



LANGEBERG MUNICIPALITY DRAFT ALIEN INVASIVE VEGETATION MANAGEMENT PLAN

2016 – 2024

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Project Partners

Stakeholders, role players, organizations and agencies participating in the Langeberg Municipality Alien Invasive vegetation management plan include, but are not limited to:

- Langeberg Municipality directorates of Infrastructure (Engineering department), Community (Parks and Amenities department) and Corporate Services (Property administration department)
- Cape Winelands District municipality
- Working for Water agents, Central Breede Water Users Association
- The Department of Agriculture, Forestry and Fisheries
- The Department of Environmental Affairs
- CapeNature
- Langeberg Municipality Protected Areas Advisory Board
- Montagu Hacking Society
- McGregor Heritage Society
- Rock climbing SA Montagu

EXECUTIVE SUMMARY

1.1 Legislative background

The Regulations on the management of Listed Alien and Invasive Species under the National Environmental Management: Biodiversity Act [hereafter termed “NEMBA”] was promulgated on 1 August 2014 as Regulation Gazette No. 10244 in Volume 590 of the South African Government Gazette (Publication No. 37885). These regulations came into effect on 1 October 2014. (They are annexed to this report as Annex 1.)

In Chapter 4, “National Framework Documents”, Section 8, entitled “Invasive Species Monitoring, Control and Eradication Plans”, states *inter alia* that “The Minister must - (a) within one year of the date on which these regulations come into effect, develop guidelines for the development of Invasive Species Monitoring, Control and Eradication Plans for Listed Invasive Species as contemplated in section 76 of the Act”.

The Listed Invasive Species were also published on 1 August 2014 as Government Notice No. 599 National Environmental Management: Biodiversity Act (10/2004): “Alien and Invasive Species List, 2014” also in Volume 590 of the South African Government Gazette (Publication No. 37886). In terms of the Act’s Section 70 (1), 559 species /groups of species were listed (they are annexed to this report as Annex 2). It is the management of these species [hereafter termed “Listed Invasive Species”] that is covered by this Framework Guidelines Document. These Lists also came into effect on 1 October 2014. However, the Lists will be regularly updated, in order to correct nomenclature, and addressing other changes to the Listed Invasive Species. The first amended Lists are about to be published in the Government Gazette. Further updates will occur, and will be able to be found on the website after publication.

NEMBA Sections 75 and 76 are very specific in terms of who must develop these Invasive Species Monitoring, Control and Eradication Plans, what the plans must include and how they should be implemented, i.e.:

“Control and eradication of listed invasive species

75. (1) *Control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs.*

(2) *Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.*

(3) *The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.*

(4) *The Minister must ensure the coordination and implementation of programmes for the prevention, control or eradication of invasive species.*

(5) *The Minister may establish an entity consisting of public servants to coordinate and implement programmes for the prevention, control or eradication of invasive species.*

76. (1) *The management authority of a protected area preparing a management plan for the area in terms of the Protected Areas Act must incorporate into the management plan an invasive species control and eradication strategy.*

(2) (a) All organs of state in all spheres of government must prepare an invasive species monitoring, control and eradication plan for land under their control, as part of their environmental plans in accordance with section 11 of the National Environmental Management Act. "

(b) The invasive species monitoring, control and eradication plans of municipalities must be part of their integrated development plans.

(3) The Minister may request the Institute¹ to assist municipalities in performing their duties in terms of subsection (2).

(4) An invasive species monitoring, control and eradication plan must include -

(a) a detailed list and description of any listed invasive species occurring on the relevant land;

(b) a description of the parts of that land that are infested with such listed invasive species;

(c) an assessment of the extent of such infestation;

(d) a status report on the efficacy of previous control and eradication measures

(e) the current measures to monitor, control and eradicate such invasive species; and

(f) measurable indicators of progress and success, and indications of when the Control Plan is to be completed."

The Control Plans for every Protected Area and every other relevant land area managed by an Organ of State (including municipalities) have to be compiled and a copy of the plan submitted to SANBI within a year of these Framework Guidelines having been posted on the Department of Environmental Affairs' website on 30 September 2015.

1.2 Site Description

See attached map of the Langeberg Municipal area, which encompasses the towns McGregor, Ashton, Bonnievale, Robertson and Montagu and includes rivers such as the Breede, Keisie, Kingna, Hoops, Droë, Willem Nels, Cogmans, Houtbaai and Hoeks. The area also has a number of protected natural areas such as the Dassieshoek Nature, Montagu Mountain Reserve.

The prevailing vegetation type is semi-arid Karoo with parcels of Renosterveld.

1.3 Reporting on the efficacy of previous control or eradication measures

Definition: Invasive alien species are plants, animals, pathogens and other organisms that are non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health.

Top 20 Invasive plant species in the Western Cape (*Noted in the Langeberg municipal area)

- Red Eye – Acacia Cyclops*
- Long-leaved wattle – Acacia longifolia*
- Black wattle – Acacia mearnsii*
- Australia blackwood – Acacia melanoxylon*

- Port Jackson willow – *Acacia saligna**
- Giant reed – *Arundo donax**
- Sponge-fruit saltbush – *Atriplex nummularia*
- Water hyacinth – *Eichhornia crassipes**
- Red River Gum – *Eucalyptus camaldulensis**
- Syringa – *Melia azerdarach**
- Oleander – *Nerium oleander**
- Wild tobacco – *Nicotiana glauca**
- Imbricate Prickly pear – *Opuntia imbricate**
- Sweet Prickly pear – *Opuntia ficus-indica**
- Honey mesquite – *Prosopis glandulosa*
- Castor oil plant – *Ricinus communis**
- Kariba Weed – *Salvinia molesta*
- Red Sesbania – *Sesbania punica**
- Spanish broom – *Spartium juncea*

Other noted in the Langeberg municipal area

- Beefwood - *Casuarina cunninghamiana*
- Tumbleweed – *Salsola kali*
- Fountain grass – *Pennisetum setaceum*

Although some control alien invasive vegetation control projects have been carried out over the past 5 years, a definitive survey of the Langeberg Municipal area, indicating the degree of infestation, noting in general terms portions of the site that might be more or less heavily infested and also indicating those areas that are invasive-free, must be planned, budgeted for and implemented.

Invasive plant species, locations, and general abundance must be indicated, as well as obvious current ecological impacts, and potential future impacts if the invasives are not managed.

1.4 Currently identified areas of concern

Table 1: History of past control of Listed Invasive Species in the Langeberg Municipal Area

Area and town	Type of Invasive	Method and agent	Success
Robertson: 4.5 km stretch of the Breede river, downriver from the bridge outside Robertson on the McGregor road	Eucalyptus spp. Port Jackson	Working for Water: Mechanical, manual and chemical eradication. The area was initially cleared mechanically and the stumps treated with herbicide to prevent regrowth. Started 3 July 2014. The regrowth seedlings on the site has since been since been chemically eradicated again and currently a full time EPWP team is regularly sweeping the area	99%
Robertson: Wonderfontein Eucalyptus coppice	Eucalyptus spp. Port Jackson	LM appointed contractor: Mechanical, manual and chemical eradication.	90%
Robertson: Willem Nels river from Wolfkloof bridge to confluence with Droe River	Eucalyptus spp. Port Jackson	LM appointed contractor: Mechanical, manual and chemical eradication.	75%
Robertson: Hoops River for Johan de Jongh Avenue to Wonderfontein	Port Jackson Spanish Reed	LM appointed contractor: Mechanical, manual and chemical eradication.	ongoing
Robertson: Droe River from Pecan Nut street and Droeheuwel play park to confluence with Willem Nels River	Port Jackson Spanish Reed Castor Oil plant	LM appointed contractor: Mechanical, manual and chemical eradication.	ongoing
Robertson: Irrigation dam in Waterkant Street	Water Hyacinth	Working for Water: Biological agents and herbicide	95%
Robertson: Van Zyl street irrigation dam	Ailanthus sp.	LM Parks department: Mechanical, manual and chemical eradication.	ongoing
Robertson: Dassieshoek dam and feed rivers	Eucalyptus spp. Populus Spp.	CWDM appointed contractor: Mechanical, manual and chemical eradication.	99%

Montagu: Badkloof gorge and Keisie river stretch in the Montagu Mountain Reserve to the Old Fort in Cogmanskloof	Port Jackson Spanish Reed Castor Oil plant	LM appointed contractor: Mechanical, manual and chemical eradication.	ongoing
Bonnievale: Seasonal river in Roos Street	Port Jackson Spanish Reed Castor Oil plant	LM appointed contractor: Mechanical, manual and chemical eradication.	ongoing
McGregor: Houtbaai and Hoeks River floodplains	Port Jackson	CWDM appointed contractor: Mechanical, manual and chemical eradication.	99%

Table 2: Control actions planned by other stakeholders in the Langeberg Municipal Area

Area and town	Type of Invasive	Method	Progress
Robertson: 0.5 km stretch of the Breede river, upstream from the bridge outside Robertson on the McGregor road, up to the confluence of the Hoops River	Eucalyptus spp. Port Jackson	Working for Water: Mechanical, manual and chemical eradication. Planned for the following 2 years, starting 2018	Done
Montagu: Keisie, Kingna and Cogmans Rivers	Port Jackson Castor Oil plant Sesbania Wild Tobacco	Montagu hacking Society Mechanical, manual and chemical eradication. Ongoing	Ongoing

INVASIVE SPECIES MANAGEMENT TARGETS AND TIMELINES

2.1. Identifying Invasive Plant Management Priorities

Table 3: Preliminary Listed invasive vegetation species per town

Town	Species name	Common name	NEMB A category	Prioritization (/10)	Risk of invasion
McGregor	<i>Acacia saligna</i>	Port Jackson	1b	8	High
	<i>Arundo donax</i>	Giant reed	1b	4	Moderate
	<i>Sesbania punicea</i>	Sesbania	1b	2	High
Bonnivale		Eucalyptus		4	Moderate
	<i>Acacia saligna</i>	Port Jackson	1b	8	High
	<i>Ricinus communis</i>	Castor Oil Plant	2		Moderate
	<i>Arundo donax</i>	Giant reed	1b	4	High
Robertson	<i>Acacia saligna</i>	Port Jackson	1b	8	High
	<i>Prosopis glandulosa</i>	Honey mesquite	1b	10	Very high
	<i>Ailanthus altissima</i>	Tree of Hell	1b	10	Very high
	<i>Ricinus communis</i>	Castor Oil Plant	2		High
	<i>Eichhornia crassipes</i>	Water Hyacinth	1b	10	Very high
	<i>Tumbleweed</i>	Salsola kali	1b		High
	<i>Beefwood</i>	Casuarina cunninghamiana	1b		High
Ashton	<i>Pennisetum</i>	Fountain Grass	1b	8	High
		Eucalyptus		4	Moderate
	<i>Acacia saligna</i>	Port Jackson	1b	8	High
	<i>Arundo donax</i>	Giant Reed	1b	4	Moderate
	<i>Nicotiana glauca</i>	Wild tobacco	1b		High
	<i>Pennisetum setaceum</i>	Fountain grass 1b			Moderate
Montagu	<i>Arundo donax</i>	Giant reed	1b	4	Moderate
	<i>Ricinus communis</i>	Castor Oil Plant	2		High
	<i>Sesbania punicea</i>	Sesbania	1b	2	High
	<i>Tumbleweed</i>	Salsola kali	1b		High
	<i>Nicotiana glauca</i>	Wild tobacco	1b		High

McGregor: Port Jackson on the Houtbaai and Hoeks River floodplains

Port Jackson at the Small Scale farmers' allotments at the town entrance

Spanish reed at the Plakkerskamp

Bonnivale: Eucalyptus at Myrtle Rigg

Port Jackson at the New Cemetery area

Robertson: Port Jackson at the Small Scale farmers' allotments at the Breede River

Ailanthus in the Keerom, Wesley, Waterkant Street areas

Montagu: Spanish reed at the Badkloof gorge and Keisie river stretch in Joubert Park

Ashton: Fountain grass in the Conradiedorp cemetery /reservoir area along to the Cogmanskloof reservoir area

2.2 Recommended Invasives Species Control Priorities

Methods of control

Biological – Some alien plants have natural enemies, such as insects and diseases that only affect a specific species. The controlling agents (beetles, viruses) are sourced from the country of origin and released here among an invasive species to control it.

Manual – Young or small invaders can be removed from the soil by hand. The plants should be stacked responsibly to prevent regrowth.

Mechanical – Plants and trees can be chopped down with a hatchet, panga, bowsaw or chainsaw. Trees can also be killed by removing a 30–40cm strip of bark around their trunks (known as “ring-barking”).

Chemical – Two or more methods can be used at the same time. For example, ring-barking and then spraying a registered herbicide on the stump.

2019 / 2020

- 2 Appoint a contractor for clearing of the Houtbaai and Hoeks river flood plains in McGregor
- 3 Appoint a consultant to survey and map all alien invader vegetation in the Langeberg Municipality
- 4 Continue vegetation rehabilitation of the Breede River cleared stretch, Robertson
- 5 Monitor and treat, if necessary, the Water hyacinth reoccurrence on the irrigation dam in Waterkant Street, Robertson and other municipal dams
- 6 November to January: Cut and remove the Giant reed in all river courses that the municipality is responsible for
- 7 February to May: Treat the Giant reed in all river courses that the municipality is responsible for with appropriate herbicide
- 8 Monitor and treat the Eucalyptus regrowth in the Clairvaux copse
- 9 Remove the Port Jacksons around the Ashton Conradiedorp cemetery and reservoir
- 10 Treat the Fountain grass around the Ashton Conradiedorp cemetery and reservoir with herbicide
- 11 Monitor the Robertson Waterkant / Wesley street area for Ailanthus seedlings and destroy
- 12 Initiate training sessions for municipal staff, small scale farmers, and interested public to identify Alien Invader vegetation and apply herbicides/practice other methods of control
- 13 Initiate local media awareness campaigns about Alien Invader vegetation

2020 / 2021

- 14 Appoint a consultant to survey and map all Alien Invader vegetation in the Langeberg municipal area
- 15 Continue the vegetation rehabilitation of the Breede River cleared stretch, Robertson
- 16 Monitor and treat, if necessary, the Water hyacinth reoccurrence on the irrigation dam in Waterkant Street, Robertson and other municipal dams
- 17 November to January: Cut and remove the Giant reed in all river courses that the municipality is responsible for
- 18 February to May: Treat the Giant reed in all river courses that the municipality is responsible for with appropriate herbicide
- 19 Monitor and treat the Eucalyptus regrowth in the Clairvaux copse
- 20 Monitor and treat the Port Jackson regrowth around the Ashton Conradiedorp cemetery and reservoir
- 21 Monitor and treat the Fountain grass regrowth around the Ashton Conradiedorp cemetery and reservoir with herbicide
- 22 Monitor the Robertson Waterkant / Wesley street area for Ailanthus seedlings and destroy
- 23 Initiate training sessions for municipal staff, small scale farmers, and interested public to identify Alien Invader vegetation and apply herbicides/practice other methods of control
- 24 Continue the local media awareness campaigns about Alien Invader vegetation

2021 / 2022

- Review the Alien Vegetation Invader Control Plan
- Begin to implement the recommendations of the formal Alien Vegetation Invader Control Plan
- Continue the vegetation rehabilitation of the Breede River cleared stretch, Robertson
- Monitor and treat, if necessary, the Water hyacinth reoccurrence on the irrigation dam in Waterkant Street, Robertson and other municipal dams
- November to January: Cut and remove the Giant reed in all river courses that the municipality is responsible for
- February to May: Treat the Giant reed in all river courses that the municipality is responsible for with appropriate herbicide
- Monitor and treat the Eucalyptus regrowth in the Clairvaux copse
- Monitor and treat the Fountain grass regrowth around the Ashton Conradiedorp cemetery and reservoir with herbicide
- Monitor the Robertson Waterkant / Wesley street area for Ailanthus seedlings and destroy
- Initiate training sessions for municipal staff, small scale farmers, and interested public to identify Alien Invader vegetation and apply herbicides/practice other methods of control
- Continue the local media awareness campaigns about Alien Invader vegetation

2022 / 2023

- Review the Alien Vegetation Invader Control Plan
- Continue to implement the recommendations of the formal Alien Vegetation Invader Control Plan
- Continue the vegetation rehabilitation of the Breede River cleared stretch, Robertson
- Monitor and treat, if necessary, the Water hyacinth reoccurrence on the irrigation dam in Waterkant Street, Robertson and other municipal dams
- November to January: Cut and remove the Giant reed in all river courses that the municipality is responsible for
- February to May: Treat the Giant reed in all river courses that the municipality is responsible for with appropriate herbicide
- Monitor and treat the Eucalyptus regrowth in the Clairvaux copse
- Monitor and treat the Fountain grass regrowth around the Ashton Conradiedorp cemetery and reservoir with herbicide
- Monitor the Robertson Waterkant / Wesley street area for Ailanthus seedlings and destroy
- Initiate training sessions for municipal staff, small scale farmers, and interested public to identify Alien Invader vegetation and apply herbicides/practice other methods of control
- Continue the local media awareness campaigns about Alien Invader vegetation

2023 / 2024

- Review the Alien Vegetation Invader Control Plan
- Continue to implement the recommendations of the formal Alien Vegetation Invader Control Plan
- Continue the vegetation rehabilitation of the Breede River cleared stretch, Robertson
- Monitor and treat, if necessary, the Water hyacinth reoccurrence on the irrigation dam in Waterkant Street, Robertson and other municipal dams
- November to January: Cut and remove the Giant reed in all river courses that the municipality is responsible for
- February to May: Treat the Giant reed in all river courses that the municipality is responsible for with appropriate herbicide
- Monitor and treat the Eucalyptus regrowth in the Clairvaux copse
- Monitor and treat the Fountain grass regrowth around the Ashton Conradiedorp cemetery and reservoir with herbicide
- Monitor the Robertson Waterkant / Wesley street area for Ailanthus seedlings and destroy
- Initiate training sessions for municipal staff, small scale farmers, and interested public to identify Alien Invader vegetation and apply herbicides/practice other methods of control
- Continue the local media awareness campaigns about Alien Invader vegetation

Way Forward: Future plan (2016 onwards)

- In future, the specifications of all management plans commissioned for natural areas must include Alien Invader Vegetation management plans
- A new municipal bylaw will need to be formulated and promulgated to enforce Alien Invader Vegetation control on private properties within the municipal boundaries.

Currently targeted areas from June 2019 onwards

Ashton: Conradie dorp cemetery, reservoir site and View point. Alien Invasive plants to be controlled are Port Jackson, Fountain grass, Eucalyptus and Castor oil. Plants will be treated using the correct control measures.

Bonnievale: Aloe garden and from Buitenkant crescent to Kruin crescent street, using the appropriate methods of controlling fountain grass and Port Jackson

Robertson: Droe River. Using the appropriate methods of controlling Castor oil

The table 4 on the appendices gives a breakdown of the IAPS control carried out by the Langeberg Municipality Parks Department in the above mentioned towns

Table: invasive species control conducted by Parks department employees

Area and town	Type of invasive	Control method	Herbicide and dye	Clearing	Person days
Ashton: Conradie dorp cemetery Reservoir area View point George, Buitekant and Paul Kruger street	Fountain grass Port Jackson Castor oil Eucalyptus spp.	Chemical and Mechanical control methods	Glyphosate Kaput Super lawn weeder Bounty Eco blue dye	Fountain grass: cut from the bottom using lasher sickle and grass shear. Inflorescence was collected, bagged and then later deposited into a still drum where it was burnt to prevent seed dispersal. During regrowth it was then treated with herbicide (glyphosate, super lawn weeder, bounty) mixed with dye using truck spraying equipment along road side and foliar spray was used in other areas. Port Jackson: cut using loppers, handsaw or chainsaw. Stump treated with kaput Castor oil plant: cut using loppers and handsaw. Stump treated with kaput. Seeds bagged and then later deposited into a still drum and burnt. Eucalyptus spp.: young eucalyptus species cut using loppers. Cut stump treated with kaput	Every Tuesday 09H00-16H00
Bonnievale: Buiten street to Kruin street Aloe garden	Fountain grass Port Jackson	Chemical and Mechanical methods	Glyphosate Kaput Eco blue dye	Fountain grass: cut from the bottom using lasher sickle and grass shear. Inflorescence was collected, bagged and then later deposited into a still drum where it was burnt to prevent	Every Thursday 09H00-16H00

				seed dispersal. During regrowth it was then treated with herbicide (glyphosate) mixed with dye using foliar spray to avoid affecting other indigenous plants. Port Jackson: cut using handsaw. Stump treated with kaput.	
Montagu: Barrydale road Van Riebeeck Street Golf court Lovers walk (NR)	Fountain grass Castor oil	Chemical and Mechanical methods	Glyphosate	Fountain grass: cut from the bottom using lasher sickle and grass shear. Inflorescence was collected, bagged and then later deposited into a still drum where it was burnt to prevent seed dispersal. During regrowth it was then treated with herbicide (glyphosate) mixed with dye using foliar spray to avoid affecting other indigenous plants.	Twice a week
Robertson: Droe river	Castor oil Port Jackson	Chemical and Mechanical methods	Kaput	Castor oil plant: cut using loppers and handsaw. Stump treated with kaput. Seeds bagged and then later deposited into a still drum and burnt. Port Jackson: cut using loppers, handsaw or chainsaw. Stump treated with kaput	30 days

REFERENCES

<http://invasives.org.za/legislation/what-does-the-law-say>

https://www.environment.gov.za/.../nemba10of2004_alienandinvasive_speciesrelist.2

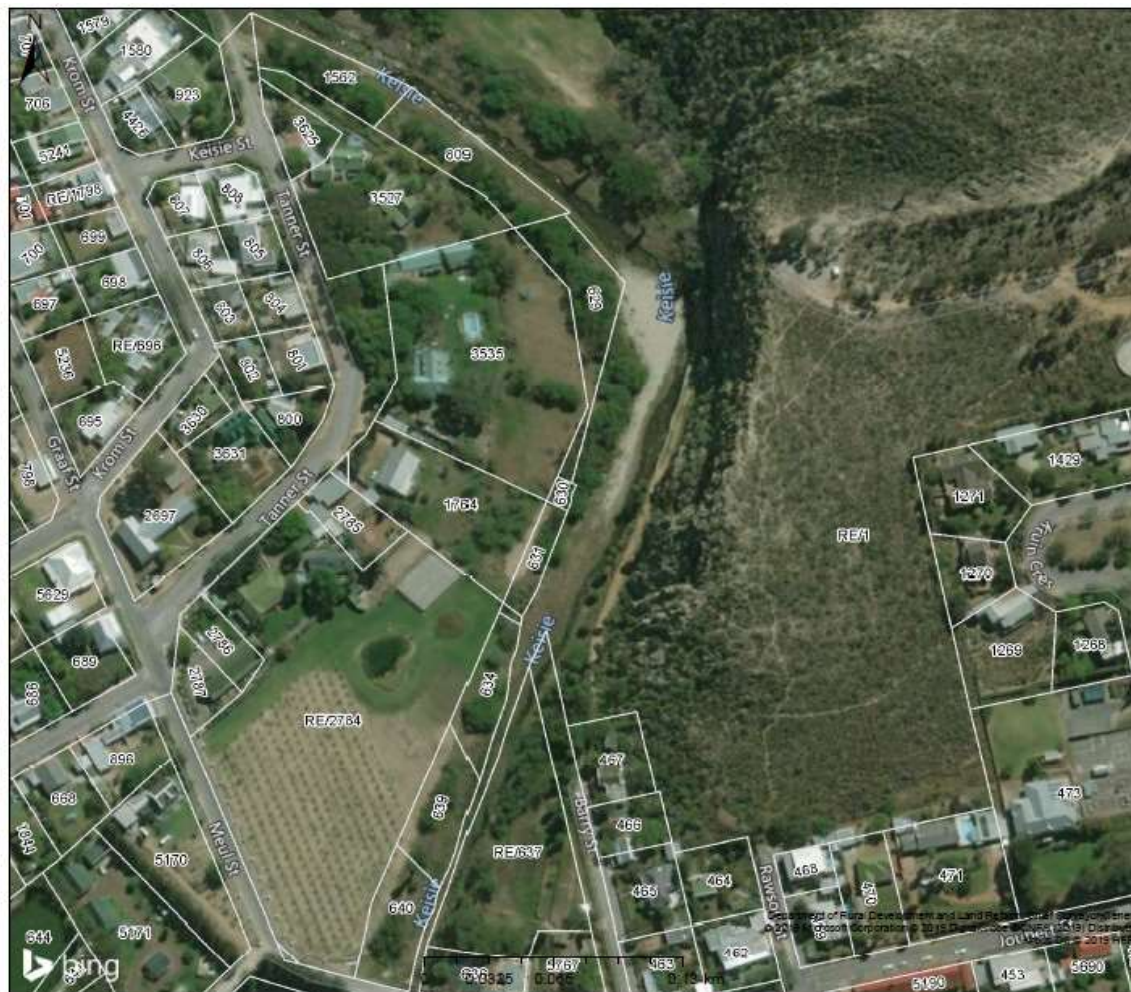
https://www.environment.gov.za/.../nemba10of2004_alienandinvasive_speciesregulations

<https://www.invasives.org.za/files/.../NEMBA%20Guidelines%20for%20Control%20Plans.pdf...>

APPENDICES

Survey maps





Montagu: Clearing

Legend

□ Erf

Scale: 1:2 600

Date created: November 22, 2019

Compiled with CapeFarmMapper



**Western Cape
Government**

Agriculture



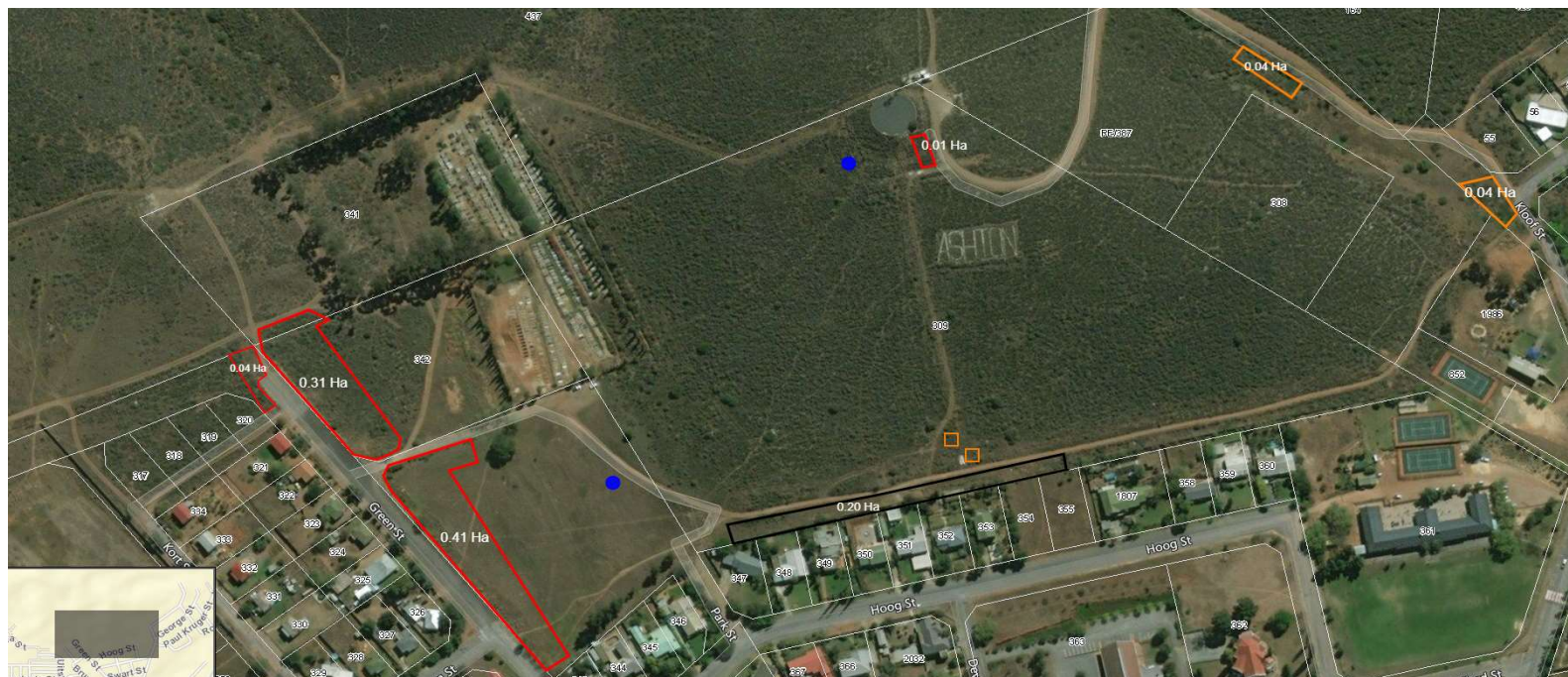
Bonnievale: Species Clearing

Legend
☐ Erf

Scale: 1:2 200

Date created: October 2, 2019



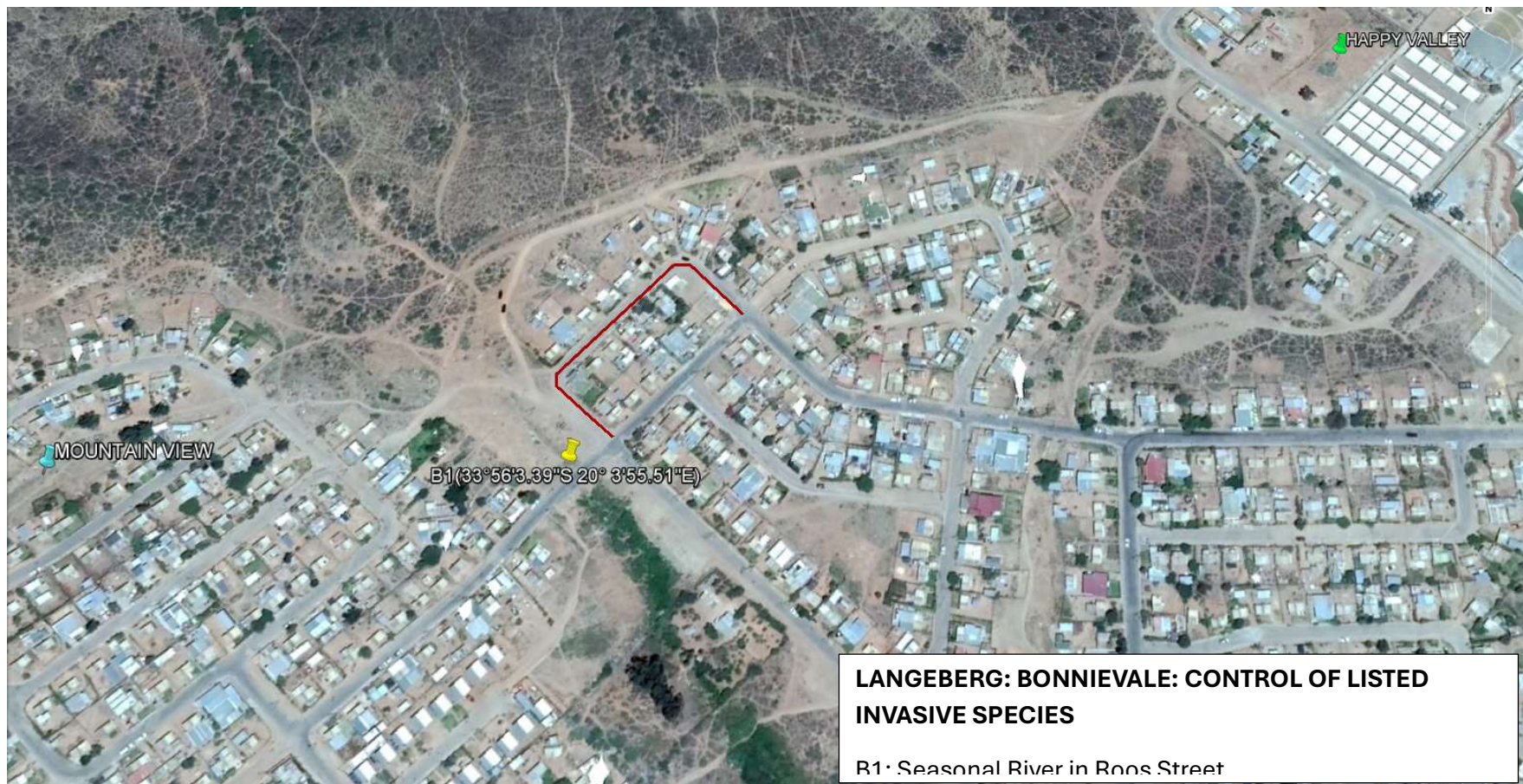


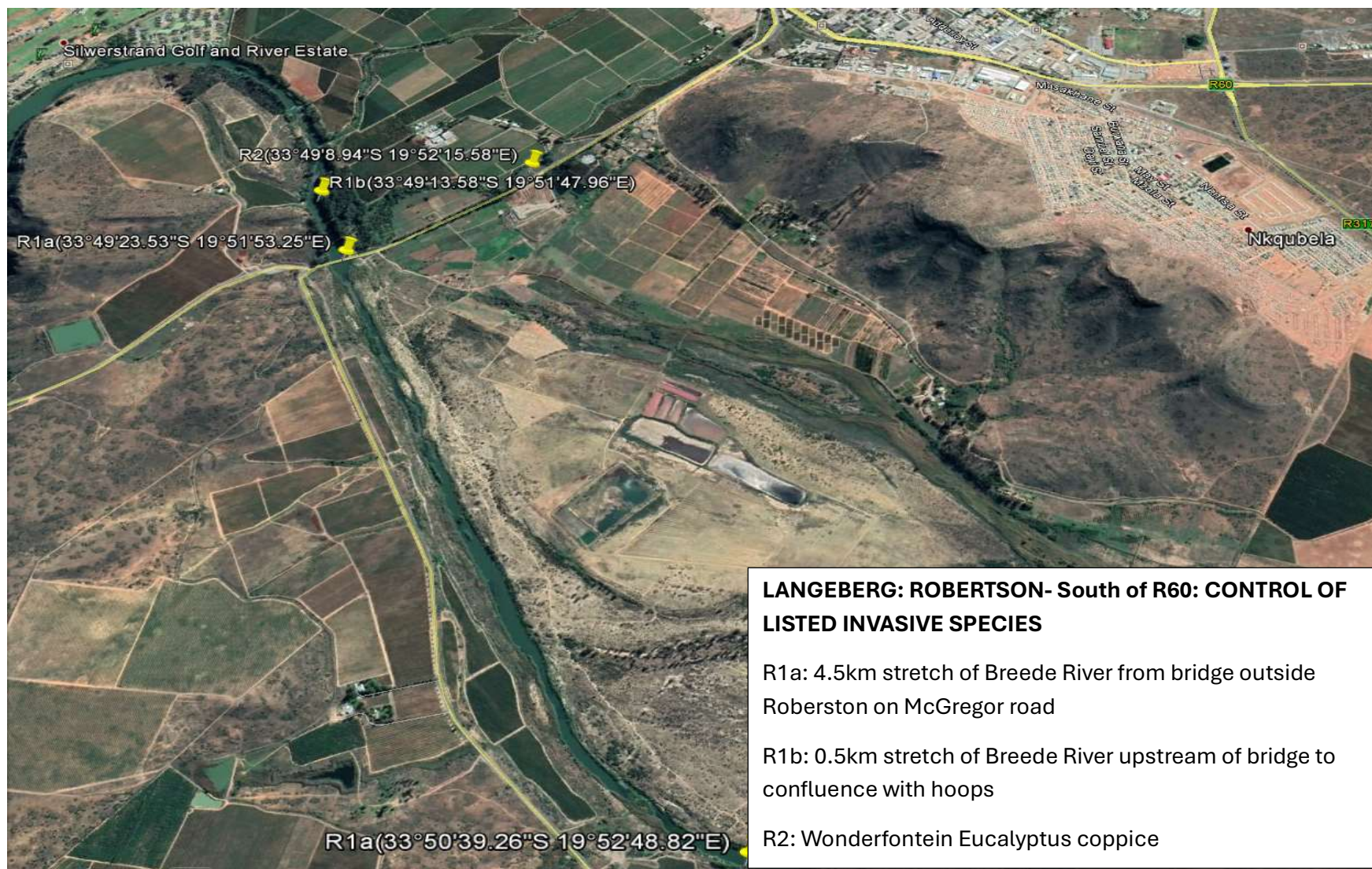
Ashton: Species Clearing

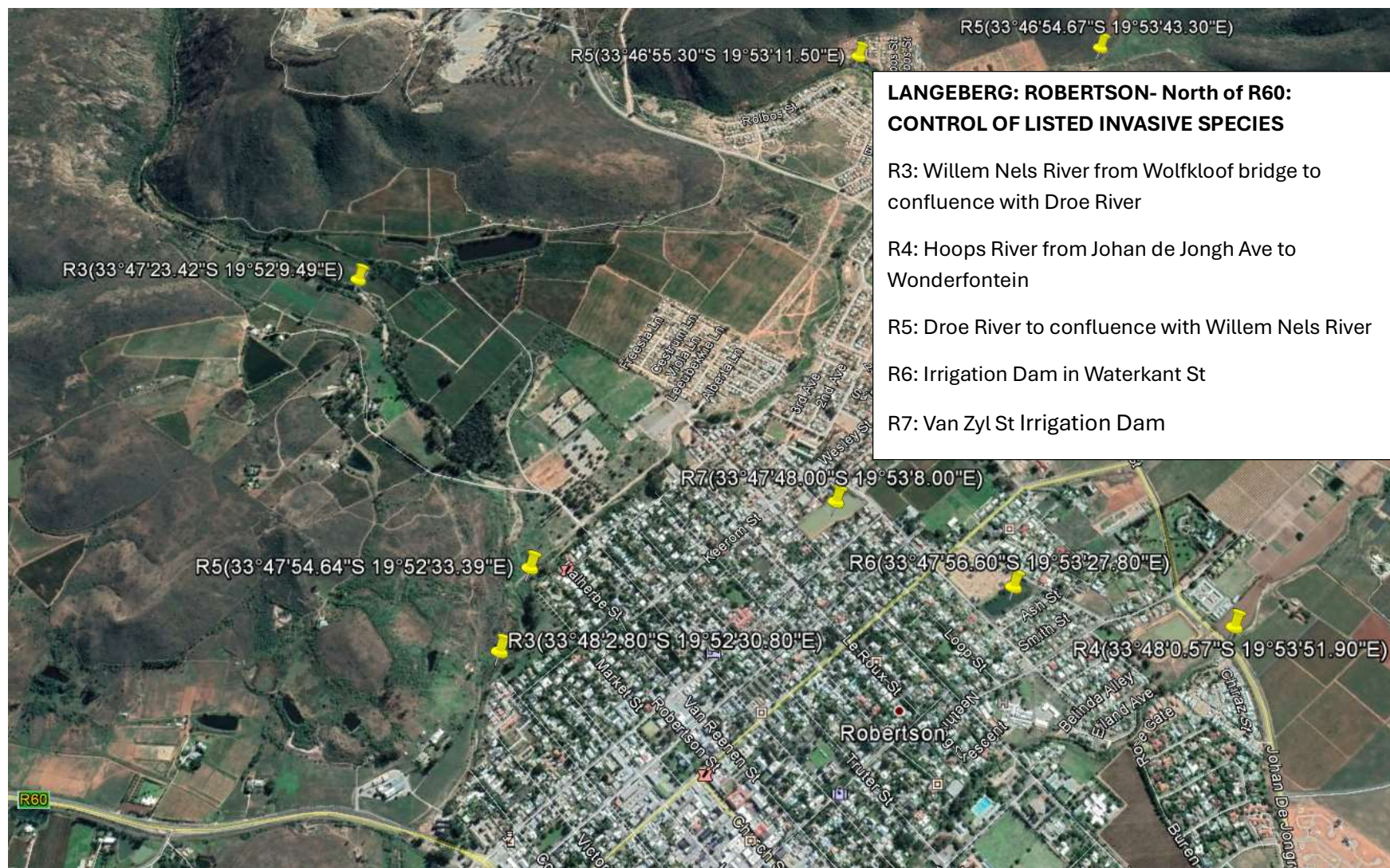
-  Port Jackson
-  Fountain Grass
-  Castor Oil
-  Castor Oil and Fountain Grass













B. Detailed description and recommended control of invasive species in the Langeberg region

Invasive Alien Plants are plants species that have been introduced, either intentionally or unintentionally to South Africa. They can reproduce rapidly in their new environments and tend to out-compete indigenous plants. They can significantly alter the composition, structure and functionality of ecosystems, as a result, they degrade the productive potential of the land, intensify the damage caused by veld fires and flooding, increase soil erosion, and impact on the health of rivers and estuaries. Indigenous species may be reduced in numbers/coverage, or may be lost as a result of Invasive Alien Plants infestations, posing a threat to South Africa's natural heritage in sensitive locations and therefore need to be controlled. Below are the recommended controlled measures that the Langeberg region makes use of:

Mechanical Control

Mechanical control involves the physical destruction or total removal of plants. Mechanical techniques vary, and include hand-pulling, felling, uprooting, ringbarking, cutting/slashing, strip-barking or mowing. Mechanical methods are not feasible in dense infestations as these can be labour intensive and time-consuming. Removing all Invasive Alien Plants using mechanical control methods in a densely infested area can also cause severe soil disturbance and erosion. These methods are generally more appropriate for sparse infestations and for species that do not coppice after cutting.

Hand pulling: is the removal of plants by hand, ensuring that the root is also removed. Hand pulling is only recommended when an area is sparsely invaded, has a high rainfall (the soil should ideally be damp or soft), warm temperatures, and sandy soils and the plants are small enough to be pulled out successfully with the roots intact. Hand pulling does create soil disturbance, but if the area is sparsely invaded such disturbances are unlikely to be ecological damaging.

Manual removal using hand tools

Manual removal using tools such as can knives, tree loppers and slashers can be used to remove Alien Invasive Plants. The use of hand tools is probably the most widely adopted, and often the most effective of all the methods. Methods of cutting the plants include:

- **Ring-barking:** useful for killing large trees. A can knife or awe is used to remove the trees bark and cambium in a horizontal band about 30cm wide (about 50cm from the ground). Herbicide, if used should be applied immediately after ring-barking on the cut area.
- **Cut-stumping:** plants with a stem/ trunk diameter larger than 10mm can be cut as low to the ground as possible with a chain saw or can knife. Herbicide, if used, should be applied to the cut surface immediately after cutting.
- **Slashing:** the seed stalks /branches of annuals (plants that die each year after they set seed) can be slashed with a cane knife, mattock, bill hook or slasher before the seeds have matured.

This is an effective method significantly reducing the presence of viable seeds that will germinate in the new season. Costs are generally low for controlling annuals in this way, as no herbicide is required.

- **Strip-barking:** with the use of a can knife or axe, the bark of large trees can be stripped completely, from waist height down to the base of the trunk. Herbicide, if used, should be applied to the stripped surface immediately after strip-barking. This is an effective but time-consuming method.

Manual removal using mechanised tools

A variety of mechanised tools can be used for Invasive Alien Plants removal. They include:

- **Brush-cutter:** heavy duty motorised brush-cutters that are usually powered by small two-stroke engine are popular for controlling low growing thickets of Invasive Alien Plants. Importantly a suitable blade must be fitted to the brush-cutter. Ideally, herbicide application to the stem should follow immediately after cutting. A team effort can work well in such instances, with one or two team members each applying herbicide as they follow in the path of the machine operator. Stems with a diameter smaller than 10mm are easy to miss, hence the advantage of having several herbicide applicators.
- **Chainsaw:** a chainsaw is ideal for felling large trees and can be used to cut logs and branches into shorter lengths. Common target species for felling include large specimens of syringa, pine, gum and wattle. Training for chainsaw operators is essential. Operators need to understand the techniques of felling i.e. ensuring that the tree falls in the desired direction and must understand and be able to apply the necessary safety precautions during the felling process.

Chemical control

Chemical control of Invasive Alien Plants involves the use of herbicides to kill the targeted plants. Managers and herbicide operators must have a basic understanding of how herbicides function, as this will guide the correct selection of herbicides for different purposes and plants. The use of inappropriate herbicide and the incorrect use of the appropriate herbicides are wasteful, expensive practices. They do more harm than good especially when working in close proximity to watercourses.

Herbicides are classified as either selective or non-selective. Selective herbicides are usually specific to a particular group of plants. Non-selective herbicides can kill any plant they come into contact with, and are therefore not suitable for use in areas where indigenous plants are present.

Chemical application techniques

Chemical application techniques include foliar (leaf) application, stem applications (basal stem, total frill, stem injection) and stump application (cut stump, total stump, scrape and paint):

- **Foliar spraying:** this method uses a knapsack sprayer to spray Invasive Alien Plants below 1 metre in height. Leaves are sprayed to the point of run-off. Correct training and certifications is essential before a team member uses this method. Foliar spraying is generally regarded as a cheaper method than cut stump treatment, because fewer people are required to treat larger areas. It does, however, require large amounts of clean water (for mixing with herbicides), and therefore only practical where water is available.
- **Handheld spraying:** is a means to apply herbicide after cut stumping, ring-barking, frilling and strip-barking. The most common and convenient handheld sprayer has a 1.5 litre capacity and a nozzle that can be set to achieve the correct spray width. Workers must receive training on how to maintain handheld sprayers properly, they are cheap and application of herbicide is accurate.

Biological control

Invasive Alien Species thrive and spread in exponential manner partly due to the lack of natural enemies (e.g. browsers and pathogens) that might occur in their land of origin. Biological control is the introduction of these natural enemies to remove the plants competitive advantage, and reduce population vigour to a level comparable to that of the natural vegetation.

These natural enemies are termed 'biological control agents' and most include insects, mites and micro-organisms such as fungi or bacteria. Biological control agents usually attack specific parts of the plant. They can either attack the reproductive organs directly, e.g. on the parent plant (flower buds, flowers or fruit) or the seed after they have dropped the stress caused by the biological control agents may kill a plant outright, or it might impact on the plants reproductive capacity.

In certain instances, the reproductive capacity is reduced to zero and the population is thus effectively sterilized. All of these outcomes will help to reduce the rates of spread of the species. This is useful in areas where plant population needs to be contained until resources can be mobilised to implement other control measures.

C. List of declared Invasive Alien Vegetation

Category 1: Invader plants must be removed & destroyed immediately. No trade in these plants.

Category 2: Invader plants may be grown under controlled conditions only in permitted zones. No trade in these plants.

Category 3: Invader plants may no longer be planted or sold. Existing plants do not need to be removed.

Kind of plant (Botanical name)	Common Name	Category
Acacia baileyana	Bailey's wattle	3
Acacia cyclops	Rooikrans	2
Acacia dealbata	Silver wattle	Category 1 plant in Western Cape Category 2 plant in the rest of South Africa
Acacia decurrens	Green wattle	2
Acacia elata	Pepper tree wattle	3
Acacia implexa	Screw – pod wattle	1

Acacia longifolia	Long – leaved wattle	1
Acacia mearnsii	Black wattle	2
Acacia melanoxylon	Australian blackwood	2
Acacia paradoxa	Kangaroo wattle	1
Acacia podalyriifolia	Pearl acacia	3
Acacia pycnantha	Golden wattle	1
Acacia saligna	Port Jackson willow	2
Achyranthes aspera	Burweed	1
Agave sisalana	Sisal hemp, Sisal	2
Ageratina adenophora	Crofton weed	1
Ageratina riparia	Mistflower	1

<i>Ageratum conyzoides</i>	Invading ageratum	1
<i>Ageratum houstonianum</i>	Mexican ageratum	1
<i>Ailanthus altissima</i>	Tree-of-heaven	3
<i>Albizia lebbbeck</i>	Lebbeck tree	1
<i>Albizia procera</i>	False lebbeck	1
<i>Alhagi maurorum</i>	Camel thorn bush	1
<i>Anredera cordifolia</i>	Madeira vine, Brida wreath	1
<i>Araujia sericifera</i>	Moth catcher	1
<i>Ardisia crenata</i>	Coralberry tree, Coral bush	Category 1 plant only in Northern Province, Kwa Zulu-Natal & Mpumalanga

Argemone mexicana	Yellow – flowered Mexican poppy	1
Argemone ochroleuca	White – flowered Mexican poppy	1
Arundo donax	Giant reed, Spanish reed	1
Atriplex lindley	Sponge – fruit saltbush	3
Atriplex nummularia	Old man saltbush	2
Azolla filiculoides	Red water fern	1
Bauhinia purpurea	Butterfly orchid tree	3
Bauhinia variegata	Orchid tree	3
Bryophyllum delagoense	Chandelier plant	1

Caesalpinia decapetala	Mauritius thorn	1
Campuloclinium macrocephalum	Pom pom weed	1
Canna indica	Indian shot	1
Cardiospermum grandiflorum	Balloon vine	1
Casuarina cunninghamiana	Beefwood	2
Casuarina equisetifolia	Horsetail tree	2
Cereus jamacaru	Queen of the Night	1
Cestrum aurantiacum	Yellow or Orange cestrum	1
Cestrum elegans	Crimson cestrum	1
Cestrum laevigatum Schtdl	Inkberry	1
Cestrum parqui	Chilean cestrum	1

Chromolaena odorata	Triffid weed, Chromolaena	1
Cinnamomum camphora	Camphor tree	Category 1 plant only in the Northern Province, KwaZulu-Natal & Mpumalanga
Cirsium vulgare	Spear thistle, Scotch thistle	1
Convolvulus arvensis	Field bindweed, Wild morning glory	1
Cortaderia jubata	Pampas grass	1
Cortaderia selloana	Pampas grass	1
Cotoneaster franchetii	Coloneaster	3
Cotoneaster pannosus	Silver – leaf cotoneaster	3
Cuscuta campestris	Common dodder	1

<i>Cuscuta suaveolens</i>	Lucerne dodder	1
<i>Cytisus monspessulanus</i>	Montpellier broom	1
<i>Cytisus scoparius</i>	Scotch broom	1
<i>Datura ferox</i>	Large thorn apple	1
<i>Datura innoxia</i>	Downy thorn apple	1
<i>Datura stramonium</i>	Common thorn apple	1
<i>Echinopsis spachiana</i>	Torch cactus	1
<i>Echium plantagineum</i>	Patterson's curse	1
<i>Echium vulgare</i>	Blue echium	1
<i>Egeria densa</i>	Dense water weed	1
<i>Eichhornia crassipes</i>	Water hyacinth	1

<i>Elodea canadensis</i>	Canadian water weed	1
<i>Eriobotrya japonica</i>	Loquat	3
<i>Eucalyptus camaldulensis</i>	Red river gum	2
<i>Eucalyptus cladocalyx</i>	Sugar gum	2
<i>Eucalyptus diversicolor</i>	Karri	2
<i>Eucalyptus grandis</i>	Saligna gum, Rose gum	2
<i>Eucalyptus lehmannii</i>	Spider gum	Category 1 plant in the Western Cape Category 2 plant in the rest of South Africa
<i>Eucalyptus paniculata</i>	Grey ironbark	2
<i>Eucalyptus sideroxylon</i>	Black ironbark, Red ironbark	2

Eugenia uniflora	Pitanga, Surinam cherry	Category 1 plant in the Northern
		Province, KwaZulu-Natal and
		Mpumalanga
		Category 3 plant in the rest of South Africa
Gleditsia triacanthos	Honey locust, Sweet locust	2
Grevillea robusta	Australian silky oak	3
Hakea drupacea	Sweet hakea	1
Hakea gibbosa	Rock hakea	1
Hakea sericea	Silky hakea	1
Harrisia martinii	Moon cactus, Harrisia cactus	1

Hedychium coccineum	Red ginger lily	1
Hedychium coronarium	White ginger lily	1
Hedychium flavescens	Yellow ginger lily	1
Hedychium gardnerianum	Kahili ginger lily	1
Hypericum perforatum	St.Johns' wort, Tipton weed	2
Ipomoea alba	Moonflower	Category 1 plant in the Northern Province, KwaZulu-Natal & Mpumalanga Category 3 plant in the rest of South Africa
Ipomoea indica	Morning glory	Category 1 plant in the Northern Province, KwaZulu-Natal & Mpumalanga

		Category 3 plant in the rest of South Africa
Ipomoea purpurea	Morning glory	3
Jacaranda mimosifolia	Jacaranda	3
All seed producing species or seed producing hybrids of Lantana that are non-indigenous to Africa	Lantana/Lantana, Tickberry, Cherry Pie	1
Lepidium	Pepper – cres, Hoary cardaria, White top	1
Leptospermum laevigatum	Australian myrtle	1
Leucaena leucocephala	Leucaena	Category 1 plant in the Western Cape Category 2 plant in South Africa, excluding Western Cape

Ligustrum japonicum	Japanese wax – leaved privet	3
Ligustrum lucidum	Chinese wax – leaved privet	3
Ligustrum ovalifolium	Californian privet	3
Ligustrum sinense	Chinese privet	3
Ligustrum vulgare	Common privet	3
Lilium formosanum	St Joseph's lily, Trumpet lily, Formosa lily	3
Litsea glutinosa	Indian laurel	1
Lyrthrum salicaria	Purple loosestrife	1
Macfadyena unguis-cati	Cat's claw creeper	1

Melia azedarach	“Syringa”, Persian lilac	3
Metrosideros excelsa	New Zealand christmas tree	3
Mimosa pigra	Giant sensitive plant	3
Montanoa hibiscifolia	Tree daisy	1
Morus alba	White mulberry, Common mulberry	3
Myoporum tenuifolium	Manatoka	3
Myriophyllum aquaticum	Parrot’s feather	1
Myriophyllum spicatum	Spiked water – milfoil	1
Nassella tenuissima	White tussock	1
Nassella trichotoma	Nassella tussock	1

Nephrolepis exaltata	Sword fern	3
Nerium oleander	Oleander	1
Nicotiana glauca	Wild tobacco	1
Opuntia aurantiaca	Jointed cactus	1
Opuntia exaltata	Long spine cactus	1
Opuntia	Mission prickly pear, Sweet prickly pear	1
Opuntia humifusa	Large flowered prickly pear, Creeping prickly pear	1
Opuntia imbricata	Imbricate cactus, Imbricate prickly pear	1

Opuntia lindheimeri	Small round – leaved prickly pear	1
Opuntia monacantha	Cochineal prickly pear, Drooping prickly pear	1
Opuntia rosea	Rosea cactus	1
Opuntia spinulifera	Saucepan cactus, Large roundleaved prickly pear	1
Opuntia stricta	Pest pear of Australia	1
Orobanche minor	Lesser broomrape, Clover broomrape	1
Paraserianthes lophantha	Austalian Albizia, Stink bean	1

Parthenium hysterophorus	Parthenium	1
Passiflora caerulea	Blue passion flower	1
Passiflora molissima	Banana poka, Bandadilla	1
Passiflora suberosa	Devil's pumpkin, Indigo berry	1
Passiflora subpeltata	Grandina	1
Pennisetum setaceum	Fountain grass	1
Pennisetum villosum	Feathertop	1
Pereskia aculeata	Pereskia/Barbados gooseberry	1
Phytolacca dioica	Belhambra	3

Pinus canariensis	Canary den	2
Pinus elliotti	Slash pine	2
Pinus halepensis	Aleppo pine	2
Pinus patula	Patula pine	2
Pinus pinaster	Cluster pine	2
Pinus radiata	Radiata pine, Monterey pine	2
Pinus roxburghii	Chir pine, longifolia pine	2
Pinus taeda	Loblolly pine	2
Pistia stratiotes	Water lettuce	1

Pittosporum undulatum	Australian cheesewood, Sweet pittosporum	1
Plectranthus comosus	Abyssinian' coleus, Wooly plectranthus	3
Pontederia cordata	Pickrel weed	3
Populus alba	White popular	2
Populus x canescens	Grey popular, Matchwood popular	2
Prosopis glandulosa	Honey mesquite	2
Proposis velutina	Velvet mesquite	2
Psidium cattleianum	Strawberry guava	3
Psidium guajava	Guava	2

Psidium guineense	Brazilian guava	3
Psidium x durbanensis	Durban guava	1
Pueraria lobata	Kudu vine	1
Pyrancaantha angustifolia	Yellow firethorn	3
Pyrancaantha crenulata	Himalayan firethorn	3
Rhus succedanea	Wax tree	1
Ricinus communis	Castor – oil plant	2
Rivina humilis	Rivina, Bloodberry	1
Robinia pseudoacacia	Black locust	2
Rorippa nasturtium – aquaticum	Watercress	2

Rosa rubiginosa	Eglantine, Sweetbriar	1
Rubus cuneifolius	American bramble	1
Rubus fruticosus	European blackberry	2
Salix babylonica	Weeping willow	2
Salix fragilis	Crack or brittle willow	2
Salvinia molesta	Kariba weed	1
Schinus terebinthifolius	Brazilian pepper tree	Category 1 in KwaZulu-Natal Category 3 in the rest of South Africa
Senna bicapsularis	Rambling cassia	3
Senna didymobotrya	Peanut butter cassia	3

Senna pendule		3
Sesbania punicea	Red sesbania	1
Solanum elaeagnifolium	Silver-leaf bitter apple	1
Solanum mauritianum	Bugweed	1
Solanum seforthianum	Potato creeper	1
Solanum sisymbriifolium	Wild tomato, Dense – thorned bitter apple	2
Sorghum halepense	Johnson grass, Aleppo grass	2
Spartium junceum	Spanish broom	1
Syzygium cumini	Jambolan	3
Syzygium jambos	Rose apple	3

Tamarix chinensis	Chinese tamarisk	Category 1 plant in the Northern, Western and Eastern Cape Category 3 plant in the rest of South Africa
Tamarix ramosissima	Pink tamarisk	Category 1 plant in the Northern, Western and Eastern Cape Category 3 plant in the rest of South Africa
Tecoma stans	Yellow bells	1
Thelechitonia trilobata	Singapore daisy	Category 1 in KwaZulu-Natal Category 3 in the rest of South Africa
Thevetia	Yellow oleander	1
Tipuana tipu	Tipu tree	3

<i>Tithonia diversifolia</i>	Mexican sunflower	1
<i>Tithonia rotundifolia</i>	Red sunflower	1
<i>Toona ciliata</i>	Toon tree	3
<i>Triplaris americana</i>	Indian almond	1
<i>Ulex europaeus</i>	European gorse	1
<i>Xanthium spinosum</i>	Spiny cocklebur	1
<i>Xanthium strumarium</i>	Large cocklebur	1

D. Legislation

Conservation of Agricultural Resources Act No. 43 of 1983 (CARA)

The Conservation of Agricultural Resources Act (CARA) regulates and restricts the propagation, harbouring and sale of invasive alien plant and weed species listed in a set of regulations published in terms of the Act. CARA was revised in 2001 and is administered by the National Department of Agriculture, Forestry and Fisheries. All listed Invasive alien plants are divided into three categories as described below. The full list of CARA regulated species is included in the appendix D: List of declared invasive alien vegetation.

Category 1: Invader plants must be removed & destroyed immediately. No trade in these plants.

Category 2: Invader plants may be grown under controlled conditions only in permitted zones. No trade in these plants.

Category 3: Invader plants may no longer be planted or sold. Existing plants do not need to be removed.

National Environmental Management: Biodiversity Act No. 10 of 2004 (NEMBA)

The National Environmental Management: Biodiversity Act (NEMBA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations published in Government Notices R.506, R.507, R.508 and R.509 of 2103 under NEMBA categorises and regulates the control of invasive and alien species:

Category 1a: invasive plants requiring compulsory control. Plants are to be removed and destroyed. Any category 1a listed plants must be eradicated.

Category 1b: these are invasive plants requiring control a part of an invasive species management programme. Permits must be issued for these plants to be kept on a property, and their management and control must be in terms of an approved invasive species management plan.