMPLEMENTATION GUIDELINES

4.1 Protected Plant Permits

IMPLEMENTATION OF THE PLAN CAN ONLY BE UNDERTAKEN ONCE A RELEVANT PERMIT/LICENCE REGARDING PROTECTED TREES FROM THE DFFE HAS BEEN OBTAINED TO AUTHORISE THE TREE CLEARING AND PLANT REPLACEMENT PLAN AND/OR AN ORDINARY PERMIT FROM EKZNW HAS BEEN OBTAINED FOR PROVINCIALLY PROTECTED PLANT SPECIES.

4.1.1 Plant Permit Requirements

Plant permit requirements are detailed in Table 5 below. The following plant species require an ordinary permit from Ezemvelo KZN Wildlife (EKZNW) given their 'Specially Protected' Provincial status in terms of Schedule 12 of the Natal Nature Conservation Ordinance:

- ***Dioscorea cotinifolia***

Table 5. Permit requirements for protected plants.

Species Name	No. Plants	Status	Permit Required
Dioscorea cotinifolia	1	Specially Protected Plant (Schedule 12)	EKZNW: ordinary permit

4.2 General Guidelines

To undertake a successful plant rescue and translocation programme, it is of paramount importance that the following general guidelines are adhered to. This list serves to highlight key principles and actions that must be undertaken or considered when implementing this protocol. Any deviations from the plan that may be required should first be checked.

i. **PLANT TRANSLOCATION MUST BE UNDERTAKEN BY A SUITABLY QUALIFIED AND EXPERIENCED TEAM.** Translocation requires people who understand how to move plants and when to move plants to minimise damage to plants and improve the chances of the project being a success. This implies that an external team must be appointed for the sole purpose of translocating plants.

ii. **THE EDUCATION OF FIELD WORKERS IS VERY IMPORTANT.** Field workers will be primarily responsible for undertaking the translocation work and will need to be informed of the correct procedures to be employed.

iii. **WORKERS MUST BE STRICTLY MONITORED.** A suitably trained supervisor must be employed to supervise teams as they undertake plant rescue and translocation work.

iv. **USE OF SPECIES-SPECIFIC EQUIPMENT IS IMPORTANT.** The team undertaking the translocation exercise must have the correct equipment to translocate plants. For example, large Aloes (e.g. *A. ferox*) are very heavy and susceptible to breaking. It is necessary therefore to have equipment to hoist such plants and move them without damaging them.

v. **NO PLANT MUST BE TRANSLOCATED WHILE FLOWERING OR IMMEDIATELY POST FLOWERING**. During flowering, most forbs expend all their resources such that when subjected to stress related with translocation they fail to recover and consequently perish.

vi. **EVERY EFFORT MUST BE MADE TO DIG OUT PLANTS WITH THEIR UNDERGOUND STORAGE ORGAN AND /OR ROOT BALLS INTACT**. This will keep the underground storage organs (bulb or corm) and rooting structures intact and moist and aid in the recovery of the plant.

vii. **ENSURE PROPER CARE DURING TEMPORARY STORAGE AND LIMIT TIME BETWEEN HARVESTING AND REPLANTING TO A MINIMUM**. Rescued plants are likely to be sensitive to removal and transplanting and are therefore to be handled with care and not to be stored outside of their soil/habitat for more than a few hours (remove and transplant plants on the same day). Alternatively, plants can be planted into suitable containers and housed within a temporary nursery. This is important to prevent drying of the root ball and over-stressing the plant. Plants removed are to be stored safely and treated according to their specific requirements (to be advised by the botanist/plant translocation specialist appointed to undertake rescue and relocation of plants).

viii. **TRANSPLANTS MUST BE PLANTED IN ENVIRONMENTS SIMILAR TO THEIR DONOR SITES**. This is important to ensure that plants survive and reproduce successfully.

ix. **RECEPTOR SITES / HABITAT MUST BE INTACT**. This is an important measure to prevent further disturbance of transplants and ensure their long-term survival. Re-planting into the wild must occur sensitively, causing as little damage/disturbance to natural vegetation as possible.

x. **TIMING OF PLANTING AND CORRECT WATERING REGIMES ARE IMPORTANT**. Immediately after being transplanted, species should be adequately watered. Different plants require different watering regimes depending on time / season of translocation. Each species watering requirement must be reviewed thoroughly prior to translocating.

xi. **RECORDING PLANT INFORMATION**. A community of plants that are rescued must be photographed prior to removal, tagged with a unique number or code and the geographical coordinates (latitude/longitude) recorded using a hand-held GPS device. Steps are also to be taken to protect rescued and translocated plants from further disturbance in order to aid/facilitate their re-establishment at the new site (may require fencing off, signage, monitoring, etc.). The position (coordinates) of rescued plants that have been re-planted should be recorded using a GPS device to inform future monitoring of the success of the plant rescue, translocation and protection efforts undertaken. 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.

4.3 Protocol for Plant Rescue and Relocation

4.3.1 Aligning plant rescue and translocation with flowering times for certain plants

One of the key requirements of translocation is not to rescue and translocate plants when flowering, as plants use up most if not all of their energy reserves when flowering such that when subjected to stress linked with translocation, they fail to recover and risk perishing. It is based on this understanding that the following chart (in Table 6) has been developed, indicating the flowering season for each species and this should be used to inform when to undertake translocation.

Table 6 shows flowering times indicated in red shading and with two distinct periods, preferably from **June to July** or if not possible, during early **November** before the onset of the spring rains of any given year, when translocation and planting can and should be undertaken to improve the success of the translocation/planting (refer to the "green" shaded cells in Table 6).

Table 6. Summary of known/estimated flowering times of the protected plant species.

Botanical name	Months (January – December of any given year)											
	J	F	M	A	M	J	J	A	S	O	N	D
Dioscorea cotinifolia						X	X				X	

Red shaded cells indicate flowering times; green shaded cells indicate periods when translocation and tree planting can/should be undertaken; and an 'X' represents the preferred period when translocation and tree planting is recommended.

Table 7. Translocation protocols and guidelines for individual protected plant species.

Plant Name & Guidelines for Handling the Plant	Receiving Site	Watering Requirements	Ideal Time to Translocate
Dioscorea cotinifolia i. Occurs in dry, open forest or along margins of the closed forest and therefore must be planted in a similar receiving environment. ii. The plant may either have its caudex (tuber rootstock) below or above ground. If not visible, care must be taken when digging up the plant because the caudex may be large. iii. The plant is a slender climber, therefore care must be taken not to break plant parts when translocating.	The plant **prefers light shade but not deep shade.** The caudex (tuber rootstock) **must be in the shade always.**	• Water immediately after planting.	**June to July** or **early November**

4.4 Onsite Nursery Setup

Not necessary since only a single plant species requires rescue and translocation.

4.5 Protocol for Tree Replacement Planting

Not applicable.

5 MONITORING & EVALUATION

Post-planting monitoring is a crucial step in evaluating the success of the tree replacement, which can only be only be judged by the establishment of a viable, self-sustaining population (Griffiths *et al*. 1989). To achieve this, a long-team monitoring programme is typically required. In addition to judging the success of a tree replacement project, monitoring data can also be used in the dissemination of information, with lessons learned being important in the design of future translocation procedures and monitoring strategies (Harris *et al*. 2014). At a regional or national level, monitoring data can also potentially be used to advise future policies on species translocations.

For this particular project, we have elected use of simple monitoring techniques that would enable the assessor to establish whether the planted tree population is viable and self-sustaining. These techniques include:

i. **Plant counts** – counting the number of surviving and dead plants;
ii. **Measuring tree growth** – entails measuring tree height only. This is only applicable for trees;

iii. **Measuring plant condition** – entails evaluating the condition of the plant using the following numerical scale (SMEC, 2012);
   - 0 is dead
   - 1 is leafless with no sign of re-shooting
   - 2 has small amount of foliage
   - 3 has a substantial amount of foliage
   - 4 is has foliage that is healthy and re-shooting
   - 5 is growing actively and flowering or seeding

iv. **Flowering and fruiting** – counting the number of plants flowering and or fruiting. This aspect may be difficult to monitor because plants flower at different times of the year, however, every effort must be made to record whether the plant is flowering or fruiting. A yes / no rating is recommended; and

v. **Fixed-point photography** – taking progressive photographs of selected plant populations from the same position for visual purposes.

Monitoring of the transplanted species should commence at the completion of planting and then at four-month intervals (thus 3 times a year). The monitoring process must be conducted in the presence of the main contractor by a suitably qualified external/independent auditor, such as an ECO. A recommended monitoring sheet for completion when monitoring is appended as **Annexure A.** Following each monitoring exercise, a brief report must be developed. The report must capture reasons for any plant mortality. Factors to consider when reporting on mortality include handling, planting techniques, the weather, watering regimes, receptor site parameters (soil, sunlight / shade), invasive alien plants, herbivory, etc. Any plants that are found dead must be replaced at a 1:2 ratio (thus 1 dead: 2 planted). Replacement plants must be sourced commercially or propagated from onsite plants. Propagation of replacement plants may need to be undertaken by or through a registered local nursery or dedicated nursery setup on site.

Following completion of the initial monitoring period, the external auditor must assess the need / desirability for further monitoring based on the success of translocation. To evaluate project success, the following attributes/rehabilitation indicators need to be clearly defined and understood:

i. Aspects/values of interest referred to herewith as 'concerns';
ii. Level of achievement required to consider the rehabilitation exercise successful; and
iii. Quantitative performance level used as a desirable target.

Table 8, below, provides for basic translocation evaluation guidelines useful for evaluating the success of the project. The evaluation process must be conducted by the external auditor at least once every year.

Table 8. Guidelines for evaluating the success of translocation.

Concern	Performance indicator	Desired Target
1. All transplants and planted saplings must survive.	Mortality rate	0% (zero mortality)
2. All plants must be healthy.	Plant condition	All plants must have a health score of at least 3
3. All plants must show growth within 12 months.	Growth rate	Progressive increase in plant height, leaf length etc.
4. All adult plants must reproduce.	Flowering & Fruiting	Some plants to flower and bear fruit.

6 REFERENCES

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7 ANNEXURES

Annexure A: Recommended Monitoring Sheet

GPS Coordinates	Species name	Plant condition	Flowering?	Fruiting?	Photos	Plant height (cm)	General Comments	Recommendations
-30° 04' 12.7'' S 30° 51' 16.3'' E	*e.g. D. cotinifolia*	3/5	Yes/no	Yes/no	IMG 220	78 cm	• Showing good growth despite leaves being cut - supposedly by locals harvesting. • The tree has grown by roughly 5cm in the last 3 months.	Place a sign to discourage harvesting of planted saplings.