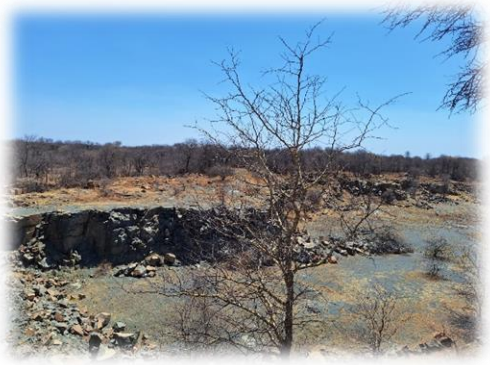
PROPOSED STOCKPILE ACTIVITIES ON A PORTION OF PORTION 1 OF FARM RUIGTEVLEY 97 KQ, THABAZIMBI LOCAL MUNICIPALITY, LIMPOPO PROVINCE.

INVASIVE PLANT SPECIES MANAGEMENT PLAN



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ABBREVIATIONS

AIS	Alien Invasive Species Regulations, 2014 (as amended)
BAR	Basic Assessment Report
CARA	Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)
CBA	Critical Biodiversity Area
EIA	Environmental Impact Assessment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EMPR	Environmental Management Programme
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)
PAOI	Project Area of Influence
PCO	Pest Control Officer
STEP	Subtropical Thicket Ecosystem Planning

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1. INTRODUCTION

Inzalo Crushing and Aggregates (Pty) Ltd (hereafter referred to as the applicant) proposes to establish an area for stockpiling and crushing/screening (if needed) of mined material, on 11.7 ha over a disturbed area of the farm previously used for mining activities on a portion of Portion 1 of Farm Ruigtevley 97 KQ, Thabazimbi Local Municipality, Limpopo Province.

Greenmined Environmental (Pty) Ltd was appointed by the Applicant to compile the Invasive Plant Species Management Plan / alien eradication programme in support of the environmental authorisation application for this project.

2. SITE LOCATION

The application was lodged over 11.7 ha on a disturbed area of the farm previously used for mining activities on a portion of Portion 1 of Farm Ruigtevley 97 KQ, Thabazimbi Local Municipality, Limpopo Province. The table below lists the GPS coordinates of the proposed stockpile footprint.

Table 1: GPS coordinates of the proposed stockpile footprint.

NUMBER	DEGREES, MINUTES, SECONDS	
	LAT (S)	LONG (E)
Corner 1	24°18'15,606"S	27°24'54,364"E
Corner 2	24°18'10,962"S	27°25'6,571"E
Corner 3	24°18'21,935"S	27°25'7,597"E
Corner 4	24°18'26,582"S	27°24'55,174"E
Corner 5	24°18'23,857"S	27°24'53,798"E
Corner 6	24°18'23,058"S	27°24'55,559"E
Corner 7	24°18'21,625"S	27°24'54,893"E

3. SITE SPECIFIC INFORMATION

The infrastructure to be used on site will all be of temporary and mobile nature. Containers will be used for office and storage purposes and a weigh bridge will be established (temporary). The storage of fuel (if any) will be below the threshold of the NEMA EIA listed activities. The proposed stockpile area, and the plant will be powered with generators. The ablution facilities will be chemical toilets that will be serviced by registered suppliers. The office and storage containers, weigh bridge and ablution

facilities will most likely be placed at the entrance to the site, while the crushing equipment will be of mobile nature, moving around the site as needed.

During the site establishment phase the applicant will clear the topsoil from the stockpiling area to allow the stockpiling of the material. Upon stripping, the topsoil will be stockpiled along the boundaries of the area to be used during the rehabilitation phase. The material will be screened/crushed if needed and stockpiled until removed from site.

Should this application be successful, the Applicant intends to:

1. demarcate the boundaries of the stockpile area;
2. strip the topsoil off the earmarked area and stockpile it for later use in rehabilitation;
3. stockpile the processed material (dolerite product) in various size categories within the boundaries of the approved area;
4. process the material through crushing and screening;
5. load and transport the material from the stockpiles onto trucks

Considering this, the Applicant intends to establish the following infrastructure within the boundaries of the proposed area:

- Mobile crushing and screening infrastructure;
- Mobile containers that will be used for offices and storage purposes; and
- Ablution facilities to be used by all employees.

Should the EA be issued, and the proposed activity be allowed, the project will comprise of activities that can be divided into three key phases (discussed in more detail below) namely the:

(1) *Site establishment/construction phase* which will involve the demarcation of the authorized area. Site establishment will also necessitate the clearing of vegetation, the stripping and stockpiling of topsoil, and the introduction of machinery and equipment.

(2) *Operational phase* that will entail the stockpiling and crushing (when needed) of the material mined from the quarry on the property until it is transported from site.

(3) *Decommissioning phase* which entails the rehabilitation of the affected environment. The EA holder will further be responsible for the seeding of all rehabilitated areas.

PHASES OF THE PROJECT

1. *Site Establishment Phase:*

Site establishment entails the demarcation of the boundaries, clearance of vegetation, and stripping and stockpiling of topsoil as detailed below:

- **Demarcation of Boundaries:**

Pursuant to receipt of the Environmental Authorization (EA) and prior to site establishment, the boundaries of the approved area will be demarcated with visible beacons.

- **Access Road:**

The Applicant intends to construct a dirt road spanning from the R510 to the designated stockpile area and extended as the activities progress and will be rehabilitated as part of the final reinstatement of the area. The access farm road turns right from the R510 road.

In the event that new roads need to be constructed, these roads will be selected as far as possible to avoid watercourses and steep gradients. Adequate drainage and erosion protection in the form of cut-off berms or trenches will be provided where necessary.

Any new roads to be established to the site will be below the threshold of the EIA regulations of the National Environmental Management Act, 1998 (Act No 107 of 1998) as amended June 2014.

The existing farm road will be used as access road to the site. Should a portion of the access road need to be newly constructed in future the following will be adhered to:

The route will be selected that a minimum number of bushes or trees are felled, and existing fence lines will be followed as far as possible.

Adequate drainage and erosion protection in the form of cut-off berms or trenches will be provided where necessary.

- **Clearing of Vegetation:**

According to Mucina and Rutherford (2012) the stockpile area extends over a vegetation type known as the SVcb 16 Western Sandy Bushveld which is classified as Least Threatened. According to the Limpopo Conservation Plan, the area is classified as Ecological Support Area (ESA). To mitigate this, the clearing of vegetation must be contained to the approved stockpile footprint, and no vegetation/bush clearance, outside the approved area, may be allowed.

- **Topsoil Stripping:**

It is proposed that topsoil removal will be restricted to the exact footprint of areas required during the operational phase of the activity. The topsoil will be stockpiled at a designated signposted area within the approved boundary to be replaced during the rehabilitation of the area. It will be part of the obligations of site management to prevent the mixing of topsoil heaps with other soil heaps. The complete A-horizon (the top 100 – 200 mm of soil which is generally darker colored due to high organic matter content) will be removed. If it is unclear where the topsoil layer ends the top 300 mm of soil will be stripped. The topsoil berm will measure a maximum of 2 m in height to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen.

- **Introduction of Machinery and Site Equipment:**

The infrastructure to be used on site will all be of temporary and mobile nature. Containers will be used for office and storage purposes, and a weigh bridge will be established (temporary). The storage of fuel (if any) will be below the threshold of the NEMA EIA listed activities. The ablution facilities will be chemical toilets that will be serviced by registered suppliers. The office and storage containers, weigh bridge and ablution facilities will most likely be placed at the entrance to the site, while the crushing plant will be of mobile nature, moving around the site as needed.

Presently, the infrastructure/equipment is expected to consist of at least:

- A temporary wash bay;
- ADT trucks;
- Chemical ablution facilities;
- Containers used as site office, workshop, and storage room;

- Crushing and screening plant (mobile);
- Earthmoving- and excavating equipment;
- Weighbridge with control room;
- Generators; and a
- Water truck.

2. *Operational Phase:*

The Applicant submitted this application for environmental authorization in need for gravel/aggregate in the area due to the proposed R510 road construction project as well as the increase in building, construction and other road maintenance projects.

Aggregate will be transported from quarries within the vicinity of the area or from other commercial sites. The rock will then be delivered to the crushing and screening plant where it will be reduced to various sized gravels. The screened material will be delivered to various size category stockpiles. Transportation of the final product will be from the stockpile area to the end point by means of trucks.

Should this application be successful, the Applicant intends to:

1. demarcate the boundaries of the stockpile area;
2. strip the topsoil off the earmarked area and stockpile it for later use in rehabilitation;
3. stockpile the processed material in various size categories within the boundaries of the approved area;
4. process the material through crushing and screening;
5. load and transport the material from the stockpiles onto trucks that will transport it to clients.

Water Use:

Dust generated on the access road will as far as possible be managed through alternative dust suppression methods to prevent the use of water for dust suppression.

These measures will include a combination of the following:

- The speed of all equipment/vehicles will be restricted to 40 km/h on the internal farm road to minimize dust generation;

- When the truck leaves the stockpile area it will be covered (e.g. shade cloth material) to minimise windblown dust from the loads;
- The Applicant will attempt to lessen denuded areas (dust source) to the absolute minimum.

Under very windy/dusty conditions the EA holder might have to substitute the above-mentioned dust suppression methods with the spraying of water, in which case water will be bought and transported to the stockpile area in a water truck that will moisten the problem area. The water truck driver will receive proper training to ensure effective use of the water on problem areas preventing water wastage. Should additional water be required at any stage of the process, water will be bought and transported to site.

- **Electricity Use:**

The proposed project will make use of diesel generators to power the infrastructure. All generators will have secondary containment in the form of a bund wall/drip tray that can contain 110% of the generator's maximum capacity.

- **Servicing and Maintenance:**

A temporary workshop and wash bay will be established on site where minor servicing and emergency repairs of project related equipment/machinery will take place. The wash bay will have an impermeable floor and drain into an oil sump that will be serviced by a qualified contractor. No wash water will be allowed to drain into the surrounding environment. No bulk storing of fuel (>60 000 l) will take place on site, and any chemicals needed at the workshop will be stored in accordance with the product specific safety data sheet in temporary containers/secured cages.

- **Waste Handling:**

Solid (general) waste, generated during the operational phase, will be contained in sealable refuse bins that will be placed at the office area until the waste is transported to a registered general waste landfill site. A registered contractor will service the chemical toilets that will serve as ablution facilities to the employees.

Due to the nature of the project very little generation of hazardous waste is expected and will mainly be the result of accidental spillages or breakdowns. Such contaminated areas will be cleaned up immediately (within two hours of the occurrence) and the contaminated soil will be contained in designated hazardous waste containers that will be kept in a bunded area with impermeable surface until it is removed from site by a registered hazardous waste handling contractor to an approved facility.

Decommissioning Phase:

The decommissioning phase will entail the reinstatement of the stockpile area by removing the stockpiled material, and site infrastructure/equipment and landscaping the disturbed footprints. The reinstated area will be seeded with an appropriate grass mix.

The decommissioning activities will therefore consist of the following:

- Removing all stockpiled material;
- Removing all machinery and equipment from site;
- Landscaping all disturbed areas and replacing the topsoil;
- Vegetating the reinstated area; and
- Controlling/monitoring the invasive plant species.

The future land use of the proposed area will be agriculture. Upon replacement of the topsoil, the area will once again be available for grazing purposes, and the planting of the cover crop (to protect the topsoil) will tie in with the proposed land use.

4. OBJECTIVE

The objective of an invasive plants control plan is to provide site management with an implementation tool to control problem plant species that is present or may germinated within the proposed footprint area.

5. WHAT ARE ALIEN INVASIVE PLANT SPECIES?

According to the book, *Problem Plants of South Africa* (Bromilow 2001) a weed is a plant in the wrong place at the wrong time. Problem plants are described as vigorous growers that are easily adaptable and mostly exotic or foreign in origin. Weeds usually are pioneer plants that invade disturbed areas such as stockpile areas, overburden and topsoil stockpiles and firebreaks. Invasive plants are plants that have been imported and has the ability to invade the natural vegetation.

INVASIVE PLANT SPECIES MANAGEMENT PLAN

Alien invasive plants and alien invasive infestations have several repercussions, which includes environmental, social and economic. Some of the more obvious issues are:

- These plants absorb and transpire a large amount of water, which is wasted/removed for use by indigenous plants. This leads to the reduction of water flow in the vicinity of water bodies and alters aquatic ecosystems.

- When invasive species are in close proximity to watercourses, the plants may alter riverbanks and highly increase the potential for erosion that could in turn impact the integrity of the watercourse and alter flood lines. This has negative consequences on associated ecosystems and all downstream water users.

- Large stands of alien invasive species result in loss of productive land resulting in associated negative economic and social impacts.

- Large infestations reduce the availability of land to indigenous species. This has ecological implications when biodiversity is directly impacted, and social implications when natural resources become scares.

- Alien invasive species increase the dry material ratio of the veldt, thereby directly increasing the veldt fire hazards.

Therefore, the benefits of eradicating and controlling alien invasive species extends to the social-, economic- and environmental aspects of South Africa.

Invasive species have been characterized as a “catastrophic wildfire in slow motion”. Thousands of invasive plants have infested hundreds of millions of hectares of land and water across the country causing massive disruptions in ecosystem function, reducing biodiversity and degrading ecosystem health. The health and function of forests, mountains, wetlands, and rivers have been affected by alien plant invasion which outcompete indigenous or endemic plant species and drain the water resources.

A species is considered invasive if it meets these two criteria:

- It is non-native to the ecosystem under consideration; and

- Its introduction causes or is likely to cause economic or environmental harm or harm to human health.

Appendix 1, of this document highlights, listed alien invasive species common in the Grassland Biome, including those that have been identified at the proposed stockpile area, that need to be controlled. The list also indicates the control methods to be applied.

6. LEGAL FRAMEWORK

Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)

South Africa has numerous problematic alien invader species. The Conservation of Agricultural Resources Act, 1983 was promulgated to amongst other things combat the invasion and spread of such species. The Act categorizes weeds into three categories, with varying degrees of action required for each category of weeds.

The Conservation of Agricultural Resources Act, No. 43 of 1983, (CARA) as amended in March 2001, sets out the regulations regarding the control of invasive plants and weeds under Regulations 15 and 16 and provides lists of species declared as invasive plants and indicators of bush encroachment. The Regulations classify the listed alien invasive plants into three categories. The categories can be described as follows:

Category 1: Plants that are alien invasive species and must be eradicated and controlled. These species have little economic or social value and their invasive habits outcompete indigenous species, severely alter ecosystems and threaten local biodiversity.

Section 15A of CARA states that:

1. Category 1 plants may not occur on any land or inland water surface other than in biological control reserves.
2. A land user shall control any Category 1 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E.
3. No person shall, except in or for purposes of a biological control reserve –
    a. establish, plant, maintain, multiply or propagate Category 1 plants;
    b. import or sell propagating material of Category 1 plants or any Category 1 plants;
    c. Acquire propagating material of Category 1 plants or any Category 1 plants.
4. The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with the requirements of sub-regulation (1) on such conditions as the executive officer may determine in each case.

Category 2**:** Species that have commercial or utility value and may only be grown in demarcated areas, in a controlled manner and under a permit.

Section 15B of CARA states that:

1. Category 2 plants may not occur on any land or inland water surface other than a demarcated area or a biological control reserve.
    a. The executive officer may on application in writing demarcate an area as an area where Category 2 plants may occur, be established and be maintained.

b. An area in respect of which a water use license for stream flow reduction activities has been issued in terms of section 36 of the National Water Act, 1998 (Act No. 36 of 1998) shall be deemed to be a demarcated area.

2. The executive officer shall demarcate an area for the occurrence, establishment and maintenance of Category 2 plants only if –
   a. The Category 2 plants in the area are cultivated under controlled circumstances;
   b. The land user concerned has been authorised to use water in terms of the National Water Act, 1998 (Act No. 36 of 1998);
   c. The Category 2 plants or products of Category 2 plants in the area are demonstrated to primarily serve a commercial purpose, use as a woodlot, shelter belt, building material, animal fodder, soil stabilisation, medicinal or other beneficial function that the executive officer may approve; and
   d. All reasonable steps are taken to curtail the spreading of propagating material of the Category 2 plants outside the demarcated areas.
3. When an area is demarcated for the occurrence, establishment and maintenance of Category 2 plants the executive officer may impose such additional conditions as may reasonably be deemed necessary to keep the Category 2 plants in the area in check.
4. No person shall sell propagating material of Category 2 plants or any Category 2 plants to another person unless such other person is a land user of a demarcated area or of a biological control reserve.
5. No person shall acquire propagating material of Category 2 plants or any Category 2 plants unless such material or such plants are intended for use in a demarcated area or in a biological control reserve.
6. Propagating material of Category 2 plants or Category 2 plants shall only be imported or sold in accordance with the provisions of the Plant Improvement Act, 1976 (Act No. 53 of 1976), the Agricultural Pests Act, 1983 (Act No. 36 of 1983) and the environment conservation regulations.
7. A land user shall control any Category 2 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E.
8. Unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland.
9. The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with one or more of the requirements of sub-regulations (1), (3), (5), (6), (8) and (9) on such conditions as the executive officer may determine in each case.

Category 3: Species that often have ornamental value and may be grown where they currently exist but cannot be planted, propagated or traded.

Section 15C of CARA states that:

1. Category 3 plants shall not occur on any land or inland water surface other than in a biological control reserve.
2. Subject to the provisions of sub-regulation (3), the provisions of sub-regulation (1) shall not apply in respect of Category 3 plants already in existence at the time of the commencement of these regulations.
    a. No land user shall allow Category 3 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland.
    b. The executive officer may impose such additional conditions as may reasonably be deemed necessary with regard to Category 3 plants already in existence at the time of the commencement of these regulations.
    c. A land user must take all reasonable steps to curtail the spreading of propagating material of Category 3 plants.
    d. The executive officer may, after consultation with the land user, issue a direction in terms of section 7 of the Act that Category 3 plants in existence at the time of the commencement of these regulations must be controlled by means of the measures prescribed in regulation 15F.
3. No person shall, except in or for purposes of a biological control reserve –
    a. plant, establish, maintain, multiply or propagate Category 3 plants;
    b. import or sell propagating material of Category 3 plants or any Category 3 plants;
    c. acquire propagating material of Category 3 plants or any Category 3 plants.
4. The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with one or more of the requirements of sub-regulations (1), (3) and (4) on such conditions as the executive officer may determine in each case.

The National Department of Agriculture is responsible for administering the CARA act and landowners having alien invasive species on their property may be penalised. Penalties can be in the form of fines or imprisonment. It is therefore important to have an alien invasive management plan in place that aims at primarily eradicating and secondly controlling alien invasive species. It is also important to keep records of all procedures followed and to have photographic records, as many alien invasive species are difficult to completely eradicate.

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

The National Environmental Management: Biodiversity Act, 2004 (NEM:BA) provides for the management and conservation of biological diversity and components thereof; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing of benefits rising from bio-prospecting of biological resources; and cooperative governance in biodiversity management and conservation within the framework of NEMA. The Act also gives effect to international Strategic Review of the Status of Biodiversity Management in the South African Mining Industry agreements relating to biodiversity. The Act states that the Minister of Environmental Affairs and Tourism may identify any process or activity in a listed ecosystem as a threatening process and will, thereafter, be regarded as an activity contemplated in Section 24(2)(b) of NEMA which states that:

a. Specified activities may not be commenced without prior authorization from the Minister or MEC and specify such activities. This Act allows for any person, organization or organ of state to contribute to biodiversity management. Such a party may submit to the Minister a draft management plan for an ecosystem or species. Should the Minister approve the management plan, an agreement can be entered into regarding the implementation of the plan.
b. The NEM:BA established the South African National Biodiversity Institute (SANBI) and gave it a mandate regarding monitoring, advising and co-coordinating biodiversity issues in South Africa.

The Alien and Invader Species (AIS) regulations was subsequently published in terms of section 97(1) of NEM:BA in August 2014. The AIS regulations, 2014 (as amended) grouped plants into four categories and prescribes the subsequent management of each category.

Category 1a: Invasive plant species requiring compulsory control. These plants must be removed and destroyed and any species falling within this category is by law required to be eradicated from the environment. No permits should be sought or given to keep or propagate plant species falling within this category. Any form of trade or planting is strictly prohibited.

Category 1b: Invasive plants requiring compulsory control as part of alien invasive plant species control programme. These plants are considered to have high invasive potential, thus require removal and eradication. Plants falling within this category qualify for governmental sponsored alien invasive plants control and management programmes. Furthermore, no permits will be issued to keep or sell plant falling within this category.

Category 2: The plants falling within this category are alien invasive plants regulated by area or locality. These alien invasive plant species requires a demarcation permit in order to import, grow, breed, sell, buy or accept as gifts. However, no permit will be issued for invasive plant species within this category existing in riparian areas or zones.

Category 3: These alien invasive plant species are regulated by activity, thus an individual plant permit is required to import, grow, breed, possess, sell, buy, or move these plants. No permit is issued for Category 3 alien invasive plant species existing in riparian areas.

In order to identify invasive plants in need of controlled/eradication from site, the plants specified in these groups must be used as a guideline.

7. ROLES AND RESPONSIBILITIES

Inzalo Crushing and Aggregates (Pty) Ltd will be the responsible permit holder that will be accountable for the effective implementation of this plan. The alien invasive management plan is legally binding and must be implemented to fulfil the requirements of relevant legislations and recommendation.

8. CONTROL OF ALIEN INVASIVE AND PROBLEM PLANT SPECIES

Alien plant invasions cause a decline in species diversity, local extinction of indigenous species and ecological imbalance. Thus, preventing the onset of an alien invasion, management of further spreading is required as problem plants outcompete indigenous plant species and quickly establish themselves in an area. In light of this, a national strategy was compiled identifying four primary programs to address the management of alien invasive plant species as listed below:

1. Prevention: Keep the invasive species out;
2. Early detection and rapid response: Detect and eradicate invasive species to stop them from spreading;
3. Control and management: Eliminate or control the problem of invasive species; and
4. Rehabilitation and restoration: Heal, minimize, or reverse the harmful effects from invasive species.

The occurrence of alien invasive plants not only affect the growth and distribution of natural endemic plants, they also use more water than indigenous plants, some have toxic fruits or leaves which when consumed could lead to fatalities. Therefore, alien invasive plant species need to be controlled or removed and the following section contains different methods that can be used.

The ultimate aim of an alien invasive management plan is to completely eradicate problem species from site. This is often very difficult as many of the species have seeds that remain viable for a very long time and even after physical removal of plants, the seeds germinate to form new infestations. An alien invasive management plan must therefore be an ongoing practice over many years and should follow the following phases:

1. The initial bulk eradication of alien invasive species by chemical or mechanical means, and in some instances biological control agents. This may also require rehabilitation if large stands of alien invasive species are removed. Local, indigenous species should be planted in the disturbed areas;
2. There should also be immediate follow up and all seedlings should be pulled out and removed. This should be done regularly, although the timeframes will vary from species to species depending on their growth forms and rates; and
3. Finally, monitoring of areas that appear to be under controlled must continue on at least an annual basis. Rehabilitated areas should also be monitored and action taken immediately if regeneration of problem plants occur.

Various options are available for the control of alien invasive species, including mechanical, chemical and biological control. In most instances, mechanical means are utilised and include physical removal of plants. Research on use of herbicides has been conducted on many species and can be applied in conjunction with mechanical methods. For some species, herbicides have not yet been fully researched and/or herbicides have not been registered and these need to be mechanically controlled. The Department of Water and Sanitation's Working for Water section provides guidelines to the preferred clearing methods for most problem plants. This information can be obtained from their website: http://www.dwaf.gov.za/wfw/Control/. The selection of appropriate methods of control shall be based on the species to be controlled, the size of the plants, the density of the stand, the accessibility of terrain and environmental safety.

Biological control of alien invasive species is an ongoing process with some biological control agents having been released on various alien invasive species showing varying degrees of success. Biological control options need to be carried out with specialist advice from academic or research institutes involved in research of alien invasive species.

Control options must take into account the species being controlled, as well as the ecosystem in which the control options are being applied. For instance, some of the herbicides registered for control of alien invasive species may not be used in riparian areas, while some should preferably be used in areas where natural grass cover occurs. Some herbicides should only be utilised after consultation with a Working for Water technical advisor.

The control options are discussed below as individual actions, but in many cases integrated measures (more than one (1) control measure) are taken for more effective control of alien invasive species.

The Department of Water and Sanitation proposes that the following methods of control for age or size target plants:

- Seedlings

  Hand pulling or hoeing:

  - Hand pulling/hoeing should be carried out in sparse stands.

- Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimized to reduce re-germination.

Herbicides:

- Herbicides can be used on dense stands.

❖ Saplings

Hand pulling or hoeing:

- Where appropriate saplings can be removed manually as described above.

Herbicides:

- Foliar sprays can be carried out depending on the density of the stand. Fan nozzles should be fitted for overall spraying and solid cone nozzles for individual plant treatment. Spraying should be restricted to plants waist high or lower. Ensure there is sufficient foliage to carry the herbicide to the root system.
- Basal stem treatments of suitable herbicides in diesel can be carried out to the bottom 250 mm of the stem. Applications should be by means of a low pressure, coarse droplet spray from a narrow angle solid cone nozzle.
- Cut stump treatments can be used where stems are cut as low as practical. Herbicides are applied in diesel or water as recommended for the herbicide. Applications in diesel should be to the whole stump and exposed roots and in water to the cut area as recommended on the label.
- The application of herbicides should only be sprayed/used on site by a registered pest control officer.

❖ Mature Trees (trees above shoulder height or robust bushes 12 – 1 months or older)

Ring Barking:

- Bark must be removed from the bottom of the stem to a height of 0.75 – 1.0 m. All bark must be removed to below ground level for good results.
- Where clean de-barking is not possible due to crevices in the stem or where exposed roots are present, a combination of bark removal and basal stem treatment should be carried out.

Frilling or partial frilling:

- Cuts should be made through the bark into the sapwood by means of a light axe and a suitable herbicide must be applied into the cuts.

Basal stem treatments:

- Suitable herbicides should be applied in diesel to the base of the stem and to any exposed roots. Stems with a diameter up to 50 mm should be treated to a height of 250 mm and stems above 50 m diameter to a height of 500 mm. This method is only suitable for stems up to 100 mm in diameter.

Cut stump treatment:

- Stumps should be cut as low as practical and the herbicide applied. Applications in diesel should be to the whole stump and exposed roots and in water to the cut area as recommended on the label.

When herbicides are chosen as the preferred control method the guidelines of Working for Water (DWS) as stipulated in the Policy on the Use of Herbicides for the Control of Alien Vegetation must be followed:

- Herbicides selected for control shall be registered for use on that species under the conditions specified.
- Protection of the environment is of prime importance. Riparian areas must be protected and only herbicides that are approved may be used. Washing of equipment or disposal of waste spray mixture is prohibited in or near water courses where contamination of water can occur.
- Empty herbicide containers must be disposed of as hazardous waste and may not be used for any other purpose.
- Equipment must be washed where there is no danger of contamination of a water source or natural vegetated area. It is proposed that washing be restricted to the wash bay.
- Product and spray mixtures should be stored so that it is inaccessible to the public. Site management must ensure that the Safety Data Sheet of the product is available on site.
- The application of herbicides should only be sprayed/used on site by a registered pest control officer.

9. HANDLING AND DISPOSAL OF PLANT DEBRIS OR MATERIAL

The unwanted plant material from mechanical or chemical clearing should not be kept on site as it attributes to the fire risk by providing fuel. Therefore, the following handling and disposal method could be utilized as some of the debris can offer services and some can be completely disposed of:

9.1 Stacking

- Stacking the cut material in heaps, or in windrows along slope contours to reduce erosion, facilitates easy access for follow-up. It also assists in containing the resulting fuel load and therefore the risk of uncontrolled fire;
- Keep stacks well apart to prevent fires from crossing easily; not less than five meters apart, this is naturally dependant on the size of the stack and the resulting fire intensity when they burn. Stockpile removed material into piles of 2 m high, 3 m wide windrows/stacks;
- Stack light branches separately from heavy timber (75 mm and more). Preferably remove heavy branches to reduce long burning fuel loads that can result in soil damage from intensely hot fire; and
- Do not make stacks under trees, power and telephone lines, within 30 meters of a fire belt or near watercourses, houses and other infrastructure.

9.2 Disposal

- Plant material should be used beneficially wherever possible, as opposed to disposing it at a landfill site where it takes up valuable airspace;
- Woody and dry material, provided no seeds are present, can be chipped and used as mulch or made available to the local community for firewood;
- Wet material and aquatic weeds should be combined with other organic matter and composted. Alternatively, it may be possible to use it for basket making, animal feed or other uses.
- Material which cannot be used beneficially must be disposed of at a registered and approved disposal site.
- When removing material, take care to remove all debris, including shoots and seeds.

10. CONTROL PHASES

Alien invasive plant species removal should ideally adopt a hands on approach. The combination of two or all three control methods could prove more effective than using one control method in combating the problematic plant species. Therefore, it is advisable that landowners/operators should:

- not allow conditions to develop on their land that will contribute to the spread of a wildfire;
- remove invasive alien plants that create large fuel loads or cause fires to burn intensely; and
- take steps to fireproof their property and possessions. These apply especially to those living on the edge of open areas or in close proximity to fire prone areas.

Furthermore, any control programme for alien vegetation must include the following three phases;

1. **Initial control:** drastic reduction of existing population;
2. **Follow-up control:** control of seedlings, root suckers and coppice growth; and
3. **Maintenance control:** sustain low alien plant numbers with annual control.

The initial control in most cases, involves mechanical methods and in the case of heavy infestation, machinery could be used. The initial control is a drastic measure to reduce the number of adult and large invasive plants.

The follow-up control serves are measures to reduce the ability of the mechanically removed plant species for coppice or having the infestation proliferate such as to negate the efforts of initial control. Therefore, follow up control of alien seedlings and coppice re-growth is essential to achieve and sustain the progress made with initial control work.

Maintenance control entails regular monitoring to prevent the occurrence of re-colonisation or re-infestation. The monitoring should take place timeously so to prevent infestation of the cleared area by another alien invasive plant species.

11. ALIEN INVASIVE PLANT ERADICATION TOOL

Working for Water provides the site manager with an implementation tool to control problem species and keep the site free of invasive plants:

Step 1: Conduct Site Assessment;

- ❖ Identify areas where alien invasive species need to be eradicated and controlled. Take pictures of these sites so as to have a pre-control photographic reference of the site. In this way comparisons can be made at later stages to see if control measures are adequate.

Step 2: Set objectives based on resources available and priorities:

- ❖ Prioritize management of plants according to the categories stipulated in the AIS regulations.
- ❖ Consider control options that will be applied in these areas. Consider integrated approaches and ensure approaches are not conflicting with each other. Also consider safety aspects such as trees on a slope which should not be felled but treated *in situ*.

Step 3: Develop and implement an action plan to achieve objectives:

- ❖ The plan must be long term and should include a clearing plan that includes follow up actions for rehabilitation of the cleared area.
- ❖ The site plan should include a map showing the areas invested with problem plants.
- ❖ Lighter invested areas should be cleared first to prevent the build-up of seed banks, while the control plan works progressively towards the areas with denser stands.
- ❖ Educate workers on the species that needs to be eradicated, as well as the specific method to be used.
- ❖ Conduct control of invasive plant species.
- ❖ Remove plant remains to a suitable disposal area.
- ❖ Prevent dispersal of seeds.
- ❖ Strive for collective management and planning with neighbours to prevent seed dispersal of problem plants across boundaries.
- ❖ When removing alien invasive species from infested areas, always work from lower infested areas towards more infested areas and from higher-lying areas to lower areas;
- ❖ Try to remove alien invasive species when they are not seeding. If seeding, then seed heads should first be carefully removed and disposed of in a sealed bag so as not to spread the seeds;

- If soils are disturbed during the process, then these should be carefully levelled, slightly pressed down and covered with leaf litter or cut vegetation that is seed-free. Some alien invasive species release chemicals that suppress growth of other plants and these should not be utilised as leaf litter under any circumstances. The soil can also be re-seeded with indigenous vegetation;
- To reduce the risk of spread via seeds, flowers should be removed from the plants prior to seeding. To prevent further infestations, remove seeds, fruits, bulbs, corms, tubers and any other vegetative parts that may root from the site in sealed bags and dispose of safely. In some instances, these parts should be burnt on site immediately;
- Consider herbicide practices to integrate with physical removal where possible, with use of generic herbicides on alien invasive species without registered herbicides;
- Consider the uses of plants that will be removed. Options such as its potential for compost heaps (as long as it is seed free), potential as leaf litter (as long as it is seed free) and possible options for timber and cork markets. As stated earlier, some alien invasive species release chemicals that suppress growth of other plants and these should not be utilised as leaf litter under any circumstances.

Step 4: Monitor performance and change actions if necessary

- Conduct monthly inspections to enable early detection of grow back.
- Regularly follow up on areas where infestations were treated and re-apply control measures if necessary. Once again, take photographs of sites regularly and keep records of actions that were taken so that evidence is in place with regard to control measures that were successful and those that were not.
- Consider rehabilitation of area cleared of invasive species at every stage of the control programme and consider the need to re-introduce local indigenous species to help the natural ecology stabilise within the areas.
- Consider training of employees. Courses range from introductory and awareness courses to those that qualify individuals as alien invasive control officers.

12. SITE SPECIFIC CONDITIONS

According to the Terrestrial Biodiversity Statement (Appendix M), the location, state and size of the ecosystem suggests that it is unlikely that any functional habitat or SCCs will be lost as a result of the impacts arising from the proposed activities. However, these assumptions pertain to the terrestrial habitat within the PAOI only. It is the opinion of the specialist that the proposed development is favourable only if all mitigation measures provided in this and other specialist reports are implemented, as well as the following:

- A site walkdown during the correct flowering season (between November and March) must be conducted for all protected plant species present on site, along with the acquisition of permits for the relocation/destruction of species;
- An alien invasion plant (AIP) management plan must be compiled and implemented; and
- A rehabilitation plan must be compiled and implemented for all areas of the PAOI impacted by the project activities.

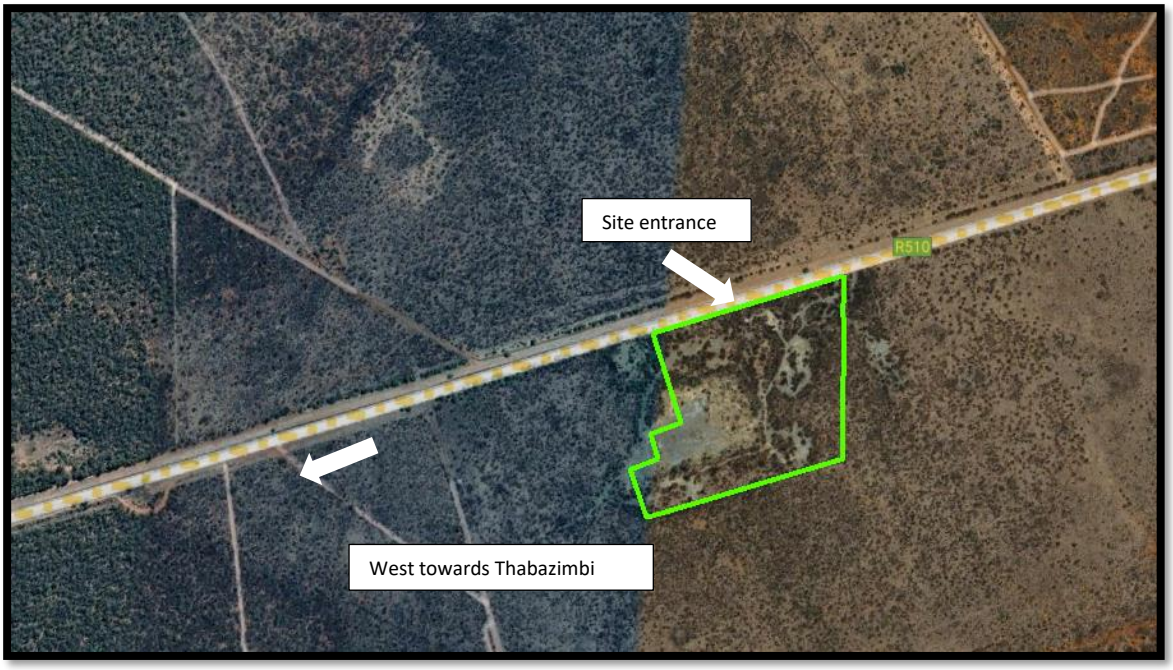

Figure 1: Satellite view showing the direction to the proposed stockpile area (green polygon)

Alien Invasive Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

These species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b and Not Indigenous (Exotic) respectively. The POSA database indicates that

seventeen (17) AIP species area expected to occur within the area where five (5) species in green, are AIP species that must be controlled by implementing an AIP Management Programme, in compliance of section 75 of the National Environmental Management: Biodiversity Act (NEMBA), as stated above.

Table 2: Summary of AIP recorded within the PAOI of Influence (PAOI) during the field survey period.

Family	Scientific Name	Alien Category
Amaranthaceae	*Alternanthera sessilis*	Not indigenous; Naturalised; Invasive
Amaranthaceae	*Gomphrena celosioides*	Not indigenous; Naturalised
Amaranthaceae	*Guilleminea densa*	Not indigenous; Naturalised; Invasive
Aristolochiaceae	*Aristolochia elegans*	Not indigenous; Naturalised; Invasive
Asteraceae	*Ageratum houstonianum*	NEMBA Category 1b.
Asteraceae	*Coreopsis lanceolata*	NEMBA Category 1b.
Asteraceae	*Schkuhria pinnata*	Not indigenous; Naturalised
Caryophyllaceae	*Polycarpaea corymbosa*	Not indigenous; Naturalised
Fabaceae	*Senna occidentalis*	NEMBA Category 1b.
Lamiaceae	*Salvia coccinea*	Not indigenous; Naturalised
Lamiaceae	*Salvia reflexa*	Not indigenous; Naturalised; Invasive
Malvaceae	*Malvastrum coromandelianum*	NEMBA Category 1b.
Onagraceae	*Ludwigia palustris*	Not indigenous; Naturalised
Poaceae	*Eragrostis barrelieri*	Not indigenous; Naturalised
Poaceae	*Sorghum halepense*	NEMBA Category 2
Rubiaceae	*Richardia brasiliensis*	Not indigenous; Naturalised
Verbenaceae	*Verbena bonariensis*	NEMBA Category 1b.

As everyone isn't familiar with the identification of plant species, photographs of the most important species to be controlled at the quarry was included below for ease of reference. Site management can refer to the table above for the proposed management/control methods to be applied.

Blue Mink

Ageratum houstonianum

Sternstaler

Coreopsis lanceolata

Coffeweed

Senna occidentalis


Prickly malvastrum

Malvastrum coromandelianum


Purpletop vervain

Verbena bonariensis

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