ENVIRONMENTAL IMPACT ASSESSMENT ON HERBICIDES WRONGLY USED TO KILL *OLEA EUROPAEA (OLEA AFRICANA)* ON FARM TIBERIAN, OTAVI MOUNTAIN LAND, NAMIBIA

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Introduction

A drone survey and an environmental impact assessment were conducted in the Otavi Mountain Lands on a farm called Tiberian, which is located ten kilometres east of Otavi on the road towards Grootfontein. The farm is accessible via the B8 road from Otavi to Grootfontein for 7 kilometres, and then turn right via the D2820 gravel road for 2 kilometres, then another right turn for approximately one kilometre before reaching the farm gate. Two areas on the farm were investigated, an impacted area (poisoned) and a control area on the neighbouring farm which has not been impacted.

The Olea Europea (also known as the *Olea Africana*), Wild Olive is an ever-green shrub or tree with dense, rounded crown and a greyish appearance, 5-8m in height, uncommon, usually occurs on rocky slopes and along the rocky edges of dry watercourses (Vukeya et al., 2023). Bark smooth, pale grey with white flecks and numerous fine, white lenticels, branchlets white-grey, hairless, white fine, vertical (Cuneo & Leishman, 2013). It takes approximately 8-12 years for an *African Olive* to establish itself in a new area (Cuneo and Leishman (2006). These trees relatively grow very fast when young (200-400 mm per annum), although it slows down as it matures.

Figure 1. A photo of the Olea europaea which is not poisoned found in the Otavi Mountain Lands. Photo is taken from the neighbouring farm which has plants that are not poisoned.

Environmental scoping is a critical step in the preparation of an EIA in order to assess the potential impacts on the farm due to the killing of *African Olives*. The African Olives are quite noticeable along the main road in the area and are clearer on windy days when the silvery underside of the leaves shows up. The killing and poisoning of these trees has potentially robbed the farm owner from seeing all these trees for a long time. The Limpopo GG herbicide was applied aerially using an aircraft fitted with specially designed herbicide application equipment. This herbicide only becomes effective if enough of the chemical is leached into the soil and into the root zone of the targeted plants, which usually happens after sufficient rainfall. This herbicide can last up to 36 months in the soil, and the poisoned plants will normally die within those 36 months from treatment. The Limpopo GG is a soil applied herbicide which is absorbed by the roots, and it is not a selective treatment which means that even non-targeted plants and grasses may die as well.

The scoping process identifies the issues that are likely to be the most important during the EIA and eliminates those that are of little concern. The scoping process shall be concluded with the establishment of terms of reference for the preparation of an EIA, as set out by the Ministry of Environment and Tourism. The purpose of this scoping report is to:

- Identify any important environmental issues to be considered before commencing with the spraying of herbicides on the trees on Farm Tiberian.
- To identify appropriate time and space boundaries of the EIA study.
- To identify information required for decision-making.

Aim and Objectives

The proponent acquired the services of Augite Environmental Consultants cc to assess the impact that has been caused on *African Olive* Trees. The *African Olive* trees were accidently poisoned against the will of the owner. The proponent requested that the trees in the green shaded area (Figure 2) should not be touched or poisoned and only the unshaded zones should be poisoned to allow for security reasons. Unfortunately, the hired contractor carried out the wrong instruction which has resulted in the great loss of African Olive trees. According to the Directorate of Forestry's list of protected trees, the *Olea europaea* subsp. *Africana* is a protected tree and should not be poisoned.

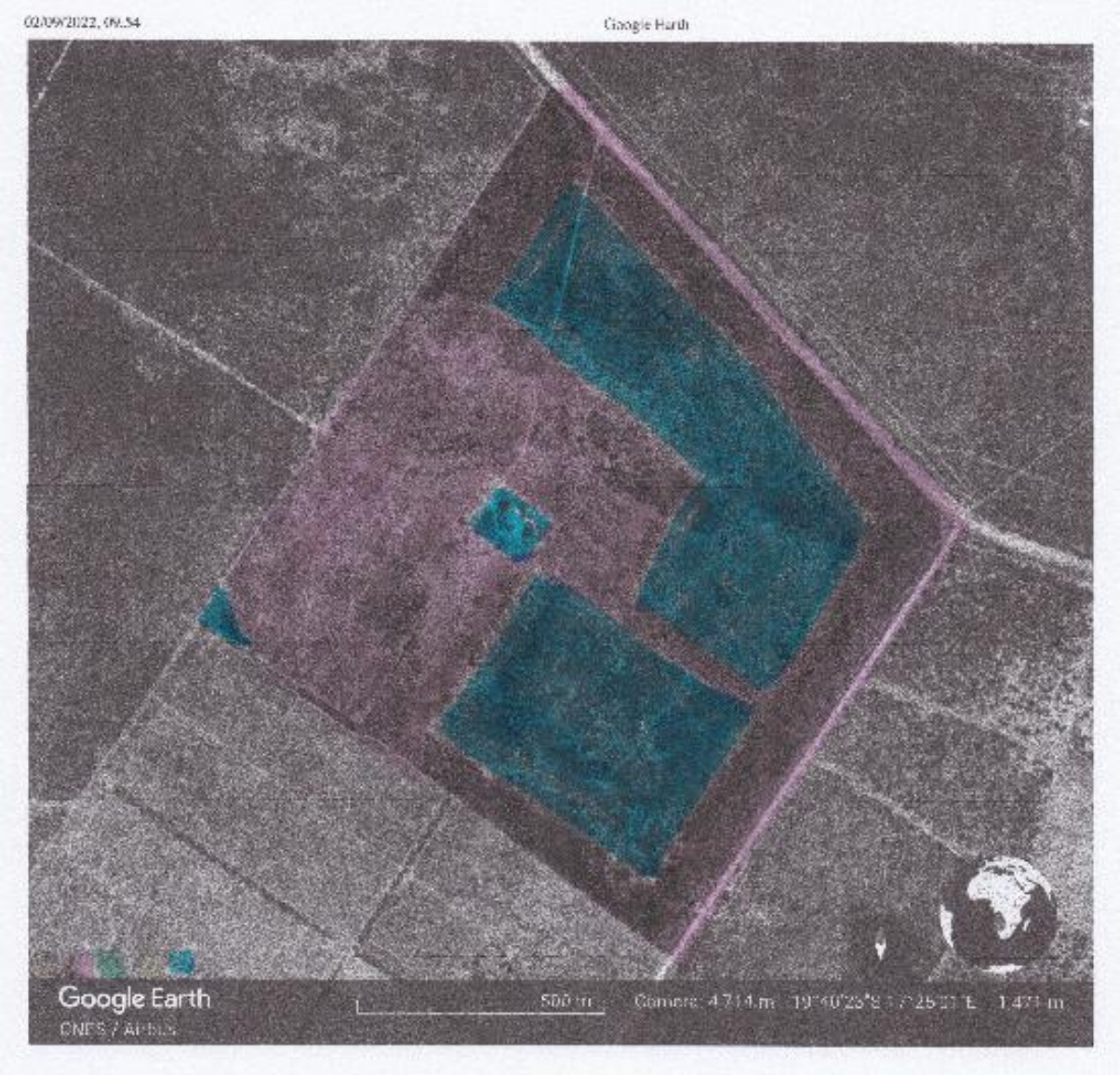


Figure 2. The image shows the area that was not supposed to be poisoned shaded in green.

Summary of applicable legislation

All trees and plants, especially threatened and endangered trees such as the *African Olive* in Namibia, are regulated by the Ministry of Environment, Tourism and Forestry whereas the environmental regulations are regulated by the Ministry of Environment and Tourism. The acts that affect the implementation, operation, and management of herbicides and killing of tree activities in Namibia are shown below.

Environmental Management Act of 2007
Line Ministry: Ministry of Environment and Tourism

The regulations that accompany this act lists several activities that may not be undertaken without an environmental clearance certificate issued in terms of the Act. The act further states that any clearance certificate issued before the commencement of the act (6 February 2012) remains in force for one year. If a person wishes to continue with activities covered by the act, he or she must apply for a new certificate in terms of the Environmental Management Act.

Forest Act, No. 12 of 2001
Line Ministry/Body: Ministry of Agriculture, Water and Forestry

The act regulates the cutting down of trees and reads as follows "To provide for the establishment of a Forestry Council and the appointment of certain officials; to consolidate the laws relating to the management and use of forests and forest produce; to provide for the protection of the environment and control and management of forest trees; to repeal the preservation of Bees and Honey proclamation 1923, preservation of Trees and Forests Ordinance, 1952 and the Forest Act, 1968; and to deal with incidental matters". The constitution defines the function of the Ombudsman and commits the government to sustainable utilization of Namibia's natural resources for the benefit of all Namibians and describes the duty to investigate complaints concerning the over-utilization of living natural resources for the benefit of all Namibians and describes the duties to investigate complaints concerning the over-utilization of living natural resources, the irrational exploitation of non-renewable resources, the degradation and the destruction of ecosystem and failure to protect the beauty and character of Namibia. Article 95 states that *"the state shall actively promote and maintain the welfare of the people by adopting; inter alia policies aimed at maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of natural resources on a sustainable basis for the benefit of all Namibians both present and future"*.

Agricultural (Commercial) Land Reform Act 6 of 1995
Line Ministry/Body: Ministry of Lands, Resettlement and Rehabilitation

To provide for the acquisition of agricultural land by the State for the purposes of land reform and for the allocation of such land to Namibian citizens who do not own or otherwise have the use of any or of adequate agricultural land, and foremost to those Namibian citizens who have been socially, economically or educationally disadvantaged by past discriminatory laws or practices; to vest in the State a preferent right to purchase agricultural land for the purposes of the Act; to provide for the compulsory acquisition of certain agricultural land by the State for

the purposes of the Act; to regulate the acquisition of agricultural land by foreign nationals; to establish a Lands Tribunal and determine its jurisdiction; and to provide for matters connected therewith.

Water Resources Management Act of 2004
Line Ministry: Ministry of Agriculture, Water and Forestry

The act provides for the management, protection, development, usage and conservation of water resources; to provide for the regulation and monitoring of water resources and to provide for incidental matters.

Nature conservation ordinance, ordinance No. 4 of 1975
Line Ministry: Ministry of Environment and Tourism

The Nature Ordinance 4 of 1975 covers game parks and nature reserves, the hunting and protection of wild animals (including reptiles and wild birds), problem animals, fish and the protection of indigenous plants. It also establishes a nature conservation board. The basic set of regulations under the ordinance is contained in GN 240/1976 (OG 3556). The topics covered in the regulations include tariffs (game parks), regulations relating to game parks, swimming baths, use of boats in game parks, inland fisheries, keeping game and other wild animals in capturing. In addition, the ordinance also regulates game dealers, game skins, protected plants, birds kept in cages, trophy hunting of hunt-able game, hunting at night, export of game and game meat, sea birds, private game parks, nature reserves, regulations of wildlife associations and registers for coyote getters.

National Heritage Act, 2004 (Act No. 27 of 2004)
Line Ministry/Body: National Heritage Council

The National Heritage Act provides for the protection and conservation of places and objects of heritage significance and the registration of such places and objects; to establish a National Heritage Council; to establish a National Heritage Register; and to provide for incidental matters.

Atmospheric Pollution Prevention Ordinance 11 of 1976
Line Ministry/Body: Ministry of Health and Social Services

This ordinance provides for the prevention of air pollution and is affected by the Health Act 21 of 1988. Under this ordinance, the entire area of Namibia, except for East Caprivi, is proclaimed as a controlled area for the purposes of section 4(1) (a) of the ordinance.

Hazardous Substance Ordinance, No. 14 of 1974
Line Ministry/Body: Ministry of Safety and Security

The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.

Public and Environmental Health Act, 2015
Line Ministry/Body: Ministry of Health and Social Services provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.

Method

A drone survey was conducted over the area of interest. The DJI Phantom 4 Pro with a 1-inch 20 MP CMOS Sensor and obstacle in five directions was used to conduct the survey. The area of interest was subdivided into smaller blocks. Each sub-block was approximately 18 hectares (Figure 2). Drone harmony 3D mobile flight app used for data capturing was used to capture the photos (https://droneharmony.com/mobile-android-ios/). The standard height used was 60 meters above the ground. A 3D visualization could be achieved while using Drone Harmony to plan flights on the various designed blocks. The captured images were then processed in Agisoft photogrammetry software to create, process and generate 3D geospatial data (https://www.agisoft.com/). It took approximately 40 minutes to fly one block.

Figure 3. An image of the DJI Phantom 4 Pro that was used for the survey.

Agisoft photogrammetry software was used to calculate the vegetation index from the impacted and control area. A Vegetation Index is a single value calculated by transforming the observations from multiple spectral bands. It is used to enhance the presence of green, vegetation features and thus help to distinguish them from the other objects present in the image. Depending on the transformation method and the spectral bands used, different aspects pertaining to the vegetation cover in the image could be evaluated. For example, the percentage of vegetation cover, amount of chlorophyll content, leaf area index and so on. These indices enhance the contrast between soil and vegetation but minimize the effects of illumination conditions.

African Olive

The *Olea Africana* is the only subspecies of the *Wild Olive* tree found in Namibia. The leaves of the wild olive are grazed by animals. Most parts are used in an extract for treatment of rheumatism, colic, and eye and throat infections (Vukeya et al., 2023). The *wild olive* is normally said to be slow growing but, if it is watered regularly during establishment, it can reach a height of more than 2m in two years. This beautiful evergreen tree will not only offer shade in the garden but will also attract birds. The bark of the tree is dark and smooth during the young growth and tends to be rough at an older growth. The leaves' size are 10 cm long, grey green to dark green and yellowish grey above and covered with silvery, brown or golden scale. Most of the oval fruits tend to ripe from October to February and mostly grazed by small livestock, kudus and duikers.

Figure 4. The poisoned African Olive tree from the Tiberian Farm it should be noted that Accacia melliferas were also observed as poisoned .

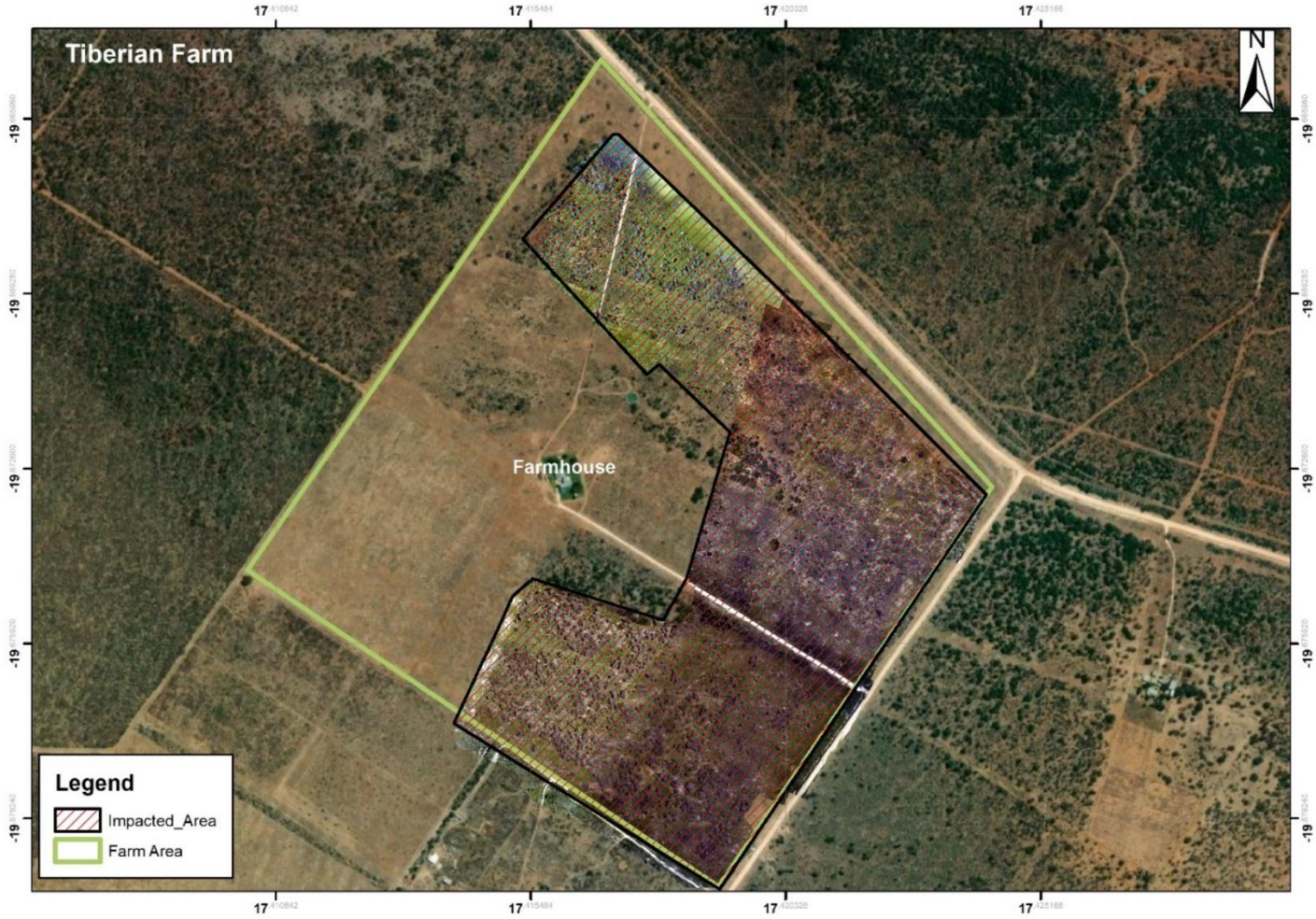


Figure 5. Map of the Tiberian Farm with the shaded area showing the impacted area which were flown with a drone to enable close surveillance of the damaged plants.

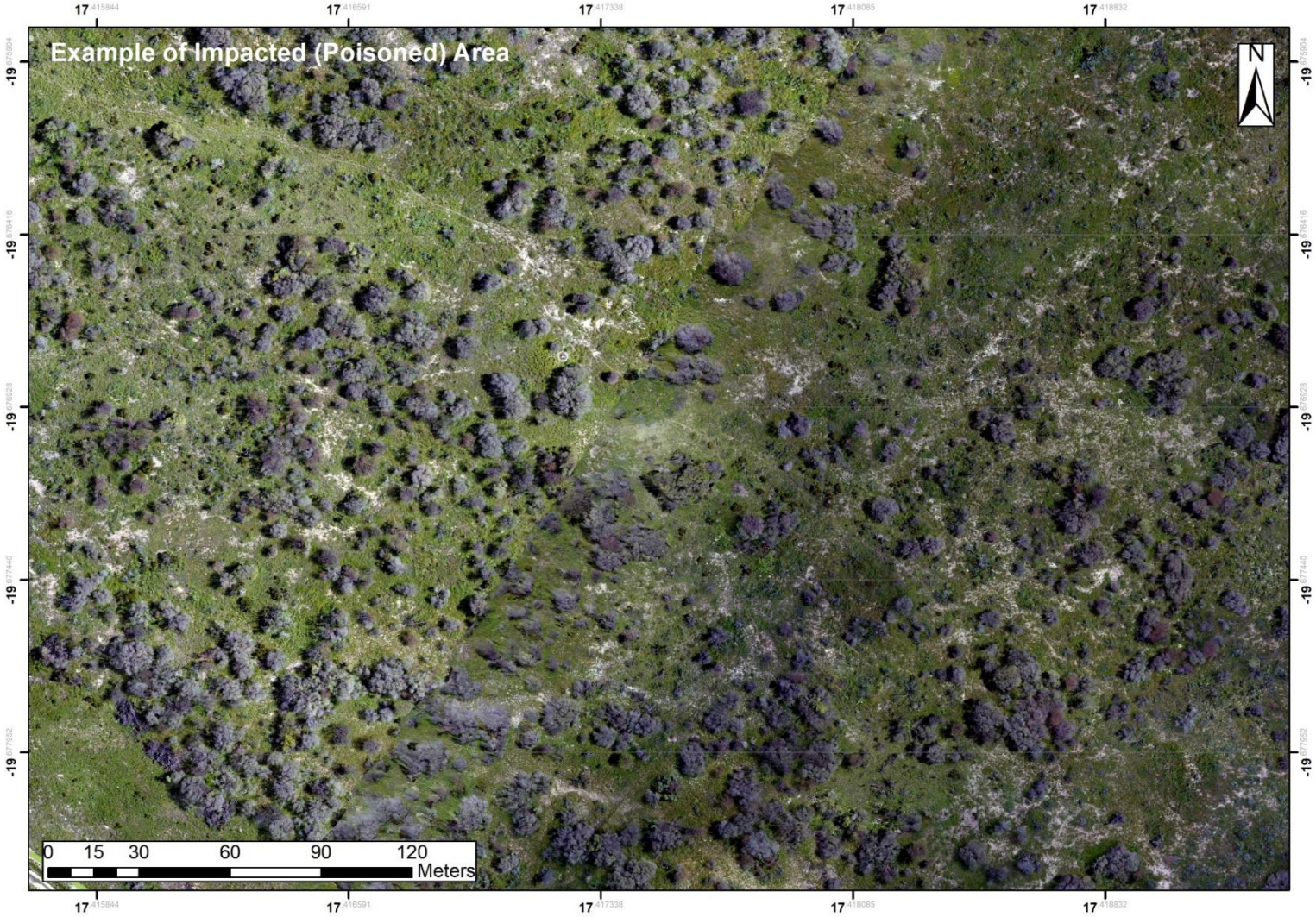


Figure 6. A high-quality drone image from the drone survey showing the poisoned plants with dead leaves.

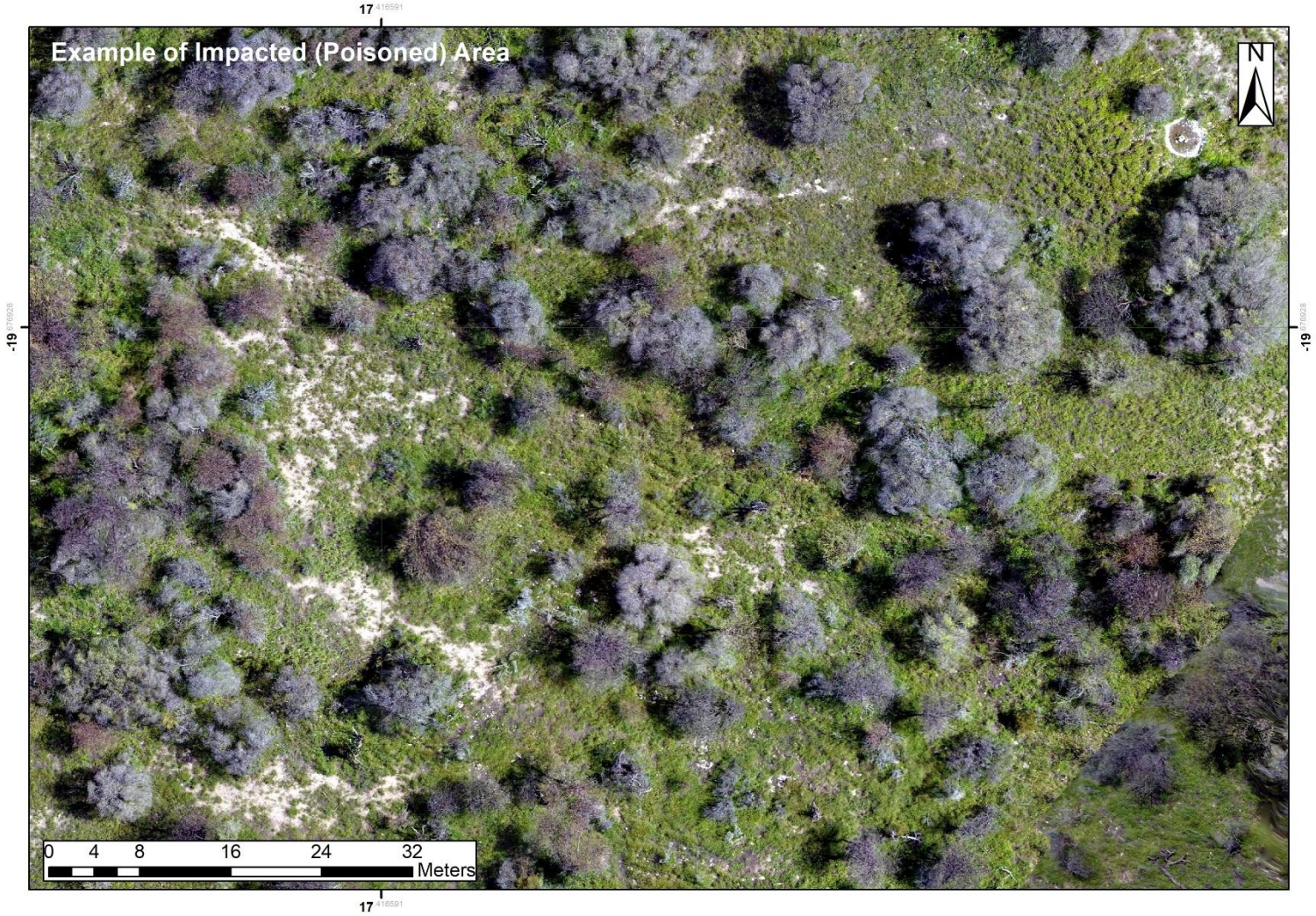


Figure 7. An up-close drone image showing the poisoned trees with dead whitish leaves.

Figure 8. An aerial image taken with a drone, which shows the green leaves and the healthy green plant.

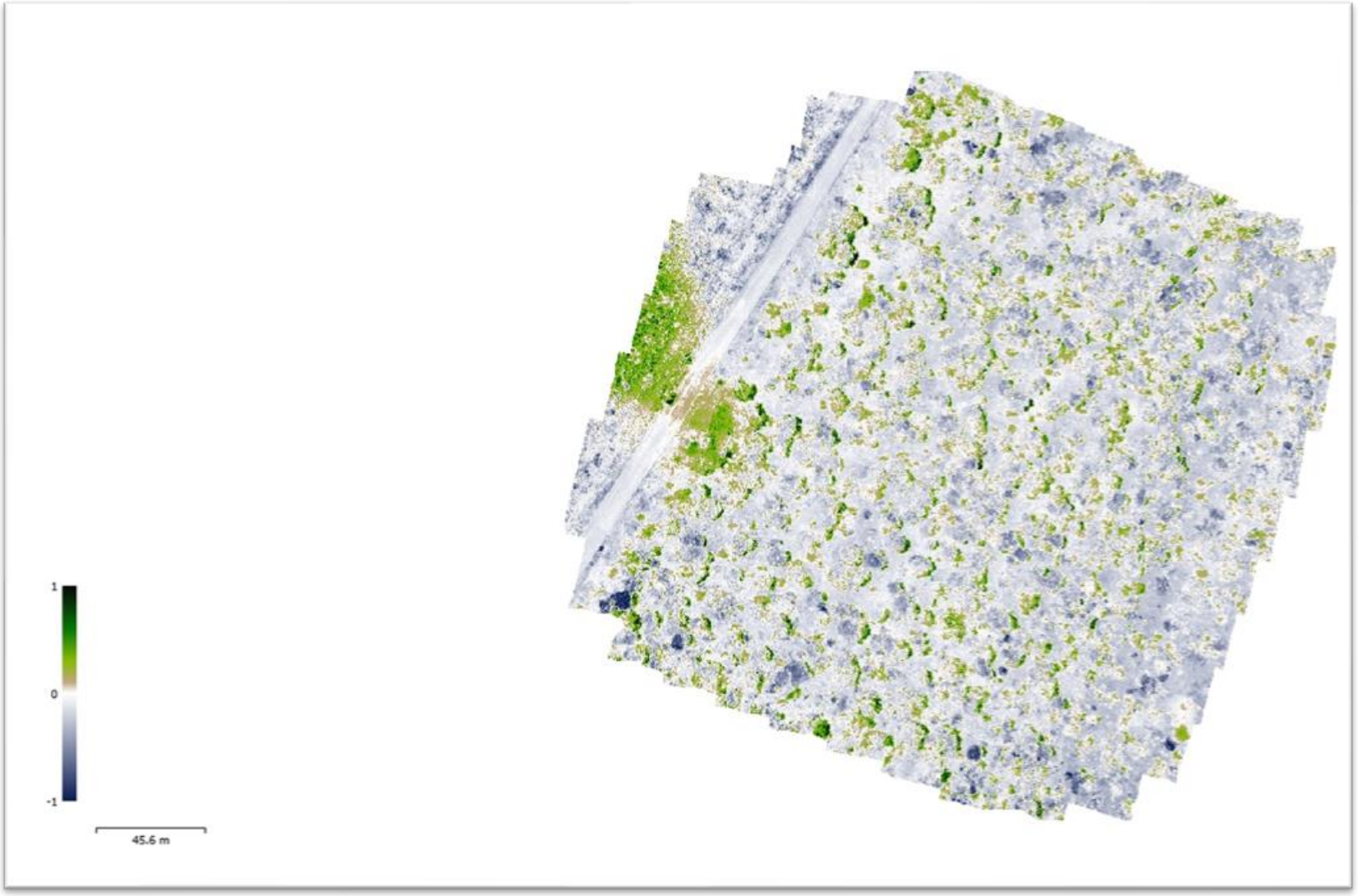


Figure 9. The vegetation index image for the control are shows the green leaves, an indication that the African Olive are healthy.

Figure 10. The vegetation index image for the control are shows the brown leaves, an indication that the African Olive are dead.

Figure 11. The vegetation index image for the control are shows the brown leaves, an indication that the African Olive are dead.

Figure 12. The vegetation index image for the control are shows the brown leaves, an indication that the African Olive are dead.

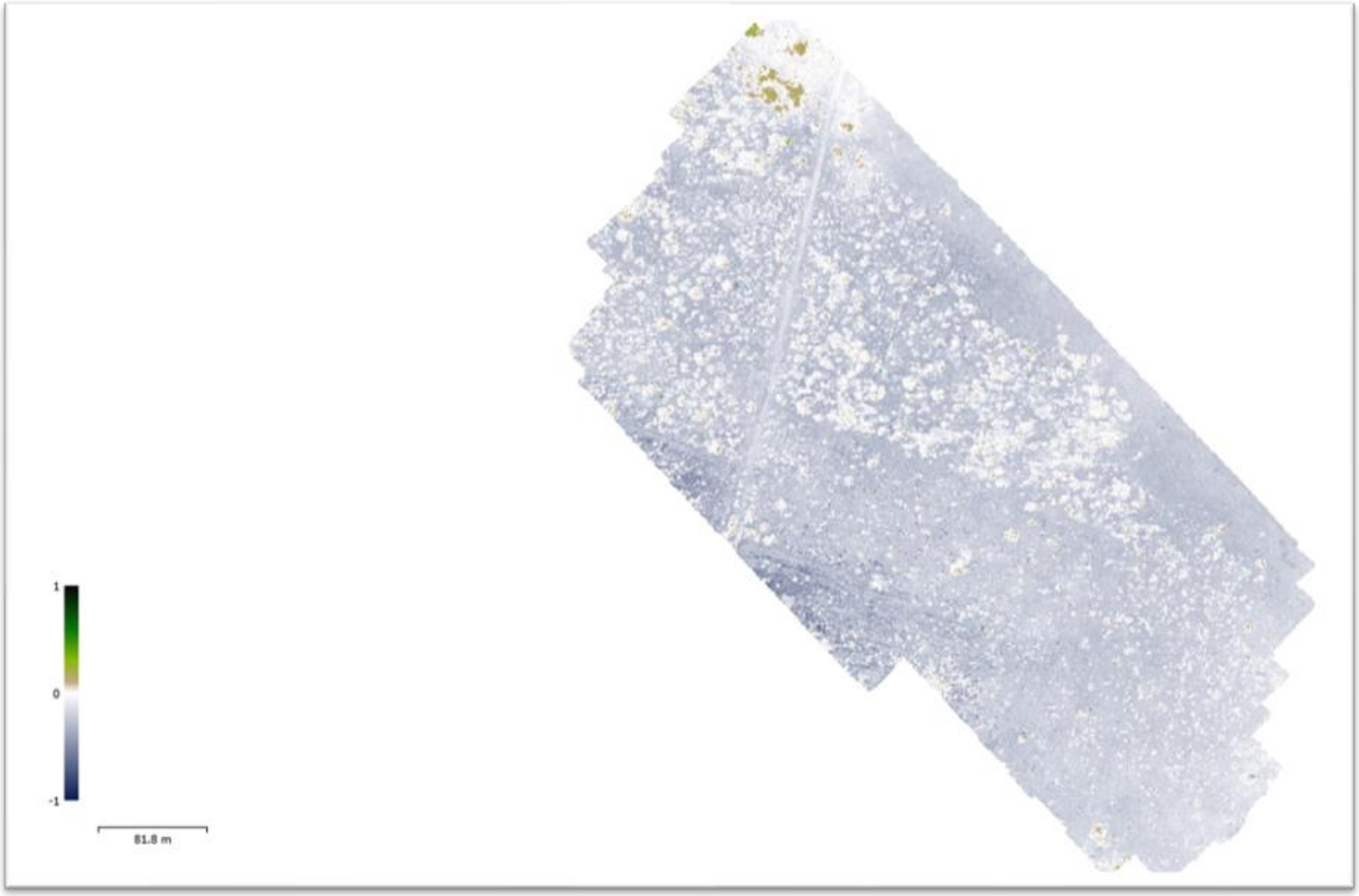


Figure 13. The vegetation index image for the control are shows the brown leaves, an indication that the African Olive are dead.

Assessment of Impacts

The purpose of this assessment of impacts section is to identify and consider the most pertinent environmental impacts and to provide possible mitigation measures that are expected from the poisoning of trees activities from the allocated area. Two different phases are associated with the proposed impacts. Firstly, the poisoning phase, and secondly the resprouting of the *African olive* trees are being covered by this assessment. Should the poisoning of the *African olive's* activities cease in the future, an EIA will need to be conducted to deal with the associated changes to environment. Mitigation measures for the identified impacts are also provided in this Section.

The following assessment methodology was used to examine each impact identified:

Table 1. Criteria for Assessing Impacts

PART A: DEFINITION AND CRITERIA		
Definition of SIGNIFICANCE		**Significance = consequence probability**
Definition of CONSEQUENCE		**Consequence is a function of severity, spatial extent and duration**
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action. Irreplaceable loss of resources.
	M	Moderate/measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/will remain in the current range. Recommended level will never be violated. Sporadic complaints. Limited loss of resources.
	L+	Minor improvement. Change not measurable/will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favorable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short-term
	M	Reversible overtime. Life of the project. Medium-term
	H	Permanent beyond closure – Long-term.
Criteria for ranking the SPATIAL SCALE of Impacts	**L**	Localized-Within the site boundary.
	M	Fairly widespread–Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/national

Table 2. The various impacts consequences

PART B: DETERMINING CONSEQUENCE					
SEVERITY = L					
DURATION	Long-term	**H**	Medium	Medium	Medium
	Medium term	**M**	Low	Low	Medium
	Short-term	**L**	Low	Low	Medium
SEVERITY = M					
DURATION	Long-term	**H**	Medium	High	High
	Medium term	**M**	Medium	Medium	High
	Short-term	**L**	Low	Medium	Medium
SEVERITY = H					
DURATION	Long-term	**H**	High	High	High
	Medium term	**M**	Medium	Medium	High
	Short-term	**L**	Medium	Medium	High
			L	M	H
			Localized Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary

Table 3. The various significance of the impacts

PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite/Continuous	H	Medium	Medium	High
	Possible/frequent	M	Medium	Medium	High
	Unlikely/seldom	L	Low	Low	Medium
			L	M	H
			CONSEQUENCE		

Table 4. The various interpretation of significance.

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

*H = high, M = medium and L = low and + denotes a positive impact.

Overall socio-economic impacts and issues

Socio-economic impacts

African olive can be an asset on farms due to its nutritious leaves and shade abilities. Hence, food for domestic animals found on the farm has been lost. These trees can live for a long time and flowers that can attract bees, butterflies, insects and the leaves can be excellent fodder for livestock. Hence, all these benefits have been lost.

Poisoning of Tree activity and associated issues

Poisoning of the African Olive tree

The following potential effects on the environment during the poisoning stage of the African olive have been identified:

Dust

Dust may be generated during this phase and might be aggravated during the winter months when strong winds occur. *African olive* helps to control erosion and makes a good firebreak. Fall out dust settling on vegetation is likely to cause local disruptions in herbivorous and predatory complexes and should be minimised as far as possible. Without these trees, the farmowner will be more prone dust on the farm that would have been previously blocked by the *Olive Trees*.

Noise

Noise will most likely be high during the poisoning phase, because an aircraft was used, might have caused a disturbance to the animals on the farm. The duration of the noise would have been for a short period of time.

Safety and Security

During the poisoning phase, small tools and equipment was used on site. This increases the possibility of injuries, and the responsible manager must ensure that all staff members are briefed about the potential risks of injuries on site. The manager is further advised to ensure that adequate emergency facilities, including first aid kits, are available on site. All Health and Safety standards specified in the Labour Act should be complied with. Should a camp be necessary at a later stage, it should be in such a way that it does not pose a risk to the community members and wildlife that roam the area.

Visual

The farm area is situated less than 1 km from any main road. As such, any visual impact that might be caused by the removal of the trees is high. The trees might have acted as a shield from the on passing traffic and vehicles. Now that shield has been poisoned and destroyed. The farm area`s topography is very flat

Table 5. Impact evaluation for the target generation phase of the project.

Identified	**Significance**		**Duration**	**Extent**	**Intensity**	**Probability**
Impact	**NMM**	**MM**				
Dust	H	H	L	M	H	MP
Noise	M	L	L	L	L	P
Safety & Security	M	L	MD	L	L	LP
Visual	M	M	MD	O	L	LP

Fire and Explosion Hazard

The poisoned *African Olives*, the trees have become dry and they can become flammable during the dry period. This can be a major fire hazard in the area. Hydrocarbons are volatile under certain conditions and their vapours in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.

In addition to this, all personnel must be sensitised about responsible fire protection measures and good housekeeping such as the removal of flammable materials including rubbish, dry vegetation and hydrocarbon-soaked soil from the vicinity of the farm area. Regular inspections should be carried out to inspect and test firefighting equipment and pollution control materials at the various sand mining projects.

All fire precautions and fire control at the site must be in accordance with SANS 10089 1:1999, or better. A holistic fire protection and prevention plan is needed.

Experience has shown that the best chance to rapidly put out a major fire, is in the first 5 minutes. It is important to recognise that a responsive fire prevention plan does not solely include the availability of firefighting equipment, but more importantly, it involves premeditated measures and activities to timeously prevent, curb and avoid conditions that may result in fires. An integrated fire prevention plan should be drafted before harvesting.

Generation of Waste

The poisoning of the *African olives* has led to the generation of waste in the farm area. Care should be taken when handling organic waste material. The waste will be temporarily handled and stored on site before being removed for final disposal at permitted waste disposal facilities. A registered Waste Management Company would be contracted to remove all organic waste from the farm site. The used herbicide can stay in the soil for up to 36 months which might impact the growth of new trees for these duration.

Health and Safety

Occupational exposures are normally related to the dermal contact with the herbicides and inhalation of herbicide vapours during handling of such products. For this reason, adequate measures must be brought in place to ensure safety of staff on site, and includes:

- Proper training of operators;
- First aid treatment;
- Medical assistance;
- Emergency treatment;
- Prevention of inhalation of fumes;
- Protective clothing, footwear, gloves and belts; safety goggles and shields;
- Manuals and training regarding the correct handling of materials and packages should be in place and updated as new or updated material safety data sheets become available;
- And Monitoring should be carried out on a regular basis, including accident reports.

Fauna

Plant generating facilities may have minor disturbances on the habitat of a few species but no significant impacts on the animals are expected. Most animals would have lost their shade and birds have lost their shelters.

Vegetation

The natural vegetation is highly disturbed in the project area especially the *African olives* except for the grasses, which have been grazed by livestock and wild animals. Some vegetation species in the area may be adversely impacted by the project. Limpo GG poisoned is not selective and might poison untargeted trees. In this case, all trees from the wrongly treated area have been killed. The type of vegetation that might be affected by the project are:

- Bushes

- Ephemeral grasses
- Small trees

Some of the sensitive vegetation types in the area include:

- Shallow drainage line vegetation
- Scrublands surrounding the mineral exploration area

Certain species regarded as particularly important for conservation are yet to be identified and made known via an Addendum to this report. If particularly important species are found, they will be located by GPS and their locations communicated to the Ministry of Environment and Tourism. Such locations will then be demarcated and completely avoided.

Avifauna

Birds or Nest sites have been disturbed by their shelter that has been destroyed due to this poisoning of *African Olives*. Should the proponent observe any bird nesting sites for vultures, they will be reported to the Ministry of Environment and Tourism and the site will be avoided.

Alien Invasive Plants

Disturbance to the natural environment often encourages the establishment of alien invasive weed species. Some of the plant species that could become invasive in the area are listed below:

- *Prosopis glandulosa*
- *Lantana camara*
- *Cyperus esculentus*
- *Opuntia imbricate*
- *Cereus jamacara*
- *Melia azedarach*

There are numerous ways in which invasive species can be introduced deliberately or unintentionally.

Heritage Impacts

Although no archaeological sites have been identified yet in the project area, appropriate measures will be undertaken upon discovering any new archaeological sites. All archaeological remains are protected under the National Heritage Act (2004) and will not be destroyed, disturbed or removed. The Act also requires that any archaeological finds be reported to the Heritage Council Windhoek.

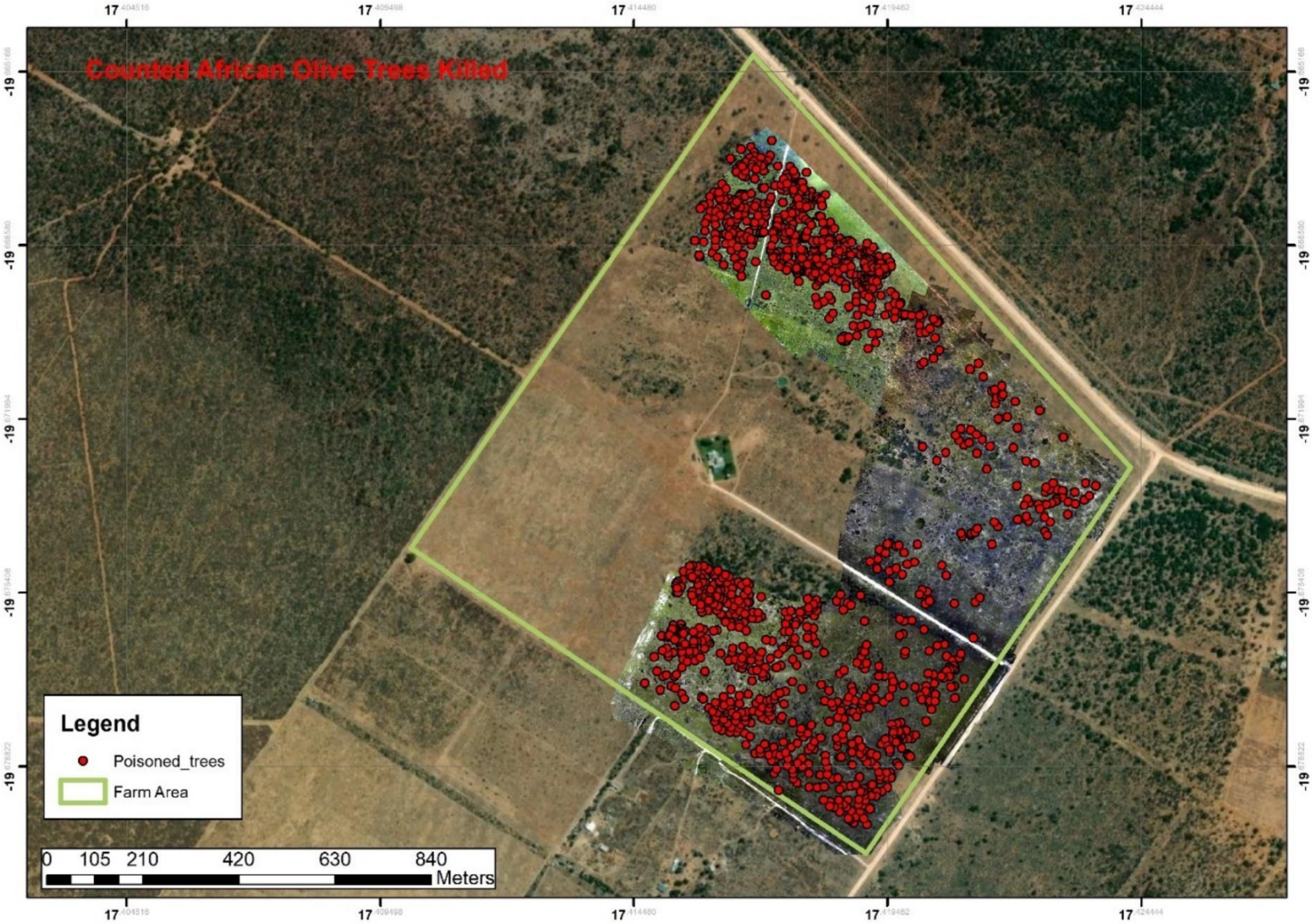
Table 6. Impact evaluation for the post the poisoning phase of the African Olive.

Identified Impact	Significance NMM	Significance MM	Duration	Extent	Intensity	Probability
Air Quality	M	L	LD	L	M	HP
Fire & Explosion Hazard	H	L	SD	O	M	LP
Generation of waste	M	M	SD	O	M	D
Health and Safety	H	M	LD	N	M	P
Fauna	M	L	MD	L	M	D
Vegetation	M	L	MD	L	M	D
Avifauna	M	L	MD	L	M	LP
Alien Invasive Plants	M		L	MD	L	P
Heritage	M		L	O	H	LP

Conclusion

The scoping report is prepared for the Environmental Impact Assessment of Tiberian Farm after the *African Olive* have been poisoned. The investigated area which is located 10 kilometres east of Otavi on the road towards Grootfontein. The farm is accessible via the B8 road from Otavi to Grootfontein for 7 kilometres, and then turn right via the D2820 gravel road for 2 kilometres, then another right turn for approximately one kilometre before reaching the farm gate. Two areas on the farm were investigated, an impacted area (poisoned) and a control area on the neighbouring farm which has not been impacted. The distinction is very clear between the Farm Tiberian and the neighbouring farm which was used as a control area. It is evident that the used herbicide did not exclusively poison the Olive African trees but dead Accacia Meliferas were also observed. Herbicides are environmental pollutants and if applied on undesired areas, the damage can be detrimental as observed in this study area. More than a hundred counted trees have been completely damaged, and it will take a minimum of five years to rehabilitate the area to its previous state.

Environmental scoping is a critical step in the preparation of an EIA on understanding the killing of the *African Olive* trees. In most cases, the drone images clearly shows the poisoned trees and can be easily counted. The soil on which the herbicides have been applied will prevent the growth of new *African Olive* trees. The proponent has lost protected trees that will take more than 5-8 years to resprout to their original size. More than a 100 *African Olives* have been poisoned and killed. It will take a substantial amount of time to recover the destroyed trees. The vegetation indices also showed that these trees that have been poisoned completely.


Counted African Olive Trees Killed
17 404516
17 409498
17 414480
17 419462
17 424444
-19 665166
-19 668580
-19 671994
-19 675408
-19 678822
Legend
Poisoned_trees
Farm Area
0 105 210 420 630 840
Meters

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Appendix

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BIO

I am a qualified and professional environmental scientist with experience in environmental geochemistry and biogeochemisty. Strong scientific report writing and data analysis skills. Team player with an eye for detail.

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EXPERIENCE

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- Exploration geological activities
- Hydrogeology
- Drilling supervision & management
- Geological mapping
- Geochemical sampling
- Environmental impacts assessments monitoring
- Quarterly report writing for EPL renewals
- EIA & EMP reports
- Identifying new geological targets
- Geotechnical & structural core logging
- Financial & budget planning
- Market monitoring & evaluation
- Report writing & research
- Data analysis, interpretation & presentations

EDUCATION

DOCTOR OF PHILOSOPHY (PHD) | EARTH SCIENCES

University of Stellenbosch

2018 - 2021

MASTER OF SCIENCE | EARTH SCIENCES

University of Stellenbosch

2016 - 2017

BACHELOR OF SCIENCE (Honors)

University of Stellenbosch

2015

BACHELOR OF SCIENCE

University of Namibia

2010

STUDENT DEMONSTRATOR/TUTOR

University of Stellenbosch

01 February 2015 - 15 December 2020

Taught 2nd & 3rd year students the following subjects whilst pursuing my Masters & PhD on a full-time basis:

- Geo-Environmental Science
- Introduction to Environmental Geochemistry
- Economic Geology
- Field skills & Engineering Geology

EXPLORATION GEOLOGIST

Sabre Resources Namibia

01 March 2010 - 31 October 2013

- Exploration geological activities
- Hydrogeology
- Drilling supervision
- Geological mapping
- Geochemical sampling
- Environmental impacts assessments monitoring
- Quarterly report writing for EPL renewals
- Geotechnical and structural core logging

Reason for leaving: To pursue Postgraduate studies on a full-time basis.

SKILLS

- Scientific report writing
- Data analysis & interpretation
- Proficient in MS Office Package

SOFTWARE

- GIS
- BenMap
- R Programming
- Hysplit Modeling Software
- Micromme 3D Modelling

LANGUAGES

- English
- Otjiherero
- Afrikaans

REFERENCES

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