

Invasive Alien Plants Management Programme for Proposed Social Housing Development on Erf 1359 Queensburgh, 35-53 Huntley Road, within eThekweni Municipality, KwaZulu-Natal



Compiled by:

4022



P.O. Box 22536
Glenashley

Compiled for:



28 Dover Road
Bluff
4093

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1 INTRODUCTION

1.1 Overview

Yethusodwa (Pty) Ltd is proposing the construction of 525 social housing units on Erf 1359 Queensburgh, 35-53 Huntley Road, within eThekweni Municipality, KwaZulu-Natal. This project requires an Environmental Authorization to be obtained through the Basic Assessment process which includes undertaking of specialist studies. One of the specialist studies undertaken for the project was the Terrestrial Biodiversity Assessment which showed that there are invasive alien plant species within the site including Category 1b species. The specialist's recommendation therefore included that an Invasive Alien Plant (IAP) Species Management Programme must be compiled for the project. This programme forms part of the Environmental Management Programme (EMPr) for this project.

1.2 Purpose

The purpose of an Alien Invasive Plant Species Management Plan is:

- To ensure that alien plants do not become established on site.
- To ensure that alien plant species do not become dominant in all or parts of the landscape.
- To implement a monitoring programme to detect the presence of alien plant species as well
- As to monitor the success of the alien management plan.

2 LEGAL FRAMEWORK

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

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared aliens must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act 198 alien species were listed as declared weeds and invaders and ascribed to one of the following categories:

- Category 1: Prohibited and must be controlled.
- Category 2 (commercially used plants): May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.
- Category 3 (ornamentally used plants): May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

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

The National Environmental Management: Biodiversity Act (NEMBA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEMBA. According to this Act and the regulations, any species designated under section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

- Category 1a: Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: 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: 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 Category 2 plants to exist in riparian zones.
- Category 3: 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 Category 3 plants to exist in riparian zones.

2.3 Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947)

According to Government Notice No. 13424 dated 26 July 1992, it is an offence to “acquire, dispose, sell or use an agricultural or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or on such a container”. Contractors using herbicides need to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). This is regulated by the Department of Agriculture, Land Reform and Rural Development.

3 RESPONSIBLE PERSONS

3.1 The Developer

Yethusodwa (Pty) Ltd will be responsible for the following:

- Ensure that the requirements set out in this management plan are adhered to and implemented;
- Allocate the responsibilities assigned to the Environmental Control Officer (ECO) to an independent suitably qualified individual prior to the start of construction activities on site; and
- Provide all principal contractors working on the project with a copy of this management plan as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

3.2 The Engineer/Project Manager

The engineer of the proposed development will be responsible for the overall implementation of the management plan during the construction phase of the project. To effectively implement the Alien Invasive Species Management Plan, the engineer must be aware of the findings, mitigation measures and conclusions of the Final Basic Assessment report, the EMP, the requirements of the Environmental Authorization (EA), and this management plan.

3.3 The Environmental Control Officer (ECO)

The ECO is responsible for monitoring and verifying the implementation of the management plan during the construction phase of the project. In order to effectively achieve this, the ECO must be aware of the

findings, mitigation measures and conclusions of the Final Basic Assessment Report, the EMP, the EA, and this management plan.

3.4 The Contractor

The contractor, being any directly appointed company or individual undertaking the implementation of works, will be responsible for complying with the management plan at all times during the construction phase.

4 CONTROL GUIDELINES

This section provides an outline of the overall approach that should be adopted at the site in order to minimize the probability of invasive alien plants becoming established and ensuring that any outbreaks are managed quickly to ensure that they do not become a long-term problem on site. The establishment of any dense infestations will be expensive to eradicate and will require more complex control measures than would be necessary for low density invasions.

4.1 Prevention

A prevention strategy should be considered and established, including regular surveys and monitoring for invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas. Prevention could also include measures such as washing the working parts and wheels of earth-moving equipment prior to it being brought onto site, visual walk-through surveys on a regular basis and other measures.

4.2 Early identification and eradication

Monitoring plans should be developed which are designed to catch Invasive Alien Plant Species shortly after they arrive in the project area. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are spotted an immediate response of locating the site for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

4.3 Containment and control

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

5 CONTROL METHODS

This section outlines the different methods generally applied for management of IAPs.

5.1 Mechanical Control

With this method, the IAP is physically damaged or removed. It includes methods such as uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only feasible in sparse infestations or on small scale, and for controlling species that do not regrow after cutting. Species that tend to regrow, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. Mechanical control is labour intensive and therefore expensive and could cause severe soil disturbance and erosion. For sites with no existing dense stands of alien invasive plant species, hand-pulling or manual removal using hand tools will be the most appropriate method.

Table 1: Mechanical control advantages and disadvantages

Advantages	Disadvantages
Effective method in areas with low infestation.	Not an effective method for dense infestations, as the cost of clearing is extremely high, with little or no impact.
High job creation and associated poverty alleviation potential.	Time consuming.
No contamination of water with herbicides.	If no herbicides are used, then the manual control techniques must be very well executed to ensure success.

5.2 Chemical Control

Use of chemical control can also affect and harm natural vegetation around the targeted plants. It should therefore only be used as a last resort. It should not be necessary if regular monitoring is undertaken, which should be effective for controlling invasive alien plants.

Chemical control involves the use of registered herbicides to kill the target weed. Managers and herbicide operators must have a basic understanding of how herbicides function. Inappropriate herbicides or incorrect use of the appropriate herbicides would be wasteful and expensive resulting in more harm than good especially as the site is close to a watercourse. Some herbicides can quickly contaminate fresh water and/or be transported downstream where they may remain active in the ecosystem.

Contractors using herbicides are required to have a permit according to Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). Herbicides are either classified as selective or non-selective. Selective herbicides are usually specific to a particular group of plants, e.g., those specified for use on broad leaf plants, but should not kill narrow-leaf plants such as grasses. Non-selective herbicides can kill any plant that they come into contact with and are therefore not suitable for use in areas where indigenous vegetation is present.

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

Table 2: Chemical control advantages and disadvantages

Advantages	Disadvantages
Complements mechanical control methods, increasing the effectiveness of control activities.	May kill non-target plants or species. This is a very important consideration and poses risks for remaining natural areas on site.
Achieve results over short period (within 6 weeks of application).	Herbicides are expensive.
Large areas can be treated quickly.	The use of herbicides may contaminate sites used for drinking water, for washing and for fishing, and can therefore threaten human and animal health.
Specialized training and certification are required for use of herbicides.	

5.3 Biological Control

Biological control is an attempt to introduce the plant's natural enemies to its new habitat, with the assumption that these natural enemies will remove the plant's competitive advantage until its vigour is reduced to a level comparable to that of the natural vegetation. Natural enemies that are used for biological control are called biocontrol agents. In the control of invasive plants, the biocontrol agents used most frequently are insects, mites and pathogens (disease-causing organisms such as fungi). Biocontrol agents target specific plant organs, such as the vegetative parts of the plant (its leaves, stems or roots) or the reproductive parts (flowers, fruits or seeds).

The choice of biocontrol agents depends on the aim of the control project. If the aim is to get rid of the invasive plant species, scientists select the types of biocontrol agents causing the most damage that are available. In such projects, scientists may use agents that affect the vegetative parts of the plant as well as agents that reduce seed production. However, if the target plant is useful in certain situations but becomes a pest when uncontrolled, conflict of interests arises regarding biological control.

This conflict is usually resolved by avoiding biocontrol agents that have the ability of causing damage to the useful part of the plant, and instead using only seed-reducing agents. These reduce the reproductive potential of the plants, curb their dispersal and reduce the follow-up work needed after clearing, while still allowing for the continued utilisation of the plant.

Table 3: Biological control advantages and disadvantages

Advantages	Disadvantages
Most environmentally friendly and most sustainable of all control methods.	Generally slow, especially initially.

Usually does not require high or long-term maintenance.	Low levels of infestation, with occasional outbreaks, will remain a feature of systems under biological control.
Relatively low-cost implication over the long term.	Any use of chemicals around biocontrol agent colonies may adversely affect the potency of this control method.
Cannot be used where the biocontrol agent would threaten commercial populations of the target species that may exist nearby.	
Biocontrol agents are not available for all target species.	

5.4 Control of IAPS found on the site

IAPs were prevalent within the assessment area due to the disturbance from past and present anthropogenic activities. Twelve (12) species of IAPs were recorded during the survey period, with 10 categorised as Category 1b. The table below lists the IAPs which were recorded within the area and the recommended control method.

Table 4: Summary of Invasive Alien Plants (IAPs) recorded within the assessment area during the survey period

Species	Growth Form	NEMBA Category	Control
<i>Ageratum houstonianum</i>	Herb	1b	Physical removal ensuring the root system is removed.
<i>Bidens pilosa</i>	Herb	-	Physical removal and post-emergence herbicide.
<i>Canna indica</i>	Herb	1b	Difficult to eradicate with herbicides. Physical removal is required taking care to dig up and destroy the rhizomes.
<i>Catharanthus roseus</i>	Herb	1b	Physical removal ensuring the root system is removed.
<i>Chromolaena odorata</i>	Woody shrub	1b	Control is difficult because it is capable of vigorous regrowth from stem coppice, root suckers and seed. Large plants must be

			cut down and herbicide applied to the stump and regrowth. Small plants can be pulled out by hand.
<i>Lantana camara</i>	Woody shrub	1b	Physical removal of seedlings. Dense bushes can be chopped and sprayed with a herbicide.
<i>Leucaena leucocephala</i>	Small tree	1b	Physical removal, ensuring that root ball is removed.
<i>Litsea glutinosa</i>	Tree	1b	Smaller plants can be pulled out by hand, but the long tap root must be removed. Larger specimens must be felled, and the stump treated with herbicide.
<i>Melia azedarach</i>	Large tree	1b (3 in urban areas)	Physical removal of seedlings or foliar herbicide application of specimens less than 2.5 m in height. Large specimens must be felled and stump treated with herbicide.
<i>Senna hirsuta</i>	Small tree	1b	Physical removal ensuring the root system is removed.
<i>Solanum mauritianum</i>	Small tree	1b	Cutting, stem painting or foliar herbicides. Young plants can be hand pulled. Follow up treatments are essential as seeds are unaffected by herbicide.
<i>Tagetes minuta</i>	Herb	-	Physical removal ensuring the root system is removed.

It is also important to note that while herbicide application has been recommended for control in some cases, herbicide application should not occur during windy days or be directly painted on to prevent drift.

5.5 Habitat Management

Managing the natural vegetation in such a way as to reduce the opportunity for IAPS becoming established is the best way to prevent invasion. The general principle is to not disturb any areas beyond the footprint of the proposed infrastructure and to also ensure that the natural processes that maintain vegetation patterns are not disrupted.

5.5.1 Follow-up and rehabilitation

Re-establishment of indigenous vegetation needs to be undertaken to reduce the probability of re-emergence of invasive alien plants and to reduce the risk of soil erosion where the soil surface is poorly vegetated. In most soils, the seeds and other propagules of the plants of the former natural habitat still survive, thus natural regeneration without the need for planting may be possible in many cases. However, if natural regeneration is not likely due to the length of time since disturbance or if the soil has been disturbed to such a degree that seeds and propagules no longer survive then planting or seeding may be required. Rehabilitation should follow these steps:

- Monitor cleared areas on a regular basis (monthly during construction and three-monthly during operation) for emergent seedlings of invasive alien species and remove these (hand pulling or chemical control).
- If the soil remains relatively undisturbed and the area has some indigenous vegetation left intact, the natural regeneration process of the indigenous vegetation on the site should be managed. This involves regular follow-up to remove emerging invasive alien plants and protecting the area from other forms of disturbance (heavy grazing, trampling, disturbance by vehicles, etc.) while the vegetation re-established naturally.
- If required, indigenous vegetation can be planted on the cleared areas. This can be in the form of a seed mix or plants rescued from previous clearing.

6 SAFETY STANDARDS AND GUIDELINES

Safety is of the utmost importance when working with invasive alien plant control. Proper safety training and equipment is therefore required.

6.1 Herbicide safety

Herbicides must be stored in a dedicated storeroom. The Herbicide Storeroom needs to comply with national Occupational Health and Safety standards. Some important safety rules are set out as follows:

- An herbicide storeroom must have adequate ventilation. If the air is stagnant or there is a smell of herbicides when opening up the storeroom then it is a good indication that there is not enough ventilation.
- Clean water needs to be available in close proximity to the storeroom.
- The floor must be non-porous. This is important because when the floor is cleaned (which must be done regularly), no residue of herbicides must remain. Place herbicide containers on wooden pallets to increase ventilation and make mopping up after spillage easier.

- 'No Smoking' and 'No Fire' signs should be posted on the door of the storeroom as well as a sign stating that it is a chemical store and who the responsible person is for the store.
- Keep the storeroom locked to prevent herbicide getting into the wrong hands.
- A spill kit needs to be kept in the storeroom to mop up any spill. The spill kit must contain a bucket with sand and a spade. The sand is to be placed on the spill to absorb the liquid. Once the sand has absorbed the spill, it is to be collected and disposed of where it cannot contaminate the environment. It is preferable to keep contaminated sand in a container and dispose of it with empty containers at a certified chemical recycling plant.
- Obtain the Material Safety Data Sheet from the supplier of the herbicide and ensure that you are familiar with the product before using it. Keep the Material Safety Data Sheet in the storeroom in case of an emergency.
- Always store herbicides in the original labelled container to avoid confusion with other products. Do not store other products in the store, such as protective clothing, food, etc., as they can become contaminated.
- All empty herbicide containers, or herbicides that have reached their expiry date, need to be safely disposed of. This can be done at a registered chemical recycling company. It is important that all empty containers are spiked before disposal. This ensures that they cannot later be used for carrying drinking water, food, etc.
- Emergency contact numbers should be posted nearby.

6.2 Personal Protective Equipment (PPE)

The use of Personal Protective Equipment (PPE) by staff controlling invasive alien plants in the field is required by law. The PPE specifications differ for the different types of control. Mechanised control includes the use of chainsaws and brush cutters and will therefore require slightly different PPE from someone using manual control (slasher, knapsack sprayer, etc.). PPE required for manual control is as follows:

- Overall: 100% cotton, two-piece overalls are best for absorbing perspiration, they last longer and are cooler.
- Rubber gloves: Standard, wrist-length rubber gloves are sufficient.
- Leather gloves: Standard wrist-length leather gloves are appropriate.
- Safety boots: Gumboots or standard safety boots, which support the ankles, are sufficient. Steel toecaps are recommended for workers that are working with heavy equipment or large trees.
- Hat: If working with large trees, on steep gradients or if any other safety risk may be present, then wearing a hardhat is advisable. Otherwise, a wide-brim hat can be used to protect the worker from the sun.
- Safety glasses: Large, clear safety glasses, which allow air to pass through, are acceptable.
- Face mask: A face mask which covers the nose and mouth is essential when mixing herbicides and for foliar spraying.

7 MONITORING PROGRAMME

7.1 Monitoring framework

The following monitoring framework must be implemented to ensure that IAPs are continually monitored, and progress pertaining to their control is recorded. The monitoring of the area throughout the process is crucial in order to prevent IAPs growing and spreading out of control, thereby threatening the wellbeing of indigenous flora and fauna.

Table 5: Proposed monitoring framework for the control of Invasive Alien Plants (IAPs) within the property

Metric	Frequency	Method	Response
How effective are the control methods?	4-6 months after every operation	Survey the cleared areas and look for regrowth. Before and after photographs are effective for this. Observe for non-target effects of herbicide application.	If the survey reveals that the control methods are effective, e.g. low levels of re-sprouting, continue following the herbicide mixtures and control methods. If non-target plants are dying off where herbicides were applied, ensure appropriate training for herbicide applicators, demonstrate the off-target effects to herbicide applicators to ensure they are using the correct methods and herbicides. (If the results show that the control methods are not effective, adapt by e.g. cutting lower above ground or changing herbicides or timing of herbicide application.
Do the infestation levels decrease?	Annually	Survey the cleared areas and record species, densities and size. Before and after pictures are very effective.	If the infestation levels are not decreasing, reconsider clearing intervals and look at clearing methods. If infestation levels are

			decreasing, then continue current control method.
Quantity of herbicides used	During every operation	Keep track of cost and ensure no wastage. Record herbicide usage	Track usage over time, it will reveal a certain trend in quantities for different infestation levels. Less herbicides should be used when the infestation levels are lower. Record herbicide cost.
Does the indigenous vegetation recover in the cleared areas?	Annually	Survey the cleared areas and look out for indigenous species variety and presence. Before and after pictures are effective.	If there is recovery of indigenous vegetation, then continue current control method. If there is no recovery, consider rehabilitation with local indigenous species.
How many jobs were created?	After every operation	Timesheets	Job creation figures are useful when asking for landowner assistance from WFW or to demonstrate contributions to jobs and socio-economic conditions
How many person days (PD) were spent per operations?	After every operation	Timesheets	Keep track of cost and assist with planning and budgeting. Determine cost per person per day (PD)

8 CONCLUSION

It is important to take into consideration working according to national laws to ensure compliance and to avoid prosecution. Designated environmental personnel should be able to identify alien vegetation. Proper monitoring and eradication should be implemented as set out in this document. A company/person with relevant experience and knowledge can be appointed to help with the eradication of alien species as well as supplying the necessary advice, herbicides and services.

Best practice is prevention rather than eradication.