INVASIVE ALIEN PLANT MANAGEMENT PLAN

For

‘THE HILL’ RESIDENTIAL DEVELOPMENT

In terms of the:
National Environmental Management Biodiversity Act, 2004 (Act 10, of 2004) & Invasive Species Regulations (October 2014)

Prepared for Applicant: Liberty Lane Trading 111 (Pty) Ltd.

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Report Reference: KNY339/05

Date: 12 February 2016
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PURPOSE OF THIS REPORT:

Invasive Alien Plant Management Plan

APPLICANT:

Liberty Lane Trading 111 (Pty) Ltd.

CAPE EAPRAC REFERENCE NO:

KNY339/05

SUBMISSION DATE

12 February 2016
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National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended & the
2014 Environmental Impact Regulations;
National Environmental Management Biodiversity Act, 2004 (Act 10, of 2004) &
Invasive Species Regulations (October 2014)

„The Hill’ Residential Development

Remainder of Portion 82 of Farm 205 Ruygtevlei & Remainder Erf 1638, Sedgefield

Submitted for:
Stakeholder Review & Comment

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# TABLE OF CONTENTS

1 INTRODUCTION........................................................................................................................ 1  

2 LEGISLATIVE REQUIREMENTS .................................................................................................. 3  
   2.1 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA, ACT 107 OF 1998) ... 3  
   2.2 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (NEM:BA) (ACT 10 OF 2004) .............................................................................................................................. 4  
   2.3 CONSERVATION OF AGRICULTURAL RESOURCES ACT (CARA) ................. 6  
   2.4 NATIONAL VELD & FOREST FIRE ACT (NVFFA) (ACT 101 OF 1998) .......... 6  

3 SITE CONTEXT (EXTENT OF INVASION) .............................................................................. 7  
   3.1 NEM:BA CATEGORIES OF INVASIVE ALIEN PLANTS ........................................... 11  

4 SCOPE OF ALIEN PLANT CLEARING PLAN ....................................................................... 11  
   4.1 SCREENING.................................................................................................................... 12  

5 CONTROL STRATEGIES AND OBJECTIVES ....................................................................... 13  
   5.1 CLEARING PRIORITY & TIMEFRAMES ...................................................................... 15  

6 CLEARING/CONTROL METHODOLOGIES ....................................................................... 16  
   6.1 INITIAL CLEARING ....................................................................................................... 16  
   6.2 FOLLOW-UP CLEARING ............................................................................................... 20  
   6.3 MANAGEMENT OF ALIEN PLANT BIOMASS ............................................................ 20  
   6.4 ENVIRONMENTAL CONSIDERATIONS FOR CLEARING ....................................... 21  

7 MAINTENANCE PHASE .......................................................................................................... 21  

8 MONITORING .......................................................................................................................... 22  

9 CONCLUSION .......................................................................................................................... 23  

10 REFERENCES .......................................................................................................................... 23  

Appendices:  
Appendix A: Locality Map  
Appendix B: Site Layout Plan  
Appendix C: Vegetation Map  
Appendix D: Working for Water recommended herbicides
GLOSSORY OF TERMS

CARA  Conservation of Agricultural Resources Act (Act 43 of 1983) - provides for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.

CBA  Critical Biodiversity Area – An area designated over sensitive, vulnerable and endangered features or ecosystems, which remain relatively intact and are in need to protection

DEA  National Department of Environmental Affairs – the national authority responsible for the sustainable environmental management and integrated planning.

DEA&DP  Department of Environmental Affairs and Development Planning – the provincial authority for sustainable environmental management and integrated development planning in the Western Cape.

DWA  Department of Water Affairs – the provincial authority mandated to enforce the Forestry Act. Permits for the removal or pruning of protected tree species eg Milkwoods must be obtained from this entity.

ECA  Environment Conservation Act, 1989 - to provide for the effective protection and controlled utilization of the environment and for matters incidental thereto.

ESA  Ecological Support Area – an area designated to support the ecological integrity of Critical Biodiversity Areas and/or sensitive ecosystems.

IAP  Invasive Alien Plant – non-indigenous plants which are considered to be weeds or invader plants which may cause economic and environmental harm or adversely affect human health (Convention on Biological Diversity, 2009).

IAS  Invasive Alien Species – species (includes fauna & flora) whose introduction and/or spread outside their natural past or present distribution threatens biological diversity (Convention on Biological Diversity, What are Invasive Alien Species?, 2016) and may cause economic and environmental harm or adversely affect human health (Convention on Biological Diversity, 2009).
NEMA National Environmental Management Act (Act 107 of 1998, as amended) – national legislation that provides principles for decision-making on matters that affect the environment.

NEM:BA National Environmental Management: Biodiversity Act (Act 10 of 2004) - This Act controls the management and conservation of South African biodiversity within the framework of NEMA.
1 INTRODUCTION

*Cape EAPrac* has been appointed by *Liberty Lane Trading 111 (Pty) Ltd.*, hereafter referred to as the Proponent, as independent environmental assessment practitioner (EAP), to facilitate the Basic Assessment (BA) process required in terms of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended) and 2014 Environmental Impact Assessment (EIA) Regulations, for the proposed „*The Hill Development*‘ bordering the town of Sedgefield to the north (Western Cape Province, Garden Route). The property is owned by *Garden Route Chalets (Pty) Ltd.* This Invasive Alien Plant (IAP) management plan is being submitted in support of the abovementioned Environmental Process.

The Proponent proposes to develop a residential estate, consisting of single residential erven, group-housing units, a commercial site, water reservoirs, private open space and service infrastructure on RE/Erf 1638 (±34ha) and RE/Portion 82 of Farm 205 Ruygtevlei (±56ha) (Figure 1 & Appendix A for Locality Plans; Figure 2 & Appendix B for the proposed Development Layout). These properties are zoned „Agriculture‘ and requires rezoning to accommodate such development rights.

*Figure 1: Showing the locality of RE/Erf 1638 (yellow) and RE/Portion 82 of Farm 205 Ruygtevlei (red) in relation to the town of Sedgefield.*
Figure 2: Showing the preferred development layout for the proposed „The Hill” development.

Access to the site for IAP clearing and timber harvesting will be via the so-called Cloud Nine public road.

The properties associated with this Invasive Alien Plant (IAP) Management Plan are densely invaded by a myriad of IAPs (see section 3) which has transformed the majority of the properties. It is the responsibility of the land owner to ensure that effective long- and short-term IAP management is implemented on the properties.

Alien invasive vegetation is a problem of global significance, affecting biodiversity and causing impacts running into millions of Rands annually. The 2010 National Biodiversity Assessment states that approximately 20 million hectares of South Africa’s land cover has been invaded by invasive woody plants (Driver et al. 2012). Impacts associated with invasive plants include reduction of biodiversity (Higgins et al., 1999), increased biomass affecting fire intensities & regimes (Setterfield et al., 2010), reduced surface water runoff & hydrological alterations (Le Maitre, 2004) and ecosystem services (Van Wilgen et al., 2008). The effective control of alien vegetation on the property is important in order to protect natural habitats, increase water run-off, decrease fire risk and fuel load and to prevent further spread of aliens from these properties.

The management of alien vegetation will generally comprise of the following phases:

- **Initial Clearing Phase:** Refers to the first time an area is cleared of alien vegetation.
• **Follow-up Clearing Phase**: Consists of a number of follow-up clearing operations (typically 4 – 5 follow-ups, however it can be more). The frequency of follow-up clearing is informed through monitoring of re-growth however an annual follow-up is accepted as standard procedure. It has to be noted that the costs of clearing re-growth increases significantly over time (i.e. longer intervals between follow-up operations).

• **Maintenance Phase**: This phase means the property/site (a specific site/area can be under maintenance whilst other areas of the property is still under active clearing) is completely cleared of all invasive alien plants and requires a walk through and removal of any regrowth and new invader plants once a year.

This IAP management plan provides recommendations for the effective management (including initial and follow-up control/clearing) of IAPs on the properties, is compiled in accordance with the National Environmental Management Biodiversity Act, 2004 (Act 10, of 2004), Invasive Species Regulations (October 2014) and the guideline document for compiling invasive species control plans. By implementing this IAP management plan the proponent will ensure compliance with the NEM:BA Regulations and will aim to control IAPs on the property and promote the re-establishment of natural vegetation on the properties.

## 2 LEGISLATIVE REQUIREMENTS

The proponent is required to comply with all necessary legislation, policies and guidelines. These include, but are not limited to:

### 2.1 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA, ACT 107 OF 1998)

The National Environmental Management Act (NEMA, Act No. 107 of 1998, as amended) embraces the notion of sustainable development as contained in the Constitution in that everyone has the right:

- to an environment that is not harmful to their health or well-being; and
- to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures.

NEMA aims to provide for cooperative environmental governance by establishing principles for decision-making on all matters relating to the environment and by means of Environmental Implementation Plans (EIP) and Environmental Management Programmes (EMP).

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 and 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

2.2 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (NEM:BA) (ACT 10 OF 2004)

This Act controls the management and conservation of South African biodiversity within the framework of NEMA. Amongst others, it deals with the protection of species and ecosystems that warrant national protection, as well as the sustainable use of indigenous biological resources. Sections 52 & 53 of this Act specifically make provision for the protection of critically endangered, endangered, vulnerable and protected ecosystems that have undergone, or have a risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention through threatening processes.

According to the Vegetation Map of South Africa (2006) and BGIS 2014, almost the entire extent of the properties in question (and proposed formalisation layout) fall within the Knysna Sand Fynbos vegetation type which has a National Spatial Biodiversity Assessment (NSBA) and NEM:BA Ecosystem Status of Endangered and Critically Endangered, respectively. Knysna Sand Fynbos is also listed as a ‘Threatened Ecosystem’ in terms of Section 52 of NEM:BA. See Vegetation Map in Appendix C.

Control and management of IAPs falls within the ambit of the NEM:BA which defines different categories of IAPs according to their current invasive state and potential to become invasive. These categories are, as per the NEM:BA Regulations (October 2014):

• Category 1a Listed Invasive Species

“(1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.

(2) A person in control of a Category 1a Listed Invasive Species must –

a. comply with the provisions of section 73(2) of the Act;

b. immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and

c. allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.
(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme."

Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.

- Category 1b Listed Invasive Species

“(1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.

(2) A person in control of a Category 1b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.”

Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.

- Category 2 Listed Invasive Species

“(1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.

(2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.

(3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.

(4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for
purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3.

(6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control."

**Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Cat 2 plants to exist in riparian zones.**

- **Category 3 Listed Invasive Species**

“(1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

(2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.”

**Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Cat 3 plants to exist in riparian zones.**

### 2.3 CONSERVATION OF AGRICULTURAL RESOURCES ACT (CARA)

The Conservation of Agricultural Resources Act (CARA) aims to provide for the conservation of natural agricultural resources by maintaining the production potential of land, combating and preventing erosion and weakening or destruction of water resources, protecting vegetation and combating weeds and invader plant species.

Its application for this IAP management plan applies to the protection of soil and water resources as well as the management of alien invasive vegetation. The CARA listed alien plants under three (3) categories, however these categories are now included under the NEM:BA Legislation and not detailed here.

### 2.4 NATIONAL VELD & FOREST FIRE ACT (NVFFA) (ACT 101 OF 1998)

The purpose of the National Veld and Forest Fire Act is to prevent and combat veld, forest and mountain fires throughout the Republic of South Africa and to provide institutions, methods and
practices for achieving this purpose. Institutions include the formation bodies such as Fire Protection Associations (FPA’s) and Working on Fire. The Act provides the guidelines and constitution for the implementation of these institutions, as well as their functions and requirements.

Every owner on whose land a veldfire may start or burn or from whose land it may spread must prepare and maintain a firebreak on his or her side of the boundary between his or her land and any adjoining land. The procedure in this regard and the role of adjoining owners and the fire protection association are dealt with within this Act.

The site associated with this IAP management plan is located within a Fynbos vegetation type, which is prone to fire. Not only is Fynbos prone to fire, fire is considered as a natural driver of the Fynbos vegetation type and its survival as many plants species’ seeds will not germinate without fire. It can therefore be said that fire, whether controlled or un-controlled, will occur on the property during sometime of the operational phase. It is the responsibility of the proponent to ensure that he is a member of the local FPA (Southern Cape FPA) for support with regards to fire management and protection. The proponent is also responsible for implementing reasonable measures in order to prevent the spread of a fire to neighbouring properties.

3 SITE CONTEXT (EXTENT OF INVASION)

This section describes the context and extent of IAP infestation on the site (RE/Erf 1638 and RE/Portion 82 of Farm 205 Ruygtevlei).

In his Ecological Specialist Report Todd (2016) stated the following:

“The site is overwhelmingly invaded by woody aliens, some of which appear to have originally been planted at the site for commercial forestry, but all of which are now recruiting unregulated across the site. The lower slopes of the site and western half of the site is dominated by Eucalyptus camaldulensis, while the upper western half of the hill is dominated by Pinus radiata and the eastern half of the site has extensive areas dominated by Black Wattle Acacia mearnsii. There are also other aliens present in abundance including Acacia melanoxylon, Acacia longifolia, Acacia saligna, Rubus fruticosus and Lantana camara (see Figure 3, Figure 4, Figure 5, Figure 6 & Figure 7 or images of invasive plants). There was only one area observed that can be considered near-natural which was less than 2 ha in extent (Figure 8). The results of the site visit clearly indicate that degradation as a result of alien invasion at the site is continuing rapidly.”

With regards to topography, it can be said that the property comprise of a steep slope (stabilised dune) along the southern side. The steep face of the stabilised dune and its substrate (sand) suggests that the site would be vulnerable to erosion, particularly with regards to seepage areas and during/post clearing of IAPs. Methods (e.g. cabling yard for timber extraction) for harvesting
of IAPs with an economic value are described later in this report. The photographs below depict the typical vegetative conditions of the site.

Figure 3: Large *Eucalyptus spp.* located on the property.

Figure 4: Much of the under storey comprise of a mix of IAPs of different species, forms, ages and sizes.
Figure 5: Black wattle (*Acacia mearnsii*) being harvested for fire wood. Note the thick stand of *A. Mearnsii* in the background.

Figure 6: Showing the general state of IAP infestation on the site.
Figure 7: The image shows RE/Erf 1638 and RE/Portion 82 of Farm 205 Ruygtvlei in the background. Notice the dense IAP infestation on both properties.

Figure 8: Some indigenous vegetation at the site which is being threatened by alien infestation (Todd, 2016).
3.1 NEM:BA CATEGORIES OF INVASIVE ALIEN PLANTS

The NEMBA listed alien and invasive species present on the property are recorded in the table below and shows the scientific name, common name and the category listed in the NEMBA alien and invasive species lists (August 2014). The list below is not exhaustive and it therefore recommended that it be updated on a regular basis (or during clearing) in order to identify all IAPs present on the property. Regular revision of the list will also help identify emerging invader plants i.e. plants which are not necessarily invasive at this moment, but which may become invasive at a later stage as a result of initial clearing and disturbance.

Table 1: NEMBA Listed (August 2014) alien and invasive species present on the property.

<table>
<thead>
<tr>
<th>Plant Species (scientific name)</th>
<th>Common Name</th>
<th>NEMBA Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia longifolia</td>
<td>Long-leaved wattle</td>
<td>1b</td>
</tr>
<tr>
<td>Acacia mearnsii</td>
<td>Black wattle</td>
<td>2</td>
</tr>
<tr>
<td>Acacia melanoxylon</td>
<td>Australian blackwood</td>
<td>2</td>
</tr>
<tr>
<td>Acacia saligna</td>
<td>Port Jacksons willow</td>
<td>1b</td>
</tr>
<tr>
<td>Eucalyptus camaldulensis</td>
<td>Red river gum</td>
<td>1b</td>
</tr>
<tr>
<td>Lantana camara</td>
<td>Lantana</td>
<td>1b</td>
</tr>
<tr>
<td>Pinus radiata</td>
<td>Radiata pine</td>
<td>1b</td>
</tr>
<tr>
<td>Rubus fruticosus</td>
<td>European blackberry</td>
<td>2</td>
</tr>
</tbody>
</table>

*Please note there may be other NEM:BA listed plant species present on the property. This table needs to be updated as new species become known.

4 SCOPE OF ALIEN PLANT CLEARING PLAN

The prioritisation of areas for alien vegetation management is crucial to the success thereof. Landowners need to focus their efforts where it will make the most sense in terms of the environment and practicality. The general rule when it comes to alien vegetation management is to clear the areas that are least invaded first and then move to denser areas. The logic behind this is that efforts need to be focussed where it can have the most benefit in the long term. Clearing dense stands of alien plants are costly and re-growth following clearing activities is typically extremely dense and requires a minimum of 5 years’ worth of follow-up.
In most cases the determining factor with regards to alien clearing and the measure thereof is the availability of funds. With regards to this IAP management plan, there is an opportunity to make use of contract harvesting of large *Eucalyptus* *spp.* and *Pinus* *spp.* occurring on the properties. By doing so the proponent will be to have large trees, which are difficult to fell and handle, be dealt with by a professional team of harvesters. This possibility is discussed in more detail later in this report (see section 5). Should timber harvesting not take place, it is deemed unreasonable, considering the size of the site (±90ha), to expect the proponent to clear the entire property of alien plants as part of a big initial clearing operation (and then implement follow-up clearing over the entire area). Should a large scale clearing (initial) operation not be possible, it is recommended that sections/areas be strategically identified and prioritized and cleared systematically over a period of years.

Initial and follow-up clearing can be extremely costly and by implementing alien clearing over a long period the proponent will be able to protect his investment in initial clearing, as opposed to clearing the entire area and not having funds to continue with follow-up over such a large area. Time and funds are often completely wasted because proper follow-up programs are not implemented and alien plants are allowed to regrow into a mature growth form which exponentially increases the cost of clearing.

The entire site, which includes both RE/Erf 1638 and RE/Portion 82 of Farm 205 Ruygtevlei, which is ±90ha in total in extent, forms the scope of IAP clearing discussed in this document. Please refer to section below on screening which recommends that large trees between the development and along the southern and northern boundaries of the development be retained for screening purposes.

### 4.1 SCREENING

The visual specialist, Anderson (2016), stated the following in her Visual Impact Assessment with regards to using some of the large alien trees on the property for screening purposes:

“By retaining large Gum and Pine trees below, above and between the development pockets, the construction activities and new buildings, including new reservoirs, will be screened to a significant degree, visually softening the development. To this end, prior to the design development, a survey of large trees should be undertaken and with the assistance of an arborist and landscape architect, trees and groups of trees that are healthy and of good visual value (screening/enclosing) should be retained. The arborist should advise with regards to the feasibility of removing some trees and leaving others and how this will effect the stability of the remaining trees. Similarly, the arborist must advise on tree root protection with respect to road and building excavations and resultant pruning of roots.

The woodland of Gums and Pines between the development and both southern and northern boundaries should be retained. Retaining the trees to the south will help screen the development...
from the N2 and Sedgefield residents while retaining the trees to the north will provide a backdrop to the development, reducing the chance of the upper units breaking the skyline.

This may mean that detail design of roads, for example, may need to include reducing the cut and fill slopes by using retainers such as gabions or walls to ensure these screening trees are retained.

Of utmost importance, is the fact that the retention of these trees must be communicated to the future residents of the development as well as agents selling the properties who should make owners aware of these restrictions.¹

In the light of the above statement it is recommended that this IAP management be updated in order to specify which sections of trees, as identified by an arborist and informed through a visual expert, must be retained for screening purposes. The future of the „screening trees‟ i.e. when to clear them and how to clear them (e.g. kill them standing through ring barking) must also be specified in the updated IAP management plan.

5 CONTROL STRATEGIES AND OBJECTIVES

The large Pinus spp. and Eucalyptus spp. located on the properties has some commercial value and as a first option it is recommended that the value of the trees for timber be exploited. The preferred clearing strategy would then be to harvest commercially viable timber from the area. This strategy has the following advantages:

- Large trees are felled by a professional team with the appropriate equipment;
- Once felled the trees can be extracted from steep slopes using a cable logging system in order to minimise impact on the stabilized dune (as opposed to driving in and out with heavy machinery);
- Harvested timber is transported off the site by the clearing contractor using the appropriate transport vehicles/trucks; and
- The opportunity exists to have the logging contractor clear all large alien trees, even though they may not hold much commercial value, in order to decrease the cost of follow-up clearing post-harvest as a specialised team is required for clearing very large trees;

¹ Please note that the NEM:BA Regulations require that most of the large alien trees be cleared from the property, therefore it would make sense to prioritise clearing of these so-called „screening‟ trees as the last trees/sections/work areas to be cleared.
Firewood harvesting for, and by, local communities must also be explored and implemented if found to be reasonable. The proponent must ensure that should firewood harvesting take place, the persons doing so must apply herbicide to the stump of the felled tree in order to stop regrowth, as the overall objective is to clear the entire property of IAPs. Herbicide must be provided to firewood harvesters by the proponent and persons must be trained to apply the herbicide correctly.

Conventional alien clearing practices must be implemented once timber harvesting is completed. It is recommended that, as per the NEM:BA Regulations for the control of invasive species, a detailed control plan be compiled for future alien plant clearing. Such a control plan must identify work areas on the property of reasonable size and these areas must be prioritized for clearing (e.g. areas with least infestation must be cleared first). These work areas must be mapped and record must be kept of when clearing was implemented and when the next follow-up will take place. It is recommended that the proponent make contact with the local Working for Water (WfW) office for assistance with IAP clearing/control (WfW can also assist in recommending contractors and in some cases supply herbicide).

The general strategy and objectives for the site would typically follow these steps:

- Harvest economically viable timber and remove large alien trees (excl. trees for screening purposes);
- Identify work areas and prioritize for initial and follow-up clearing;
- Implement initial clearing;
- Implement follow-up clearing; and
- Continuously monitor re-growth and adapt management practices as monitoring data suggest.

5.1 CLEARING PRIORITY & TIMEFRAMES

5.1.1 CLEARING PRIORITIES

As a general rule clearing efforts should normally focus on areas that are least infested and areas that require follow-up clearing to prevent further increase of alien plants and to protect the initial clearing investment. Clearing/control priorities are as follows:

- **1st priority:** clearing of IAPs along the eastern boundary of the site where natural vegetation still occur in order to prevent further loss;
- **2nd priority:** Harvest economically viable timber from the site;
- **3rd priority:** Implement initial IAP clearing;
- **4th priority:** Implement follow-up clearing at all areas where initial clearing has taken place;

5.1.2 TIMEFRAMES FOR INITIAL CLEARING

With regards to timeframes for clearing/control the following:

- It would be unreasonable to expect any landowner to eradicate all alien plants on his/her property as plants re-grow from the seed bank and spread to the property via animals from neighbouring properties or seeds caught onto vehicles.
- Alien plant control is a long term effort and is highly dependable on the availability of funds. It can also be influenced by natural events like veld fires, which will stimulate mass germination of seeds contained in the seed bank underneath alien plant stands.
- In general after five (5) follow-ups a cleared area would start to move into a maintenance state (this is naturally not the same for every area, it may require more or less).

**With regards to a long term goal, the proponent must attempt to have the entire property in a maintenance clearing state within 10 years from the date of approval of the IAP control plan. Initial clearing efforts must be completed with 5 – 6 years of the date of approval to allow sufficient time to complete follow-up clearing.**

5.1.3 TIMEFRAMES FOR FOLLOW-UP CLEARING

The following table provides a timeframe for the follow up program; however please note that this is a guideline. Alien vegetation on site needs to be monitored and follow up implemented according to the results. Clearing alien plants at a young age is more cost effective as it does not require machinery such as chainsaws and prevents vegetation reaching maturity and seeding. The first two follow-up operations are extremely important and must be carried out within the timeframes indicated in the table. Please note that the timeframes indicated are a guideline only i.e. monitoring may suggest shorter or longer follow-up intervals for the 1st three (3) follow-ups. Long term follow-up (fourth follow-up and onwards) must always remain on-going.
Table 2: Follow-up intervals are detailed in the table.

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>TIMING</th>
</tr>
</thead>
<tbody>
<tr>
<td>First follow up</td>
<td>Must take place and be completed within 4 – 6 months of completion of the initial clearing.</td>
</tr>
<tr>
<td>Second follow up</td>
<td>Must take place and be completed within 4 – 6 Months of completion of the first follow up</td>
</tr>
<tr>
<td>Third follow up</td>
<td>Must take place midway through the first spring following the second follow up</td>
</tr>
<tr>
<td>Fourth - follow up</td>
<td>Must take place annually midway through spring, starting in the first spring following the third follow up and into perpetuity.</td>
</tr>
</tbody>
</table>

Follow-up normally generally does not include the clearing/felling of large trees. Follow-up operations must be timed in such a way that the re-growth after initial clearing does not reseed or become too big. Cost of clearing increases with the growth of the alien plants.

6 CLEARING/CONTROL METHODOLOGIES

6.1 INITIAL CLEARING

This section deals with initial clearing activities and the proposed methodology assumes the following:

- That the recommend control methods described below are followed;
- That funding is available to undertake the required tasks in the short and long term;
- No detailed provision has been made for natural occurrences such as floods, droughts and wildfires. These will require an adaptive management approach depending on the circumstances and professional input will be required; and
- Personnel undertaking the control program are suitably trained and experienced to undertake such tasks.

An integrated approach including mechanical as well as chemical control methods is to be implemented. Mechanical control options include the physical felling or uprooting (only of small trees, the stumps/roots of large trees are to remain in situ for soil stabilisation) of plants, while chemical control requires the use of a suitable herbicide to prevent sprouting of cut stumps, to poison seedlings or to kill trees in situ without removing them. By killing trees in situ they will
provide habitat to the fauna of the area and also protect the soil against erosion during high rainfall periods, as the roots will stabilise the soil for a period of time.

The following control methods can be used for initial clearing, note that the method to be used depends on the species, growth form, age of the plant and end goal of the clearing operation:

- **Hand pulling:** seedlings are pulled from the ground by hand. This method is very effective on new growth after initial clearing and is also cost effective as no machinery or chemicals/herbicides are needed. Employees should be educated and encouraged to pull out young alien plants when sighted. Although hand pulling is mostly associated with follow-up clearing, it is also used during initial clearing to remove small trees. **Care must be taken that employees are able to identify juvenile invasive species.**

- **Foliar spray:** the application of herbicides onto the foliage/leaves of a plant using spray equipment. This method is used when plants are still at a young age or during follow-up operations and all foliage of the plant must ideally be covered by herbicide. The method uses a lot of chemicals and should ideally only be used for spot treatment and not blanket spraying. **Foliar spray is most effective when applied early morning and when there is little wind.**

![Figure 10: Herbicide is applied to the foliage/leaves of alien vegetation.](NSW Department of Primary Industries, 2015)

- **Cutting or slashing:** a machete or slasher can be used for this clearing method. This is one of the most popular clearing methods as it can be applied to a wide range of species and plant sizes. Herbicide application on the cut stump (if coppicing species) is recommended.
Figure 11: The image illustrates how slashers are used to clear a dense stand of alien vegetation (Venter, 2003).

- **Felling:** large trees are felled using a hand saw of chainsaw, de-branched and stacked/windrowed. Herbicide is applied to the cut stump. **Note that trees transport water in the outer layer (cambium) of the trees, herbicide application must thus be focused on the outer perimeter of the stump of a large tree.**

![Felling Image](image)

Figure 12: Herbicide must be applied to the cut stump after a tree has been felled (DEA, 2015).

- **Frilling:** a downward cut is made around the trunk of the tree. Herbicide is poured/sprayed into the cut. **This method kills a tree in situ.**

![Frilling Image](image)

Figure 13: Image illustrating frilling of alien trees (Stelzer, 2006)). Herbicide must be poured/sprayed into the cut made around the tree.
• **Ring barking:** bark must be removed from the bottom of the stem to a height of 1.75m to 1m. All bark must be removed to below the soil layer. Herbicide application is recommended on the exposed area, however is not always necessary (if all bark can be removed to below the soil layer).

![Ring barking](image)

**Figure 14:** Ring barking. A large section of bark is removed around the trunk of the tree where after herbicide is applied to the exposed area (Western Cape Department of Agriculture, 2011).

The following **methodology** is suggested with regard to the **initial mechanical clearing** of large IAPs on the site (note that *Pinus spp.* do not require herbicide application, but must be felled using the same methodology described above and below):

- All trees should be cut at no higher than 100mm above the surface of the ground using the appropriate equipment (e.g. chainsaw or hand saw);
- Hand pulling must be used in areas where seedling densities are fairly low;
- Plants from seedlings to saplings up to a diameter of 50mm at the base can be cut with loppers and trees larger than this should be cut with a chainsaw. Chainsaw operators must have the appropriate training;
- As trees can be multi-stemmed, care should be taken to ensure that all stems of the plant are cut;
- Some trees, especially in sandy areas, often tend to blow over and continue to grow along the ground. In cases like this, it is necessary to cut the stump along the ground at 30cm intervals. It is important to make sure that the stump is completely cut through and that the bark is not attached in any places;
- Many species are known to coppice and therefore stump treatment with a herbicide is required (Appendix D);
- Cut stumps should be treated with the appropriate herbicide specified for specific species. For black wattle for example the proponent must use a Triclopyr herbicide (such as Timbrel 3A or any other registered herbicide that has a Triclopyr salt as the active ingredient);
• The felled trees should be de-branched and the stumps be cut up into manageable pieces about 30cm long. The de-branching and cutting up of stumps must be done at the site where the tree is felled. Under no circumstances should the trees be “dragged” to a central location for processing as this may result in seed dispersal;

• The herbicide should be mixed exactly as per the product label (A stronger mix will not kill the plant better or quicker and will only waste expensive herbicide). For management and inspection purposes, a colorant/dye should be added to the herbicide mixture in order to monitor the areas that have already been treated;

• Please see section below with regard to management of biomass; and

• Please see section below with regard to environmental considerations of alien vegetation clearing.

6.2 FOLLOW-UP CLEARING

For follow-up operations hand pulling and foliar spray is recommended as the preferred methods. Cutting & slashing as well as the use of hand saws are recommended for trees that are too big for foliar spray (apply herbicide to stump after tree was felled).

• Hand pulling: alien plant seedlings are pulled from the ground by hand. This method is very effective on new growth after initial clearing and is also cost effective as no machinery or chemical are needed. Employees should be educated and encouraged to pull out young alien plants when sighted.

• Foliar spray: the application of herbicides onto the foliage/leaves of a plant using spray equipment. This method is used when plants are still at a young age or during follow-up operations and all foliage of the plant must ideally be covered by herbicide. The method uses a lot of chemicals and should ideally only be used for spot treatment and not blanket spraying.

• Cutting or slashing: a machete or slasher can be used for this clearing method. This is one of the most popular clearing methods as it can be applied to a wide range of species and plant sizes. Herbicide application on the cut stump (if coppicing species) is recommended.

6.3 MANAGEMENT OF ALIEN PLANT BIOMASS

Due to the increased fire risk associated with the dry biomass from the clearing operation, the following is required:

• As detailed above, the trees should be de-branched and stumps cut into 30 or 40cm lengths. This should be done at the area where the tree is felled;

• Branches should not be dragged to another location. This minimizes the spread of any seed that may be present on the plants;
The biomass must be utilised as far as possible e.g. firewood;

- In the event that the amount of alien plant biomass is simply too great, the proponent may apply for a burn permit from the local fire department.

The removal of this biomass is only required for the initial clearing and not with follow-up operations (if they take place within the recommended program). Biomass resulting from follow-up operations can be laid down in the veld (or burned if necessary).

### 6.4 ENVIRONMENTAL CONSIDERATIONS FOR CLEARING

The following considerations must be taken into account when implementing alien plant management.

- A Triclopyr (such as Garlon, Confront 360, Lumberjack etc) is a selective, non-residual herbicide and therefore has been recommended for black wattle for both cut – stump as well as foliar applications;

- A glyphosate (such as Roundup, Mamba etc) is a non-selective herbicide and should under no circumstances be considered for this application;

- A single foot-access route to the area must be maintained by clearing personnel;

- Unused herbicide should not be discarded, but used as a mix for the future applications;

- Personnel must be made aware of fire risk whilst clearing alien plants;

- Chainsaw re-fuelling & maintenance/cleaning as well as herbicide mixing areas should be situated outside of sensitive areas; and

- A receptacle should be made available for litter for all alien clearing operations

### 7 MAINTENANCE PHASE

A ‘maintenance phase’ means that a specific work area (or the entire site) is in such a state that only spot-cleaning will be required once a year. This basically means that once a year the proponent must have a team that will remove re-growth and the appearance of any new IAPs that are visible on the property, by using the appropriate methods. The goal of this IAP management plan is to have the entire site (both properties) in a maintenance phase.

Note that the occurrence of a natural event like fire will stimulate germination of any IAP seeds in the sand and following such an event an area which was once in a maintenance phase might be pushed back into a follow-up phase.
8 MONITORING

Basic monitoring during alien clearing must be implemented and comprise of **before and after photos** of the areas that have been cleared (fixed-point photography is a very usefulness way to visually monitor change on the site as a result of alien plant management). This will allow the proponent to track clearing progress and, if alien vegetation is to return, the rate of regrowth can be calculated to inform planning of future follow-up. Monitoring will also allow the proponent to assess the efficacy of clearing methods.

It is considered best practice to monitor areas where aliens have been cleared every three (3) months and apply management action as appropriate.

The following basic monitoring programme is recommended:

**Table 3:** Recommended basic monitoring programme recommended for alien control monitoring on RE/Erf 1638 (±34ha) and RE/Portion 82 of Farm 205 Ruygtvelei.

<table>
<thead>
<tr>
<th>What</th>
<th>Frequency</th>
<th>How</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>How effective are the control methods?</td>
<td>4 – 6 months after every operation</td>
<td>Survey cleared areas and look for re-growth</td>
<td>Continue with methods or adapt to be more effective</td>
</tr>
<tr>
<td>Do the infestation levels decrease?</td>
<td>Annually</td>
<td>Visual, photos</td>
<td>Continue clearing</td>
</tr>
<tr>
<td>How much herbicides were used?</td>
<td>After every operation</td>
<td>Herbicide records</td>
<td>Keep track of cost and ensure no wastage</td>
</tr>
<tr>
<td>Does the Fynbos (natural vegetation)</td>
<td>Annually</td>
<td>Photos, survey</td>
<td>If it does – control methods are effective, if not, look at clearing methods, clearing intervals of consult an expert (rehabilitation).</td>
</tr>
<tr>
<td>recover in the cleared areas?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many jobs were created?</td>
<td>After every operation</td>
<td>Timesheets</td>
<td>Keep on record</td>
</tr>
</tbody>
</table>

The proponent is encouraged to always monitor the site for IAP re-growth and emergence of new species (e.g. in the Garden Route there has been an increase in the spread of bugweed and pampas grass). All workers must be educated on the importance of IAP management/monitoring and reporting of new species occurring on the property.
9 CONCLUSION

This IAP management plan provide recommendations for the effective management of IAPs on the site and will allow the proponent to comply with the NEM:BA Regulations for the management of invasive species. It is essential that this plan be updated prior to implementation to include any additional recommendations made by specialist (e.g. trees that should not be cleared for screening purposes).

Please note that this plan must form part of the Environmental Management Plan for the proposed „The Hill‘ development and must be read in conjunction with that document.

The proponent is encouraged to initiate correspondence with the local WfW office to explore the possibility of making use of their assistance (skill sets & herbicide).

It is crucial that the proponent constantly monitor the state of the natural environment on the properties for signs of degradation and implement the appropriate management actions when and where required.

10 REFERENCES


APPENDIX A
LOCALITY MAP
Notes
- Map Scale is 1 : 40,000 when printed on A3.
- Aerial image courtesy of Google Earth Pro 2015
- Imagery date October 2014.
- Metar wind rose station: George, 2013.

Map Index
- North Cape Province
- Eastern Cape Province
- Knysna Municipality

1:50 000 Topographical Plan
The Hill, Sedgefield
Remainder Portion 82 of Farm 205
Remainder Erf 1638

Legend
- Erf_1638
- RE_Portion_82_of_205

Co-ordinates:
34°00'39"S
22°48'26"E

Image © 2015 CNES / Astrium
SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2015 TerraMetrics
Image © 2015 DigitalGlobe
APPENDIX B

SITE LAYOUT PLAN
- Map Scale is 1 : 7 000 when printed on A4.
- Aerial Image courtesy of Google Earth Pro 2015

**Preferred Layout 11**
The Hill, Sedgefield
Remainder Portion 82 of Farm 205
Remainder Erf 1638

**Legend**
- Erf_1638
- RE_Portion_82_of_205
- Preferred Layout 11
APPENDIX C

VEGETATION MAP
Vegetation Type and Ecosystem Status

The Hill, Sedgefield
Remainder Portion 82 of Farm 205
Remainder Erf 1638

Legend

- Erf_1638
- RE_Portion_82_of_205
- Preferred Layout 11

Vegetation Type, Ecosystem Status

- Knysna Sand Fynbos, Endangered
- Cape Estuarine Salt Marshes, Least threatened
- Cape Lowland Freshwater Wetlands, Least threatened
- Garden Route Shale Fynbos, Endangered
- Southern Cape Dune Fynbos, Least threatened
- Freshwater Lakes,
APPENDIX A

WORKING FOR WATER

RECOMMENDED HERBICIDES
ESTIMATED VOLUMES OF PRODUCT PER HECTARE ARE FOR A
DENSE / CLOSED STAND OF THE SPECIFIC SPECIES. FOR LOWER INFESTATIONS VOLUMES SHOULD BE REDUCED ACCORDINGLY.

MEDIUM = 75% OF DENSE / CLOSED

SPARSE = 50% OF DENSE / CLOSED

SCATTERED = 25% OF DENSE / CLOSED

VERY SCATTERED = 10% OF DENSE / CLOSED

OCCASIONAL = 1% OF DENSE / CLOSED

• FOR WATER BASED APPLICATIONS, ACTIPRON SUPER WETTER SHOULD BE ADDED WHERE RECOMMENDED ON THE LABEL. RATE PER HECTARE FOR DENSE / CLOSED STAND – 1.75 l / ha

• FOR ALL WATER BASED TREATMENTS A SUITABLE DYE SHOULD BE ADDED WHEN NECESSARY TO ENSURE THAT ALL TARGET PLANTS ARE TREATED. RATE PER HECTARE FOR DENSE / CLOSED STAND - 350ml / ha

• FOR DIESEL BASED APPLICATIONS, SUDAN RED DYE SHOULD BE ADDED. RATE PER HECTARE FOR DENSE / CLOSED STAND 300 ml / ha.
## Black Wattle (Acacia Mearnsii)

<table>
<thead>
<tr>
<th>Target Trees</th>
<th>Method</th>
<th>Product</th>
<th>Rate</th>
<th>Comments</th>
<th>Estimated Product/ Hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Pull or Hoe</td>
<td>Open Stands</td>
<td></td>
<td>Open Stands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foliar Spray</td>
<td>Mamba (Glyphosate 360g/l)</td>
<td>150ml/10L Water</td>
<td>Avoid water course contamination</td>
<td>3 l</td>
<td></td>
</tr>
<tr>
<td>Up to 1 m tall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foliar Spray</td>
<td>Touchdown (Glyphosate Trimesium 480g/l)</td>
<td>3L/ha</td>
<td></td>
<td>3 l</td>
<td></td>
</tr>
<tr>
<td>Up to 2m tall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foliar Spray</td>
<td>Garlon 4/Viroaxe</td>
<td>25 – 75ml/10L Water</td>
<td>Low rate on seedlings</td>
<td>0.5 – 1.5 l</td>
<td></td>
</tr>
<tr>
<td>Up to 1.5m tall</td>
<td>TRICLOPYR ESTER 480g/l</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seedinglings and Saplings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young Trees</td>
<td>Foliar Spray</td>
<td>Garlon 4/Viroaxe</td>
<td>75ml/10L Water</td>
<td></td>
<td>3 l</td>
</tr>
<tr>
<td></td>
<td>TRICLOPYR ESTER 480g/l</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big Trees</td>
<td>Cut Stump</td>
<td>Timbrel 3 A *</td>
<td>31/100L Water</td>
<td></td>
<td>1.5 L/ha</td>
</tr>
<tr>
<td></td>
<td>TRICLOPHYR AMINE SALT 360g/l</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inaccessible Trees</td>
<td>Frill</td>
<td>Timbrel 3 A *</td>
<td>300ml/10L Water</td>
<td></td>
<td>1.51/L/ha</td>
</tr>
<tr>
<td></td>
<td>TRICLOPHYR AMINE SALT 360g/l</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Consult the WFW Technical Advisor.

**Note:** Use Garlon 4/Viroaxe if grass species are present.
## BLUEGUMS  (*Eucalyptus Spp.*)

<table>
<thead>
<tr>
<th>TARGET PLANTS</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENTS</th>
<th>ESTIMATED PRODUCT/HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEEDLINGS</td>
<td>HAND PULL</td>
<td>BRUSH OFF *</td>
<td>200g / ha</td>
<td>APPLY TO COPPICE</td>
<td>200 g / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(METSULPHFURON METHYL 500g / kg) PLUS MAMBA</td>
<td>+</td>
<td>1.5 – 1.8 m TALL</td>
<td>3 l / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(GLYPHOSATE 360 g /l)</td>
<td>3 l / ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPPICE</td>
<td>FOLIAR SPRAY</td>
<td>CUT STUMP CHOPPER (IMAZAPYR 100 g/l) WATER</td>
<td>1250 ml / 10 l</td>
<td>IF SPECIES KNOWN CHECK RATE ON LABEL</td>
<td>6 l / ha</td>
</tr>
<tr>
<td>FELLED TREES</td>
<td></td>
<td>FRILL CHOPPER (IMAZAPYR 100g/l) WATER</td>
<td>1250 ml / 10 l</td>
<td>IF SPECIES KNOWN CHECK RATE ON LABAEL</td>
<td>6 l / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPOT SPRAY COPPICE:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16 LITRES WATER</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16 GMS BRUSH OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1% MAMBA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.5% ACTIPRON</td>
<td></td>
</tr>
</tbody>
</table>

* CONSULT THE WFW TECHNICAL ADVISOR.
**BRAZILIAN PEPPER TREE (SCHINUS TEREBRINTHIFOLIUS)**

<table>
<thead>
<tr>
<th>TARGET TREES</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENTS</th>
<th>ESTIMATED PRODUCT / HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL TREES</td>
<td>BASAL STEM</td>
<td>GARLON 4 / VIROAXE (TRICLOPYR ESTER 480g/l)</td>
<td>200ml / 10L DIESEL</td>
<td>WET UP TO 0.5m STEM AND ROOTS</td>
<td>1.5 l / ha</td>
</tr>
</tbody>
</table>
## BUGWEED  (*Solanum mauritianum*)

<table>
<thead>
<tr>
<th>TARGET PLANTS</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENTS</th>
<th>ESTIMATED PRODUCT / HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEEDLINGS &amp; SAPLINGS</strong></td>
<td><strong>HAND PULL</strong></td>
<td>STARANE 200 (FLUROXYPYR 200g/l)</td>
<td>12.5ml / 10L WATER</td>
<td>UP TO 1m TALL</td>
<td>0.5 l / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MAMBA (GLYPHOSATE 360g/l</td>
<td>50ml / 10L WATER</td>
<td></td>
<td>2 l / ha</td>
</tr>
<tr>
<td></td>
<td><strong>FOLIAR SPRAY</strong></td>
<td>TOUCH DOWN (GLYPHOSATE TRIMESIUM 480g/l)</td>
<td>2l / ha</td>
<td>SPRAY WHEN 500mm TALL</td>
<td>2 l / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GARLON 4 / VIROAXE (TRICLOPYR ESTER 480g/l)</td>
<td>50ml / 10L WATER</td>
<td></td>
<td>1.5 l / ha</td>
</tr>
<tr>
<td>TARGET PLANTS</td>
<td>METHOD</td>
<td>PRODUCT</td>
<td>RATE</td>
<td>COMMENTS</td>
<td>ESTIMATED PRODUCT / HECTARE</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------</td>
<td>----------------------------------</td>
<td>-----------------</td>
<td>------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>CUT DOWN &amp; SPRAY COPPICE</td>
<td></td>
<td>STARANE 200 (FLUROXYPYR 200g/l)</td>
<td>12.5ml / 10L WATER</td>
<td>SPRAY WHEN 500mm TALL</td>
<td>0.5 l / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MAMBA (GLYPHOSATE 360g/l)</td>
<td>150ml / 10L WATER</td>
<td></td>
<td>3 l / ha</td>
</tr>
<tr>
<td></td>
<td>TOUCH DOWN (GLYPHOSATE TRIMESIUM 480g/l)</td>
<td>2 l / ha</td>
<td>SPRAY WHEN 500mm TALL</td>
<td></td>
<td>2 l / ha</td>
</tr>
<tr>
<td>BIG TREES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUT STUMP</td>
<td>CHOPPER (IMAZAPYR 100g/l)</td>
<td>200ml/10l WATER</td>
<td></td>
<td>CUT SURFACE ONLY</td>
<td>1 l / ha</td>
</tr>
<tr>
<td></td>
<td>TIMBREL 3 A (TRICLOPYR AMINE SALT 360g/l)</td>
<td>300ml / 10L WATER</td>
<td>CUT SURFACE ONLY</td>
<td></td>
<td>2.25 l / ha</td>
</tr>
<tr>
<td></td>
<td>TIMBREL 3 A * (TRICLOPYR AMINE SALT 360g/l)</td>
<td>300ml / 10L WATER</td>
<td></td>
<td></td>
<td>1.5 l / ha</td>
</tr>
<tr>
<td></td>
<td>CHOPPER (IMAZAPYR 100g/l)</td>
<td>200ml / 10L WATER</td>
<td></td>
<td></td>
<td>1 l / ha</td>
</tr>
</tbody>
</table>

* CONSULT THE WFW TECHNICAL ADVISOR.
<table>
<thead>
<tr>
<th>SPECIES</th>
<th>TARGET PLANTS</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENTS</th>
<th>ESTIMATE PRODUCT/HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HARRISIA CACTUS (HARRISIA MARTINI.)</td>
<td>STANDING PLANTS</td>
<td>SPRAY APPLICATION</td>
<td>MSMA (MSMA 720g/l)</td>
<td>1 l / 20 l</td>
<td>WATER</td>
<td>10 l / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEM INJECTION</td>
<td>GARLON 4 / VIROAXE (TRICLOPYR ESTER 480g/l)</td>
<td>100ml / 10L</td>
<td>TREES UP TO 1.5 m TALL</td>
<td>2 l / ha</td>
</tr>
<tr>
<td>JOINTED CACTUS (OPUNTIA AURANTIACA.)</td>
<td>PLANTS AND LOOSE CLADODES</td>
<td>SPRAY APPLICATION</td>
<td>MSMA (MSMA 720g/l)</td>
<td>1 l / 21 l</td>
<td>WATER</td>
<td>5 l / ha</td>
</tr>
<tr>
<td>SPECIES</td>
<td>TARGET PLANTS</td>
<td>METHOD</td>
<td>PRODUCT</td>
<td>RATE</td>
<td>COMMENTS</td>
<td>ESTIMATED PRODUCT / HECTARE</td>
</tr>
<tr>
<td>-----------------------</td>
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<td>-------------------</td>
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<td>----------------</td>
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</tr>
<tr>
<td>IMBRICATE CACTUS</td>
<td>STANDING</td>
<td>SPRAY APPLICATION</td>
<td>WHOLE PLANT</td>
<td>MSMA (MSMA 720g/l)</td>
<td>11 / 22 l WATER</td>
<td>10 l / ha</td>
</tr>
<tr>
<td>(OPUNTIA IMBRICATA.)</td>
<td>PLANTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROSEA CACTUS</td>
<td>CUT STUMP</td>
<td></td>
<td>CUT PLANTS DOWN</td>
<td>MSMA (MSMA 720g/l)</td>
<td>11 / 22 l WATER</td>
<td>2 l / ha</td>
</tr>
<tr>
<td>(OPUNTIA ROSEA.)</td>
<td></td>
<td></td>
<td>TO 100 – 150 mm. AND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SPRAY CUT STUMP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### CACTI

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>TARGET PLANTS</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENTS</th>
<th>HECTARE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRICKLEY PEAR</td>
<td>STANDING PLANTS</td>
<td>STEM INJECTION</td>
<td>MSMA (MSMA 720g/l)</td>
<td>11/11l WATER</td>
<td>2 ml DOSES</td>
<td>12 l/ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MAMBA (GLYPHOSATE 360g/l)</td>
<td>11/2l WATER</td>
<td>2 ml DOSES</td>
<td>16 l/ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOUCHDOWN (GLYPHOSATE TRIMESIUM 480g/l)</td>
<td>330ml/10L WATER</td>
<td>2 ml DOSES</td>
<td>8 l/ha</td>
</tr>
</tbody>
</table>

**NOTE:** INJECT INTO 4 – 12 PREMADE HOLES PER PLANT
## C A C T I.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>TARGET PLANTS</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENTS</th>
<th>ESTIMATED PRODUCT / HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUR PRICKLEY PEAR</td>
<td>LARGE PLANTS</td>
<td>STEM INJECTION</td>
<td>MSMA (MSMA 720g/l)</td>
<td>1l/1l</td>
<td>2 ml DOSES WATER</td>
<td>8 l/ha</td>
</tr>
<tr>
<td>(OPUNTIA STRICTA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SEE NOTE BELOW</td>
<td></td>
</tr>
<tr>
<td>SMALL PLANTS</td>
<td></td>
<td>SPRAY APPLICATION</td>
<td>MSMA (MSMA 720g/l)</td>
<td>1l/30l</td>
<td>WATER</td>
<td>10 1/ha</td>
</tr>
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</table>

**NOTE:** APPLY DOSES INTO 1–8 PRE-MADE HOLES IN PLANTS.
<table>
<thead>
<tr>
<th>TARGET PLANTS</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL TREES</td>
<td>CUT DOWN CLOSE TO GROUND</td>
<td></td>
<td></td>
<td>DO NOT APPLY HERBICIDE TO STUMPS</td>
</tr>
<tr>
<td>IN DIFFICULT TERRAIN</td>
<td>STEM</td>
<td>ECOPLUG *</td>
<td></td>
<td>ONLY ON SMALL TREES 10CM OR LESS. NOT EFFECTIVE ON LARGER TREES</td>
</tr>
</tbody>
</table>

* CONSULT THE WFW TECHNICAL ADVISOR.
<table>
<thead>
<tr>
<th>TARGET TREE</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENTS</th>
<th>ESTIMATED PRODUCT / HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL TREES</td>
<td>CUT STUMP</td>
<td>CHOPPER (IMAZAPYR 100g/l)</td>
<td>1250ml / 10 l</td>
<td>TREAT CUT</td>
<td>6 l / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WATER</td>
<td>WATER</td>
<td>SURFACE</td>
<td></td>
</tr>
<tr>
<td>TARGET TREES</td>
<td>METHOD</td>
<td>PRODUCT</td>
<td>RATE</td>
<td>COMMENTS</td>
<td>ESTIMATED PRODUCT / HECTARE</td>
</tr>
<tr>
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<td>--------------</td>
<td>-------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>PORT JACKSON WILLOW (ACACIA SALIGNA.)</td>
<td>HAND PULL OR HOE</td>
<td>MAMBA (GLYPHOSATE 360g/l)</td>
<td>2 – 4l / ha</td>
<td>SPOT SPRAY 1.5%</td>
<td>2-4 l / ha SOLUTION</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOUCHDOWN (GLYPHOSATE TRI-MESIUM 480g/l)</td>
<td>2 – 4 l / ha</td>
<td></td>
<td>2-4 l / ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GARLON 4 / VIROAXE (TRICLOPYR ESTER WATER 480g/l)</td>
<td>50ml/10L WATER</td>
<td></td>
<td>1.5 l / ha SEE NOTE BELOW</td>
</tr>
</tbody>
</table>

**NOTE:** USE GARLON 4 or VIROAXE, IF OTHER PIONEER GRASS SEEDLINGS PRESENT.
<table>
<thead>
<tr>
<th>TARGET TREES</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>COMMENT</th>
<th>ESTIMATED PRODUCT/HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAPLINGS AND YOUNG TREES</td>
<td>HAND PULL OR HOE</td>
<td>TOUCH DOWN (GLYPHOSATE)</td>
<td>4 l/ha</td>
<td>PLANTS UP TO 600mm HIGH</td>
<td>4 l/ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GARLON 4 / VIROAXE (TRICLOPYR ESTER 480g/l)</td>
<td>50ml / 10L WATER</td>
<td>PLANTS UP TO 2m HIGH</td>
<td>3 l/ha</td>
</tr>
<tr>
<td>BIG TREES</td>
<td></td>
<td>CUT STUMP (TRICLOPHYR AMINE SALT 360 g/l)</td>
<td>300ml / 10L WATER</td>
<td></td>
<td>1.5 l/ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FRILL (TRICLOPHYR AMINE SALT 360 g/l)</td>
<td>300ml / 10L WATER</td>
<td></td>
<td>1.5 l/ha</td>
</tr>
<tr>
<td>TARGET TREE</td>
<td>METHOD</td>
<td>PRODUCT</td>
<td>RATE</td>
<td>COMMENTS</td>
<td>ESTIMATED PRODUCT/ HECTARE</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------</td>
<td>----------------------------------------</td>
<td>---------------</td>
<td>----------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>SEEDLINGS &amp; SAPLINGS</td>
<td>HAND PULL OR HOE</td>
<td>SPRAY GARLON 4 / VIROAXE (TRICLOPYR ESTER 480g/l)</td>
<td>50ml/10L WATER</td>
<td>OPEN STAND</td>
<td>DENSE STAND 21 / ha</td>
</tr>
<tr>
<td></td>
<td>CABOOSE FOLIAR SPRAY</td>
<td>GARLON 4 / VIROAXE (TRICLOPYR ESTER 480g/l)</td>
<td>50ml/10L WATER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TREES UP TO 2m TALL</td>
<td>CUT LOW DOWN</td>
<td>FRILL TIMBREL 3A* (TRICLOPYR AMINE SALT 360g / l)</td>
<td>300ml /10L WATER</td>
<td>DO NOT APPLY HERBICIDE</td>
<td>1.5 l / ha</td>
</tr>
<tr>
<td>LARGE TREES</td>
<td>CUT LOW DOWN</td>
<td>THUMBELIN 3A* (TRICLOPYR AMINE SALT 360g / l)</td>
<td>300ml /10L WATER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: CUT DOWN LOW, TO PREVENT COPPICING.
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<table>
<thead>
<tr>
<th>TARGET PLANTS</th>
<th>METHOD</th>
<th>PRODUCT</th>
<th>RATE</th>
<th>ESTIMATED PRODUCT / HECTARE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEEDLINGS</td>
<td>HAND PULL OR HOE</td>
<td>MAMBA (GLYPHOSATE 360g/l)</td>
<td>300ml / 10L WATER 6 l / ha</td>
<td>6 l / ha</td>
</tr>
<tr>
<td></td>
<td>FOLIAR SPRAY</td>
<td>TOUCH DOWN (GLYPHOSATE TRIMESIUM 480g/l)</td>
<td>6 l / ha</td>
<td>6 l / ha</td>
</tr>
<tr>
<td></td>
<td>ACCESS *</td>
<td>(PICLORAM K – SALT 240g / l)</td>
<td>100ml / 10L WATER 2 l / ha</td>
<td>2l / ha</td>
</tr>
</tbody>
</table>
LARGE PLANTS

FOLIAR SPRAY

TOUCHDOWN
(GLYPHOSATE
TRIMESIUM 480g/l)

6l / ha

6 l / ha

ACCESS *
(PICLORAM K – SALT
240g / l)

100ml / 10L WATER

SELECTED AREAS ONLY

CHOPPER
(IMAZAPYR 100g/l)

200 ml / 10 l WATER

1.5 l / ha

CUT STUMP

ACCESS *
(PICLORAM K – SALT
240g / l)

100ml / 10L WATER

SELECTED AREAS ONLY

* CONSULT THE WFW TECHNICAL ADVISOR.