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ENVIRONMENTAL MANAGEMENT PLAN FOR

BUSH CONTROL ACTIVITIES ON FARM GEMSBOKOORD NO 477

OUTJO DISTRICT, KUNENE REGION, NAMIBIA

April 2021

PO BOX 91193 Windhoek Namibia
Environmental Compliance Consultancy CC
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TITLE AND APPROVAL PAGE

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Confidentiality

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EXECUTIVE SUMMARY

Environmental Compliance Consultancy (ECC) was commissioned by the owner of Farm Gemsbokoord (No. 477) to develop an Environmental Management Plan (EMP) for implementing bush control activities on the property. The farm is located approximately 0 km northeast of Khorixas and 75 km west of Outjo in the Outjo magisterial district, Kunene Region, Namibia. The farm covers an area of 4,985 hectares in extent, is cattle-fenced and used as a free-ranging game farm. The productivity of the farm is compromised by infestations of invasive bush such as Mopane (*Colophospermum mopane*), Sickle bush (*Dichrostachys cinerea*), Deurmekaarbos (*Terminalia prunioides*) and Blackthorn (*Senegalia mellifera)*. Bush encroachment is an agricultural problem in Namibia because it reduces biodiversity and subsequently the carrying capacity of rangelands.

Bush control activities is an important intervention to combat bush encroachment by restoring productivity of rangelands. Proposed activities for this project include manual and semi-mechanised methods as well as the possible use of selective applications of arboricides during aftercare. No bush control activities have been practiced on the farm in the past. The owner proposes bush control activities on an area covering 3,000 – 4,000 hectares over a period of 5 to 10 years. Harvested wood will be used as droppers (for fencing and infrastructure on the farm) and as firewood, charcoal and wood chips, subject to economic feasibility.

Like the largest part of Namibia, Farm Gemsbokoord is located in a semi-arid environment with an average rainfall that varies between 300 and 350 mm per year. Vegetation shows a transition between Karstveld and Western Highlands, within the Acacia Tree-and-shrub Savanna sub-biome.

Implementation of bush control activities on the farm may be accompanied by impacts which may pose a risk with regards to the environment. Through a robust baseline study, a range of potential impacts towards the environmental receptors have been identified that may arise as a result of the project. This GEMP provides guidelines and a framework to direct the proposed bush control activities on the farm. The identified management measures, if implemented, can mitigate potential negative impacts and enhance potential positive impacts.

It was determined that the likely negative effects were not deemed significant, based on the magnitude of change from the baseline environment, the duration of potential impacts and the reversibility of effects. The project also has the potential to generate positive impacts, which could be enhanced.

On this premise, it is the opinion of ECC that an environmental clearance certificate could be issued, on conditions that the management and mitigation measures specified in the GEMP are implemented and adhered to.

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DEFINITIONS AND ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CIA	Cumulative Impact Assessment
DEA	Department of Environmental Affairs
DoF	Directorate of Forestry
ECC	Environmental Compliance Consultancy
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
GEMP	Generic Environmental Management Plan
I&APs	Interested and Affected Parties
HIV	Human Immunodeficiency Virus
MAWLR	Ministry of Agriculture Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
MSDS	Material Safety Data Sheet
NSA	Namibia Statistics Agency
PPE	Personal Protective Equipment
TB	Tuberculosis
WHO	World Health Organisation

1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide a management framework for the proposed bush control activities on the farm Gemsbokoord so that the potential negative impacts that could arise during operations are avoided, minimised and mitigated as far as reasonably practicable, positive impacts resulting from the operations can be enhanced and statutory requirements and other legal obligations are fulfilled.

1.2 BACKGROUND OF THE PROPOSED PROJECT

The farm Gemsbokoord (No. 477) is located approximately 50 km northeast of Khorixas and 75 km west of Outjo in the Outjo magisterial district of the Kunene Region in Namibia. The farm covers an area of 4,985 hectares, is cattle-fenced and currently being used as a free-ranging game farm. Fransfontein is approximately 40 km west and Otjikondo 60 km north of the farm. The farm can be accessed from the south via the C39 road and from the north via the D3236 district road (Figure 1).

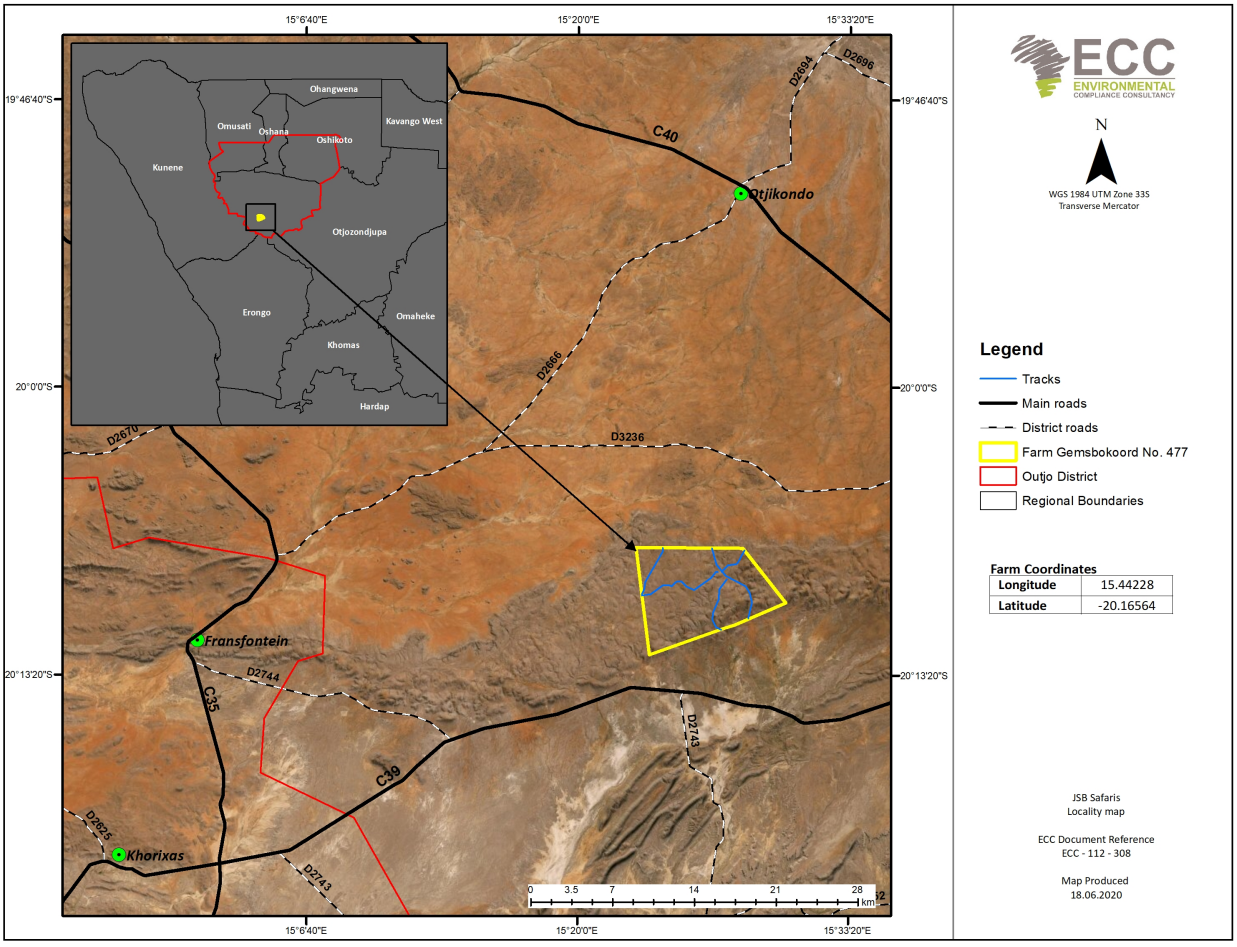

FIGURE 1 - LOCALITY MAP OF FARM GEMSBOKOORD

Most of the farm is infested by invasive species such as Mopane (*Colophospermum mopane*), Sickle bush (*Dichrostachys cinerea*), Deurmekaarbos (*Terminalia prunioides*) and Blackthorn (*Senegalia mellifera)*. The infestations compromise the farm's productivity adversely.

Due to the bush encroachment on Gemsbokoord, the owner proposes bush control activities as inevitable to restore the rangeland productivity on his property. Proposed activities for this project include manual and semi-mechanised (chainsaw) interventions as well as the possible use of selective applications of arboricide during aftercare. Harvested wood will be used as droppers (for fencing and infrastructure on the farm) and as firewood, charcoal and wood chips, subject to economic feasibility. No bush control activities have been practiced on the farm in the past.

1.3 MOTIVATION FOR THE PROJECT

Covering an estimated 45 million hectares of the entire surface area of Namibia (SAIEA, 2015), bush encroachment is a major reason for a lowering productivity of rangelands in the country. Opportunistic indigenous bush and shrub species multiplied in abundance on farmland over the last six decades and suppressed the growth of grass and other palatable species markedly, initiating thickets and impenetrable stands, causing an overall reduction in biodiversity, a decreasing carrying capacity and a noticeable change in the water cycle.

Bush control activities can restore the carrying capacity of rangelands, improve the biodiversity and repair the disturbed water cycle. At the same time many opportunities for commercial utilisation of the woody resource are offered, while additional employment is created. The method chosen depends on the type of encroacher species present, the areas affected as well as the investments the land owner is prepared to make. Knowledge of landscape ecological functioning, sustainability and post-thinning management is thus imperative.

1.4 SCOPE OF WORK

The scope of this assignment includes all proposed bush control activities on Gemsbokoord. Combating bush encroachment has biophysical as well as socio-economic impacts and this assignment assesses all potential impacts that may be linked to these proposed activities.

This document contains information to aid in decision-making for the proposed bush control activities by:

- describing the proposed activities,
- describing the receiving environment that may be affected by the activities,
- identifying the legal and regulatory frameworks relevant to the project,
- assessing the potential impacts of the proposed operations, and
- providing a management plan with protocols, procedures, roles and responsibilities to ensure that the necessary arrangements are implemented so that the potential impacts are mitigated, prevented and / or minimized and that legal obligations are fulfilled.

In the process Interested and Affected Parties (I&APs), especially neighbouring farms and communities, are offered an opportunity to provide comments or to raise concerns about the proposed operations as well.

This is a live document and shall be reviewed at predetermined intervals, and / or updated when the scope of works alters, or when further data / information can be added. All personnel working on the project will be legally required to comply with the standards set out in this document.

1.5 OBJECTIVES OF THIS DOCUMENT

Objectives of this document can be summarised as follows:

- Ascertain key issues associated with the proposed bush control activities and identify measures to mitigate negative impacts and to enhance positive impacts associated with the activities.
- Provide I&APs a chance to participate in the consultation and engagement processes relevant to the proposed operations.
- Assist with the implementation of a suitable environmental management plan for the proposed operations on Gemsbokoord.

1.6 ENVIRONMENTAL CONSULTANCY

Environmental Compliance Consultancy (ECC) was appointed to compile this document in terms of the Environmental Management Act, No. 7 of 2007 and its regulations on behalf of the owner of Gemsbokoord No. 477 (herein referred to as the proponent).

ECC is a Namibian consultancy (registration number Close Corporation 2013/11401), and has prepared this GEMP on behalf of the proponent. ECC operates exclusively in the environmental, social, health and safety fields for clients across Southern Africa, in both the public and private sectors. ECC is independent of the proponent and has no vested or financial interest in the proposed project, except for fair remuneration for professional services rendered in the preparation of this EMP.

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2 ASSESSMENT METHODOLOGY

An impact assessment is a formal process in which the effects of certain types of development on the biophysical, social and economic environments are identified, assessed and reported so that the effects can be taken into account when considering whether to grant development consent or to provide financial support.

2.1 SCREENING OF THE PROPOSED PROJECT

A screening exercise determines whether a proposed project is considered as a Listed Activity in terms of the Environmental Management Act, No. 7 of 2007 and associated regulations, and if significant impacts may arise. The location, scale and duration of project activities are considered against the receiving environment.

2.2 EIA PROCESS FOR BUSH HARVESTING PROJECTS

The Environmental Management Act, No. 7 of 2007 stipulates that an environmental clearance certificate is required to undertake listed activities in terms of the Act and its regulations. The proposed bush control activities on Gemsbokoord are classified as a listed activity:

FORESTRY ACTIVITIES

> (4) The clearance of forest areas, deforestation, aforestation, timber harvesting or any other related activity that requires authorization in terms of the Forest Act, 2001 (Act No.12 of 2001) or any other law.

In 2017 the Ministry of Agriculture, Water and Forestry and the Ministry of Environment and Tourism jointly issued a publication to streamline and simplify the legal process authorising people to combat bush encroachment in Namibia (Ministry of Agriculture, Water and Forestry and Ministry of Environment and Tourism, 2017). This is based on the *Strategic environmental assessment of large-scale bush thinning and value-addition activities in Namibia* (SAIEA, 2015) which distinguishes three categories of thresholds for the environmental impact assessment (EIA) process on bush control activities (Figure 2).

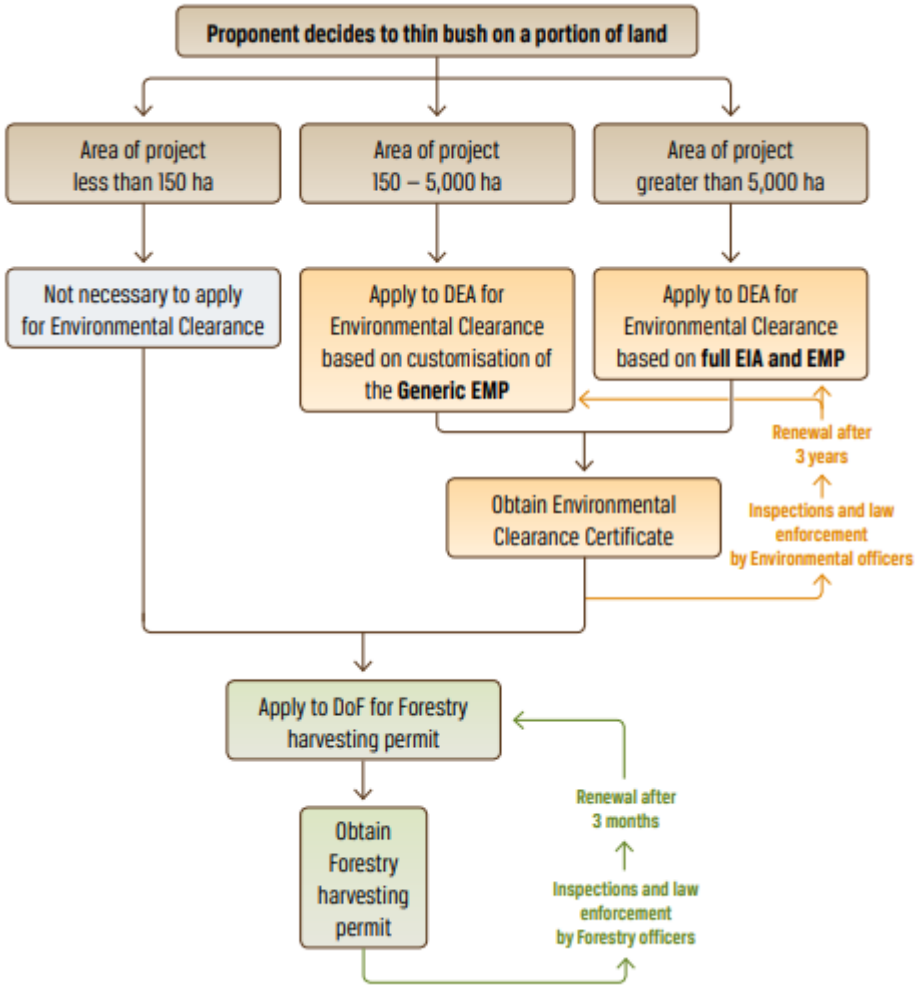

FIGURE 2 - BUSH HARVESTING EIA PROCESS (Source: Ministry of Agriculture, Water and Forestry and the Ministry of Environment and Tourism, 2017)

Accordingly:

- No Environmental Clearance is required for areas smaller than 150 hectares where bush control activities are being conducted;
- A Generic Environmental Management Plan (GEMP) is required for an area larger than 150 hectares, but smaller than 5,000 hectares where bush control activities are being conducted; and
- A full EIA and Environmental Management Plan (EMP) are required for an area larger than 5,000 hectares where bush control activities are being conducted

Gemsbokoord covers an area of 4,985 hectares, and bush control activities on an area covering 3,000 – 4,000 hectares of the farm over a period of five to ten years is proposed. This is classified as a medium-sized bush harvesting operation (150 – 5,000 hectares), which requires thus a GEMP in order to be granted an environmental clearance certificate.

An EMP aims to meet the requirements as legislated in Section 8 (j) of the regulations of the Environmental Management Act, No. 7 of 2007 and includes information about the identified environmental impacts, the

management, mitigation, protection or remedial measures to be undertaken to address the impacts associated with the proposed operations. The GEMP may be amended as new information is made available.

2.3 SCOPING OF THE ENVIRONMENTAL ASSESSMENT

The purpose of the scoping stage is to undertake a high-level assessment to identify potential impacts and confirm if further investigation is required to assign the severity of potential significant effects and allocate appropriate mitigation. With scoping the possible changes to the environment as a result of the proposed activities are predicted and evaluated. A robust baseline is required in order to provide a reference point against which any future changes associated with a project can be assessed, and it allows for suitable mitigation and monitoring actions to be identified.

The existing environment and social baseline for this project was compiled through:

- Desktop studies
- Verification through site data collection
- Consultation with stakeholders
- Engagement with Interested and Affected Parties (I&APs).

A range of potential impacts of the proposed bush control activities towards receptors (water, soil, flora, and fauna) may arise. Assessment of these potential impacts provide the necessary information to guide the development of the proposed activities. For each impact assessed, mitigation measures are proposed to reduce and / or avoid negative impacts and to enhance positive impacts. These mitigation measures are incorporated into a site-specific management plan with protocols, procedures, roles and responsibilities to ensure that the necessary arrangements are implemented so that the potential impacts are mitigated, prevented and / or minimized and that legal obligations are fulfilled.

2.4 MITIGATION

Mitigation comprises a hierarchy of measures ranging from preventative environmental impacts by avoidance, to measures that provide opportunities for environmental enhancement. The mitigation hierarchy is avoidance; reduction at source; reduction at receptor level; repairing and correcting; compensation; remediation; and enhancement.

Mitigation measures can be split into three distinct categories, broadly defined as:

- Actions undertaken by the EIA process that influence the design process / approach, through implementing measures that would entirely avoid or eliminate an impact through the inclusion of environmental features to reduce the magnitude of change. These are considered as embedded mitigation.
- Standard practices and other best practice measures for avoiding and minimizing environmental impacts. These are considered as good practice measures.
- Specified additional measures or follow-up action to be implemented to further reduce adverse impacts that remain after the incorporation of embedded mitigation. These are considered as additional mitigation.

Embedded mitigation and good practice mitigation have been taken into account in the assessment. Additional mitigation measures have been identified when the significance of impact requires it and causes the impact to be further reduced. Where additional mitigation has been identified, a final assessment of the significance of impacts (residual impacts) is necessary for consideration of the additional mitigation.

2.5 Authority Assessment and Decision Making

This report will be submitted to the Environmental Commissioner, Department of Environmental Affairs (DEA) at the Ministry of Environment, Forestry and Tourism. If the Commissioner is satisfied with the report and that the negative impacts of proposed operations are minimized, an environmental clearance certificate is issued, which will require the proponent to diligently implement the GEMP.

2.6 Monitoring and Auditing

Although this EMP will be implemented by the proponent, a site-specific monitoring strategy and audit procedure will be required. This will ensure key environmental receptors are monitored and reported to the competent authority.

3 LEGAL FRAMEWORK

3.1 NATIONAL LEGISLATION

Table 1 provides a list of legislation applicable to the proposed bush control activities at Gemsbokoord.

TABLE 1 – LEGAL COMPLIANCE

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Constitution of the Republic of Namibia of 1990	The constitution clearly defines the country's overarching position in relation to the well-being of Namibians, sustainable development and environmental management. The constitution refers that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at the following: *"Maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present, and future …"*	The proponent is committed to protection of the environmental as enshrined in the constitution. Furthermore the proponent wants to engage the local community for the proposed project by providing local jobs as well as exploring ways of finding benefits and contributing to the development of Namibia.
Forestry Act, No. 12 of 2001 as amended by the Forest Amendment Act, No. 13 of 2005 and its regulations	This act presents laws relating to the management and use of forests and forest produce. It also presents provisions for the protection of the environment and the control and management of forest fires. Some of the specific details in the act of particular relevance are: - Aerial spraying of arboricides is illegal, but application of arboricides by hand is allowed. - Cutting, destruction or removal of any living tree, bush or shrub within 100 m of a drainage course is illegal. The Directorate of Forestry (DoF) under the Ministry of Environment, Forestry and Tourism (MEFT) is responsible for the administration of this act.	The act governs bush clearing and thinning initiatives to combat bush encroachment; therefore the act is applicable to any bush harvesting activity anywhere in Namibia. The act also permits allowable harvests, the transporting, and marketing and exporting of forest produce. Conditions are stipulated per licence / permit (e.g. no tree with a stem diameter of >18 cm at ground level may be removed; no protected species may be removed, etc.).

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Environmental Management Act, (No. 7 of 2007) and its regulations, including the Environmental Impact Assessment Regulation, 2007 (No. 30 of 2012)	The act aims to promote sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment. It sets the principles of environmental management as well as the functions and powers of the minister. The act requires certain activities, which may have a detrimental effect on the environment, to obtain an environmental clearance certificate prior to project development. The act states an EIA may be undertaken and submitted as part of the environmental clearance certificate application. The act and its regulations need to be given due consideration to achieve proper waste management and pollution control by means of the cradle to grave responsibility, precautionary principle, the polluter pays principle and the principles of public participation and access to information. The MEFT is responsible for the protection and management of Namibia's natural environment. The DEA under the MEFT is responsible for the administration of the EIA process.	This GEMP documents the findings of the assessment undertaken for the proposed operations, which will form part of the environmental clearance application. The assessment has been undertaken in line with the requirements under the Forestry Act, which states that any bush clearing activity on more than 15 ha, triggers the need for a permit from DoF, and this in turn triggers the need for environmental clearance.
Water Act, No. 54 of 1956	The act enables the minister to declare a Water Management Area for the purpose of protecting any water resource, riverine habitat, watershed, wetland, environment or ecosystem at risk of depletion, contamination, extinction or disturbance from any source. The act restricts a number of activities, including water abstraction, the use of pesticides, the clearing or harvesting of vegetation, including the felling of trees and the removal of riparian growth.	The act requires appropriate management of water catchments and aquifers. The act stipulates that a person may not discharge effluent directly or indirectly to any water resource unless such person is in compliance with a permit issued in terms of Section 60. Should the project require abstraction of water from underground sources, an application should be submitted to the authorities.
Soil Conservation Act, No. 76 of 1969 and the Soil Conservation Amendment Act, No. 38 of 1971	The act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil and vegetation.	The competent authority may issue directives to landowners in respect of the prevention of erosion, the denudation, disturbance or drainage of land; and any other disturbance of soil which may create any form of erosion or pollution or silting.

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
National Heritage Act, No. 27 of 2004.	The act makes provision for the protection and conservation of places and objects with heritage significance. Section 55 requires the reporting of any archaeological findings to the National Heritage Council after which a permit needs to be issued before the find can be disturbed.	There is potential for heritage objects to be found during the operations, therefore the stipulations in the act have been taken into consideration and are incorporated into the GEMP. The project shall be compliant with Section 55 of the act.
Labour Act, No. 11 of 2007	Regulations relating to the occupational health and safety provisions of employees at work were promulgated in terms of Section 101 of the Labour Act, No. 6 of 1992 and gazetted in 1997. Accordingly, stringent health and safety policies, including the compulsory use of specific PPE in designated areas to ensure adequate protection against health and safety risks, have to be in place. Proper storage and labelling of hazardous substances are required. Implementing of a comprehensive waste management and disposal policy is necessary - this should include the management and disposal of hazardous substances. Employees in charge of and working with hazardous substances need to be aware of the specific hazardous substances in order not to compromise worker and environmental safety in the event of accidental breakage or spillage. Transport of various hazardous substances requires staff responsible for such transport to be properly trained in the handling of the substance and that adequate safety and emergency response plans are place in case of accidental spillage.	The proposed operations will comply with stringent health and safety policies, including the compulsory use of specific PPE in designated areas to ensure adequate protection against health and safety risks. Proper storage and labelling of hazardous substances are required. Employees in charge of and working with hazardous substances need to be aware of the specific hazardous substances in order not to compromise their own safety and potential environmental damage.

3.2 POLICIES

Table 2 provides a list of policies relevant to the proposed bush control activities at Farm Gemsbokoord.

TABLE 2 - POLICY FRAMEWORKS RELEVANT TO THE PROJECT

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
Vision 2030	Vision 2030 sets out the nation's development programmes and strategies to achieve its national objectives. It sets out eight themes to realise the country's long-term vision and states that the overall goal is to improve the quality of life of the Namibian people to a level in line with the developed world.	Vision 2030 recognises that bush encroachment reduces rangeland productivity, and notes that bush encroachment is complex and expensive to reverse. The planned operations aim at the overall goal to ensure job opportunities and a better living standard for Namibians as well as increasing productivity.
Fifth National Development Plan (NDP5)	NDP5 is the fifth in the series of seven five-year national development plans that outline the objectives and aspiration of Namibia's long-term vision as expressed in Vision 2030. NDP5 is structured on the pillars of economic progression, good governance, social transformation and environmental sustainability.	The proposed operations form part of the bigger picture of achieving economic progression, social transformation and environmental sustainability.
National Agriculture Policy (2015)	This policy recognises multiple problems caused by bush encroachment and strives to "establish mechanisms to support farmers in combating bush encroachment effectively over the short and long term"	Combating bush encroachment at the farm is approached as a long term initiative to improve rangeland productivity.
National Forest Policy (1992)	This policy is guided by the following documents: The **Namibia Forestry Strategic Plan** aims at the protection and sustainable utilization of natural forests, with the objectives to conserve ecosystems, increase agricultural productivity, conserve soil and water, alleviate poverty, protect biodiversity and prevent climate change. The **Namibia Forest Development Policy** emphasizes biodiversity conservation by empowering farmers to manage forest resources sustainably. In commercial areas the policy encourages de-bushing for charcoal production to enhance rangeland productivity.	The proposed operations are in line with the objectives to increase rangeland productivity, to utilise natural resources sustainably and to enhance the protection of biodiversity.

NATIONAL REGULATORY REGIME	SUMMARY	APPLICABILITY TO THE PROJECT
National Rangeland Management Policy and Strategy (2012)	This document aims to enable farmers to manage their rangeland resources in such a way that animal production per hectare is sustainably improved, vulnerability is decreased, and biodiversity is improved so that rangelands can continue to provide essential ecosystem services.	The proposed operations are aligned to the objectives of this document.

3.3 PERMITS

Table 3 provides a list of permits required for the proposed bush control activities at Farm Gemsbokoord.

TABLE 3 - FORESTRY PERMITS RELEVANT TO THE PROJECT

LEGAL INSTRUMENT	ACTIVITY TO BE UNDERTAKEN	PERMIT VALIDITY
Harvesting permit	Required from the DoF for any tree cutting and / or harvesting of wood in an area greater than 15 hectares per year. The area to be harvested will be inspected before the permit is issued.	Valid for three months for commercial purposes, seven days for communal purposes and three days for own use.
Transport permit	Required from the DoF to convey any wood or wood products in Namibia.	Valid for seven days for commercial purposes, three days for own use.
Export permit	Required from the DoF to send any wood or wood products outside Namibia	Valid for seven days
Marketing permit	Required from the DoF to enable the producer to sell wood or wood products to any other party.	Valid for three months in commercial areas and one month in communal areas.

4 PROJECT INFORMATION

4.1 DESCRIPTION OF PROPOSED ACTIVITIES

Proposed bush control activities on Gemsbokoord entail manual and semi-mechanised (chainsaw) interventions as well as the possible use of selective applications of arboricide during aftercare. Subject to feasibility the harvested wood will be used as droppers (for fencing and infrastructure on the farm) and as firewood, charcoal and wood chips.

Below is a description of the proposed activities.

4.1.1. MANUAL BUSH CONTROL

This type of activity is mostly suitable for small-scale operations where cost and time are less important. It is labour-intensive and time-consuming but, if well supervised, a highly effective method of control. Hand tools such as axes, bush picks, handsaws, and pangas are used to take out individual bushes. The method is highly selective, making it ecologically sustainable. Manual bush control has few negative environmental impacts though - if not well supervised and if harvesters are not well trained, there is a risk that non-target plants may be removed.

Workers need to be sufficiently trained in order to ensure that removal of plants is in line with forestry regulations and health and safety guidelines. In order to reduce the incidence of re-growth, stumps should either be chemically treated or should be felled below the soil. Some species are likely to coppice if felled, hence aftercare is required.

FIGURE 3 - IMAGE SHOWING BUSH FELLING USING A HAND TOOL (Source: Bush Control Manual, 2017)

4.1.2. SEMI-MECHANISED BUSH CONTROL

Horizontal and vertical trolley saw cutters are produced locally and are commonly used for bush control in Namibia. This is another labour control method, whereby handheld or pushed power tools are used to fell individual plants. This method is considered to be selective and more efficient than manual bush control. Tools like chainsaws powered by small mounted engines, brush cutters and trolley saws, are useful when operated by trained operators. These mobile saws come with horizontal or vertical saw blades for ease of use under all conditions. In some cases, access can be difficult and may often require teams of two or more people per power tool. This is necessary to reduce the risk of injury and improve efficiency. For safety reasons and to ensure that non-target bushes or trees are not removed, supervision and sufficient training is important.

FIGURE 4 - IMAGE SHOWING A HAND-OPERATED SAW-MOBILE BEING USED (Source: Bush Control Manual, 2017)

4.1.3. APPLICATION OF ARBORICIDES

Arboricides are chemicals used in killing woody plants such as invader bushes. These chemicals are solutions diluted with water to a recommended concentration. The substance is applied to the soil, to the leaves and to the cut stem. For this project, the farmer proposes the stem-applied method in combination with manual and semi-mechanised control methods, as an after-care intervention. This is done by carefully spraying the solution only to stems to be killed. Since it is applied in small amounts to small areas, it is one of the most selective and safest aftercare methods of bush control.

In addition to the use of arboricides, after-care requires continuous monitoring of the harvested areas and the identification of appropriate activities such as controlled burn, removal by hand, or the introduction of browsers such as goats.

4.1.4. PRODUCTS OF HARVESTED WOOD

Income-generating activities such as the production of woodchips, firewood, droppers and charcoal turns the negative consequences of combating bush encroachment into economical viable results and create additional employment, while at the same time rehabilitating degraded ecosystems.

Firewood and droppers are normally produced for own consumption and / or the local markets whereas the production of woodchips for energy production is an emerging market. For charcoal there is an established market for export and the producer needs to establish a network to access this market.

Guidance for charcoal production is provided through the Namibia Charcoal Association (NCA) as well as widely available publications (e.g. *Good Practices for Namibian Charcoal* by the NCA and *Financing Bush Control* and the *Bush Control Manual* by the De-bushing Advisory Services Namibia), and charcoal producers need to comply with specific legislation contained in the Forestry Act, No. 12 of 2001 as amended by the Forest Amendment Act, No. 13 of 2005 and its regulations.

5 DESCRIPTION OF THE RECEIVING ENVIRONMENT

This section provides an overview of the existing biophysical environment through the analysis of the baseline data regarding the existing natural and socio-economic environment. Desktop studies on the national database are undertaken to get information of the current status of the receiving environment. This provides a baseline where changes that occur as a result of the proposed project can be measured.

5.1 THE PROJECT SITE AND LOCATION

Gemsbokoord is located 75 km west of Outjo, and 50 km northeast of Khorixas in the Outjo magisterial district, Kunene Region. The //Audi Conservancy is located to the west of the farm.

5.2 CLIMATE

Like the largest part of Namibia, Gemsbokoord is located in a semi-arid environment with an average rainfall that varies between 300 and 350 mm per year, with a variation coefficient of 40 - 50%, meaning that rainfall is fairly unpredictable (Mendelsohn, et al., 2002). Rainfall events are limited to the summer months, mainly between December and March, in the form of sudden thunderstorms often associated with heavy downpours. Potential evaporation can exceed 2,100 mm per year. Relative humidity is low, rarely exceeding 20% in winter but may reach 80% in summer before or after thunderstorm build-up. Maximum temperatures average around 32 - 34°C, mainly recorded during afternoons between October and February, while minimum temperatures are around 6 - 8°C and are normally recorded during nights in June and July. Deviations from these averages are common, with the highest temperatures reaching 38 - 40°C and the lowest temperatures below 6°C. Frost is uncommon (Mendelsohn, et al., 2002).

On the globe, Namibia is located in the belt that is dominated by prevailing high pressure cells. Off the coast the South Atlantic High is the reason for constant southwest winds, the Benguela Current, the upwelling cells of the ocean, and the subsiding air over the Namib Desert. Over the interior the Kalahari High dominates during winter and the subsiding air causes cloudless days with stable sinking air. During summer the positions of the high pressure cell fluctuate more, allowing low pressure cells to develop over the heated interior, which in turn pull-in moist air from the inter-tropical convergence zone.

Due to the rhythm of these pressure systems, the wind patterns remain fairly predictable. Prevailing wind over the farm is expected to be from the east and northeast, with occasional airflow from the southeast and southwest. Wind speed is expected to be low with more than two-thirds of the time lower than 2 m/s. The stronger air movements during the afternoons and evenings are the result of the ground being heated more in some places than others. During the winter months wind speed is slightly higher (Mendelsohn, et al., 2002).

The prevailing wind direction in Khorixas, the nearest weather station (Figure 5), is dominantly from the east with an average speed of 5.6 MPH (i.e. 9.0 km/h) and 12.0% calm days (as measured over a period from 3 March 2012 until 16 September 2018) (Iowa State University, 2020).

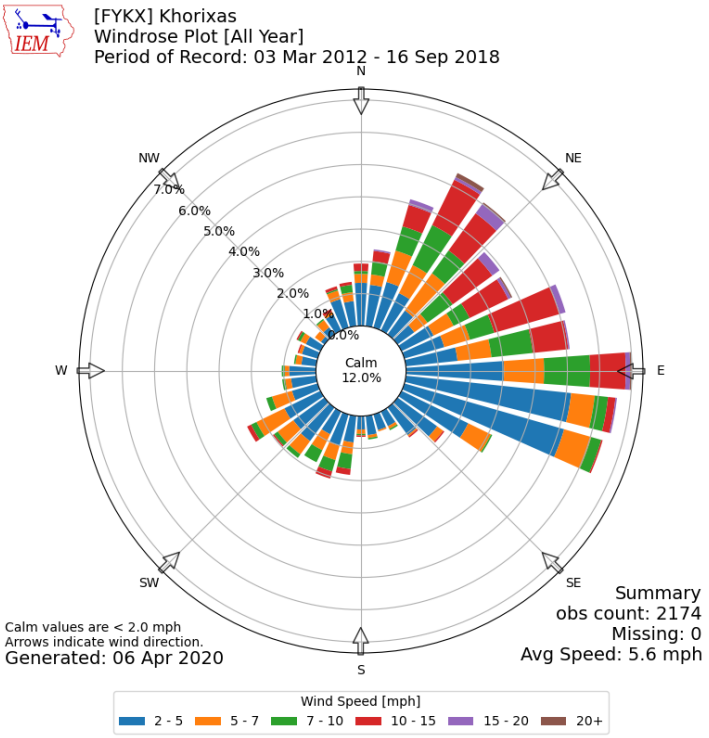

FIGURE 5 - WIND DIRECTION AND SPEED FROM KHORIXAS, KUNENE REGION (Source: Iowa State University, 2020).

5.3 GEOLOGY

The geological stratigraphy of the surroundings comprises units of the Otavi Group (Figure 6), which is hosted within a thick sequence of Precambrian (+660 million years old) carbonate rocks that form a synclinorium of the Northern Carbonate Platform. The Otavi Group form part of the Damara Supergroup, which covers the largest part of the northwest quarter of Namibia. These formations are oriented in a predominantly SW-NE direction and are 850 – 600 million years old (Mendelsohn et al., 2002). Towards Outjo in the east, the landscape is underlain by marbles of the Karibib Formations of the Swakop Group. Towards the south Cenozoic sediments and conglomerates, cemented by limonitic calcrete are associated with the ancient Ugab River valley.

Dominating rock types of the Otavi Group are limestones and dolomites. The origin of the Otavi Group is associated with the ancient sea between the Congo and Kalahari Cratons. Over millions of years a lime and dolomite rock mass of up to 5,000 m thick was formed, which was pressed upwards and folded intensely as the result of a gigantic collision between the two mainlands approximately 650 million years ago. Later the landscape was subject to a prolonged period of erosion, and only some of its higher parts preserved a mountainous character. The erosion effected the water soluble limestones particularly, creating a karst landscape marked by several synclinal and anticlinal axes, and underlain by carbonate rocks (mainly silicified dolomites). Dissolution is common, creating cavities, caves and sinkholes, but because of the karst no surface run-off into rivers is possible.

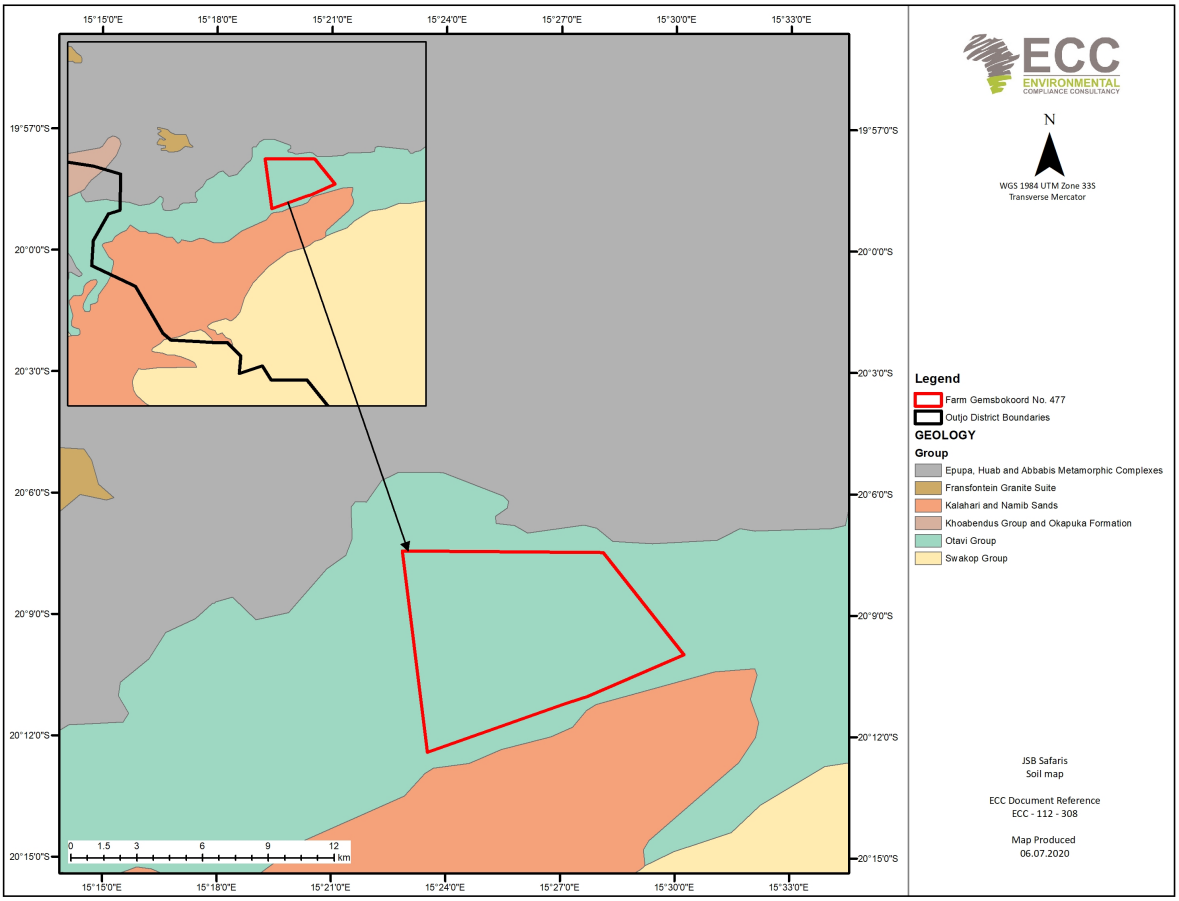

FIGURE 6 - GEOLOGY MAP

5.4 TOPOGRAPHY AND SOIL

Elevation ranges between 1,125 and 1,599 meters above mean sea level, from west to east. Figure 7 shows this variation, with the lowest and the highest points differing more than 450 meters and wide differences over short distances – indicating the undulating topography. The landscape becomes increasingly steeper towards the east.

As the entire surface of the farm is dominated by rocky outcrops and underlain by hard rock, topsoil is thin, scarce or even absent (Figure 8). On the depressions between outcrops leptosols are present. Leptosols are confined to crevices, and flatter and lower parts of the landscape. These soils are coarse-textured, often contain gravel or unweathered pieces of rock from the surroundings and are characterized by their limited depth caused by the presence of continuous sub-surface hard rock. Leptosols are poorly developed and thin, lack appreciable quantities of accumulated clay and organic material and are susceptible to erosion during the rainy season, especially in the beginning of the rainy season when vegetation cover is sparse. As the topsoil is loose and thin, it is also susceptible to wind erosion, especially when the vegetation cover is sparse.

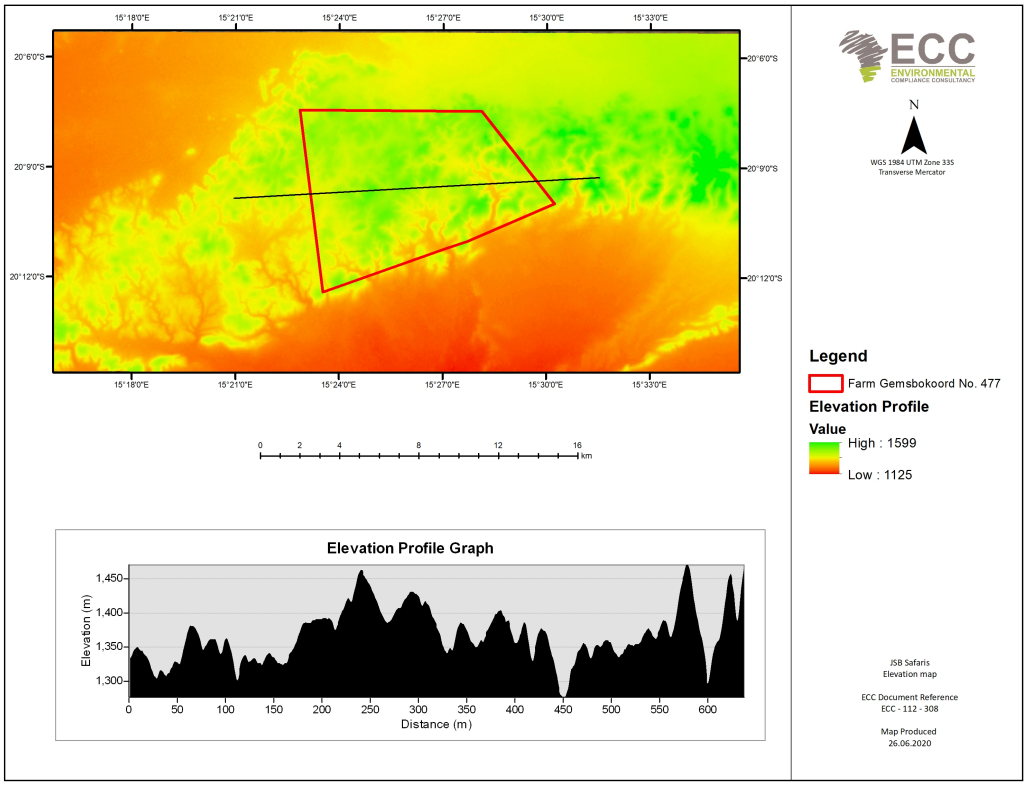

FIGURE 7 - ELEVATION MAP

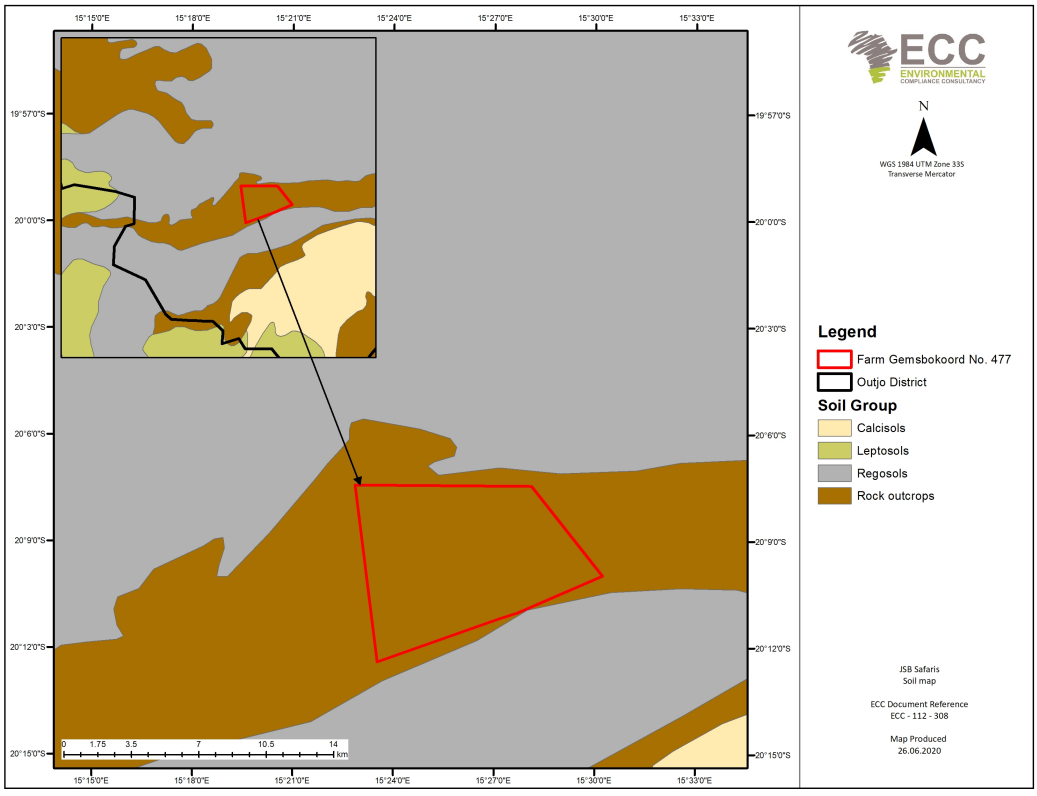

FIGURE 8 - SOIL MAP

5.5 HYDROLOGY

Surface water in Namibia is a rarity due to the little rain that falls, and when it falls it either evaporates, seeps into the ground or is rapidly drained by ephemeral rivers.

Gemsbokoord falls within the Kunene South groundwater basin, which is covered by the drainage basins of the Ugab and Huab Rivers (Figure 9). The watershed between the two basins is located close to the eastern boundary of the farm. The surface drainage system on the farm is ill-defined and tributaries of the two main rivers are not apparent. This is because dolomites and limestones, dominant rock types of the Otavi Group, constitute karst landforms. Surface run-off follow short distances and dissolution is common. Karst landforms are typically associated with a moderate to high potential of groundwater, although the local topography and geological complexity is influenced by non-porous sandstones and conglomerates, or marble bands without fissures and fractures, which prohibits a good potential of groundwater all over. The general direction of groundwater flow is west to southwest in this part of the groundwater basin (Christelis and Struckmeier, 2001).

Water for consumption comes from boreholes and there are four within the boundaries of the farm.

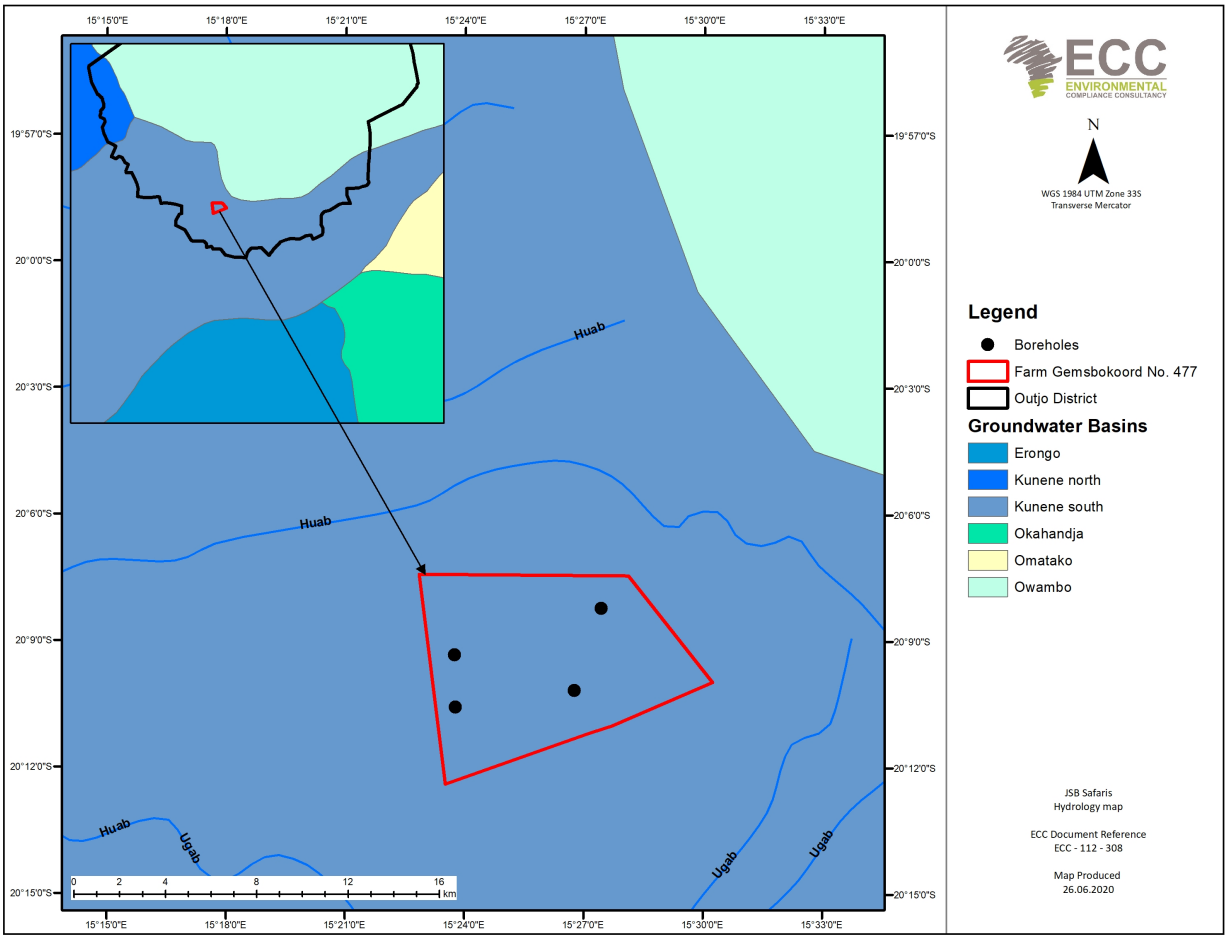

FIGURE 9 - HYDROLOGY MAP

5.6 VEGETATION

Vegetation shows a transition between Karstveld and Western Highlands, within the Acacia Tree-and-shrub Savanna sub-biome. Karstveld vegetation is broadly classified as a woodland, with vegetation dominated by woody shrubs and trees, becoming progressively shrubby where the soils are shallower, slopes are steeper and where it is more hilly and rocky (Mendelsohn et al., 2002). Most of the woody vegetation, indicated in Figure 10 as dense shrubland, vary between 1 and 3m in height. Thorny Acacia species dominate. Towards the west the vegetation is lower, sparser and increasingly dominated by Mopane (*Colophospermum mopane*), indicating a transition to the Western Highlands.

Plant diversity is estimated between 150 and 299 species (Mendelsohn et al., 2002), although local differentiation may occur because of topography and the availability of water. The most important environmental variable affecting the vegetation is rain but micro-habitat conditions and rangeland management practices determine bush density and grass composition. Grazing resources are made up of a wide variety of grass species, which vary widely in palatability and in their abundance. The farm is affected by bush encroachment, with Mopane (*Colophospermum mopane*), Sickle bush (*Dichrostachys cinerea*), Deurmekaarbos (*Terminalia prunioides*) and Blackthorn (*Senegalia mellifera),* the most abundant species.

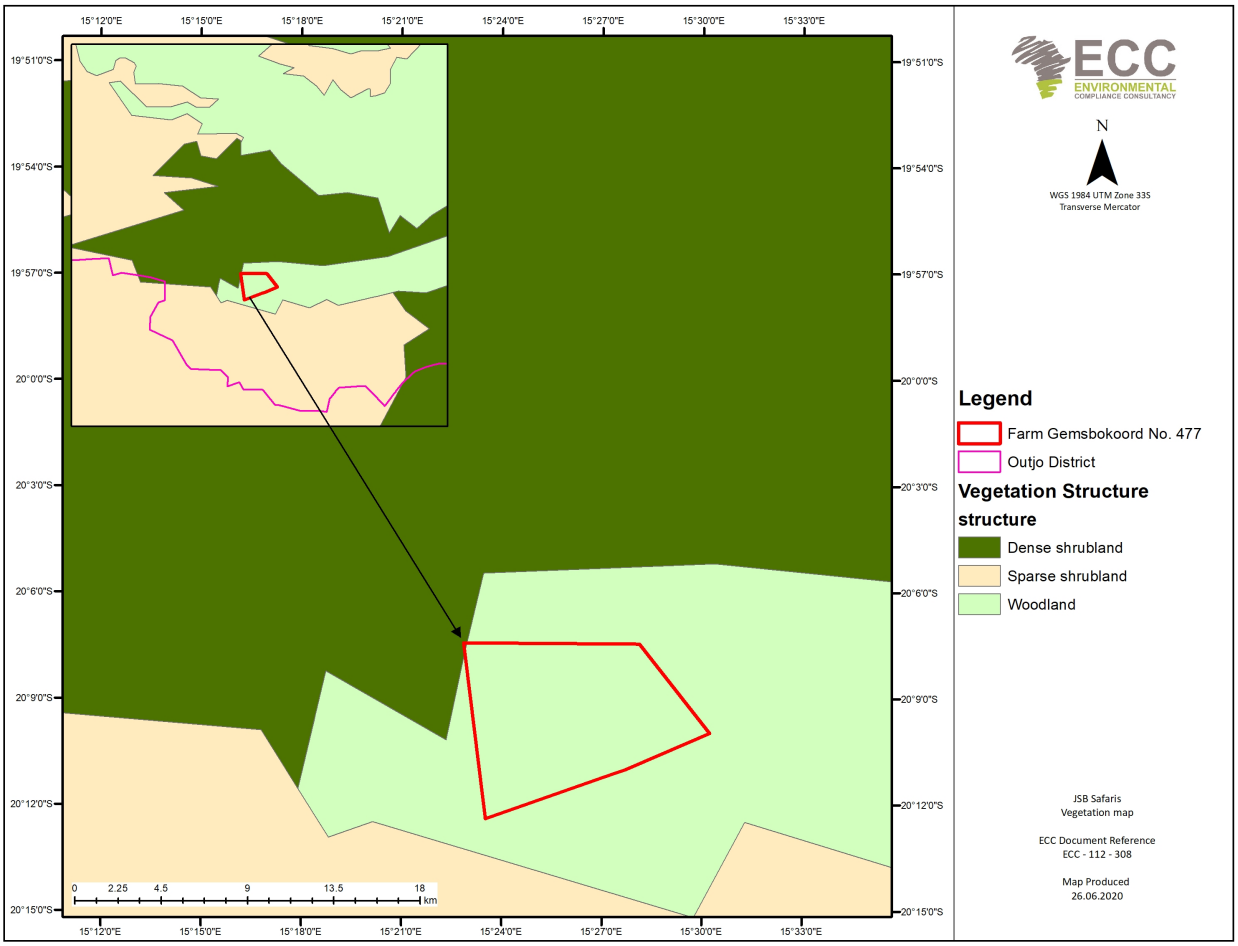

FIGURE 10 - VEGETATION MAP

5.7 FAUNA SPECIES

Overall terrestrial biodiversity of the surroundings ranges from medium to high. The number of mammal species ranges between 61 and 75, the number of bird species is between 141 and 170, with 71 – 80 reptile species, 4 – 7 frog species and 14 – 15 scorpion species that could be expected (Mendelsohn et al., 2002). On a local scale it is expected that diversity increases with the increase in habitats, which is closely coupled to shelter, food and water availability and migration routes. The micro-climate associated with an increase in elevation plays a prominent role in this regard and is directly related to the increase in terrestrial diversity.

The dominant land use of the surroundings is extensive agriculture. To protect their livestock, farmers are required to manage predators such as cheetahs, leopards and caracals.

5.8 SOCIO-ECONOMIC BASELINE

The Kunene Region in the northwest of Namibia, where Gemsbokoord is located, is underdeveloped when compared with many of Namibia's other regions. The population is predominantly rural, and in some cases (e.g. Himba) even nomadic. Parts of the region are without people, because it is desert, hostile or mountainous. The sparsely populated areas is a direct result of aridity and people and their livestock are concentrated at places where surface water is available. With an area of 115,260km² and a population of 86,856, the Kunene Region has the second lowest population density in Namibia of 0.8 persons/km² in 2011 (NSA, 2017).

Outjo, 75km to the east of Gemsbokoord, provides a limited range of facilities and services. A few shops offer a basic selection of goods and the town accommodates some education, magisterial, law and order, health and other facilities.

5.8.1. DEMOGRAPHY

Namibia is one of the least densely populated countries in the world (2.8 person per km^2). Vast areas of Namibia is without people, in contrast to some fairly dense concentrations, such as the central-north and along the Kavango River. Windhoek, the capital, functions as a primate city – not only is it the urban area with the biggest population, but the concentration of private and public head offices attracts Namibians from all parts of the country in search for a better live. National population growth rate is estimated at less than 2%, lower than most African countries. Namibia's population is young - although 57% falls in the age group 15 – 59, 37% of the total population is younger than 15 (NSA, 2017). Since 2005 there is a steady improvement in life expectancy, currently estimated at 65 years. In 2018 it was estimated that 50% of all Namibians are urbanized, in other words living in an urban settlement (retrieved from www.worldpopulationreview.com). The last national census was conducted in 2011 and counted 2.1 million Namibians. An inter-censal demographic survey was conducted in 2016 and estimated the total population at 2.3 million (NSA, 2017).

Population density in the Kunene Region is three times lower (0.8 person per square km) than the national average. The projected total population for the Kunene Region was 97,865 in 2016. Only 32% of all people in the region live in an urban place. Otjiherero is the most spoken language in the region (46% of all households). Average household size is 4.6. The literacy rate is low when compared to the rest of Namibia; only 66% for people older than 15 are literate, in contrast to the national average of 89% (NSA, 2017).

Living in a rural environment implies lower living conditions – in the Kunene Region only 75% of all households have access to safe water, 64% have no toilet facility, only 29% have electricity for lighting and 69% of all households make use of open fires to prepare food (NSA, 2017).

5.8.2. GOVERNANCE

Namibia is divided in 14 regions, subdivided by 121 constituencies. Kunene Region is divided into six constituencies which are: Epupa, Kamanjab, Khorixas, Opuwo, Outjo and Sesfontein. Each region has a regional council, elected during regional elections per constituency. Towns are governed through local authorities, in the form of municipalities. Opuwo is the capital of the Kunene Region. Khorixas and Outjo, the two towns closest to the farm, are both governed through a local authority in the form of a town council.

5.8.3. EMPLOYMENT

The labour force participation rate is the proportion of the economically active population, given as a percentage of the working age portion of the population (i.e. older than 15 years of age). The rate of labour force participation for the Kunene Region was 71.5%, compared to the average of 71.2% for Namibia in 2018 (NSA, 2019).

In 2018, 53.4% of all working Namibians were employed in the private sector and 21.5% by the state. State-owned enterprises employ 7.6% and private individuals 16.6%. Agriculture (combined with forestry and fishing) is the economic sector with the most employees – 23% of all employed persons in Namibia work in this sector. Wages and salaries represented the main income source of 47.4% of households in Namibia (NSA, 2019).

Low education levels affects employability and prevents many households to earn a decent income. Of all employed people in Namibia, 63.5% are not higher qualified than junior secondary level (Grade 10 and lower). In total 11.8% of all employed people had no formal education. In total 29.1% of all employed people fall in the category “elementary occupation” and 15.2% in the category “skilled agriculture”.

Overall the rate for unemployment is estimated at 33.4% for Namibia, using the broad definition of unemployment. The unemployment rate in rural and urban areas is almost the same – 33.4% in urban areas and 33.5% in rural areas. The highest unemployment rates are found amongst persons with education levels lower that junior secondary. The unemployment rate of persons with no formal education is 28.6%, with primary education 34.6% and with junior secondary education 32.7% (NSA, 2019).

5.8.4. ECONOMY

Although declining over time, agriculture (combined with forestry and fishing) is the sector that employs most Namibians (23%) and it is also the sector with the most employers. It is also the sector that employs the most informal workers in Namibia, calculated at 87.6%. Wages of employees in the agriculture sector are lower than all other sectors except for workers in accommodation and food services and domestic work in private households (NSA, 2019).

Since 2016, Namibia recorded slow economic growth, registering an estimated growth of only 1.1% in 2016. The primary and secondary industries contracted by 2.0 and 7.8% respectively. During 2017 the economy contracted by 1.7, 0.7 and 1.9% in the first, second and third quarters respectively (NSA, 2019). Despite the more positive expectations, the economy retracted to an average growth of not more than 1% annually since 2017.

Economic activities in the Kunene Region mainly revolve around agriculture and tourism. These two sectors provide most of the employment opportunities in the area although there has been an increase in mining ventures as of recent years. Bush control activities, and more particularly the production of charcoal, plays an increasingly important role in creating additional employment opportunities.

5.8.5. HEALTH

Since independence in 1990, the health status of Namibia has increased steadily with a remarkable improvement in access to primary health facilities and medical infrastructure. In 2015 the World Health Organization (WHO) recommended strategic priorities of the health system in Namibia which entail improved governance, an improved health information system, emergency preparedness, risk reduction and response, preventative health care and the combating of HIV/AIDS and TB (WHO, 2016).

HIV/AIDS remains a major reason for low life expectancy and is one of the leading causes of death in Namibia. There is a high HIV prevalence among the whole population, but since the peak in 2002 (15,000 new cases of HIV per year, and 10,000 deaths due to AIDS) the epidemic started to stabilise. Although new infections as well as fatalities halved during the next decade, life expectancy for females returned to pre-independence levels but for males it did not reach pre-independence levels. HIV/AIDS remains the leading cause of death and premature mortality for all ages, killing up to half of all males and females aged 40 - 44 years in 2013 (IHME, 2016).

Tuberculosis (TB) is a leading killer of people infected by HIV/AIDS, and Namibia had a high burden in 2018, 35% of people notified with TB were infected with HIV. The country is included among the top 30 high-burden TB countries in the world, with an estimated incidence rate of 423 per 100,000 people and 60 fatalities per 100,000 people in 2018 (retrieved from www.mhss.gov.na).

Over the period 2000 – 2013 significant rises were observed for stroke, ischemic heart diseases, diabetes and depressive disorders, but HIV/AIDS remained the top cause of premature mortality. Over the same period significant decreases were observed for diarrheal diseases, neonatal conditions and malaria. Risk factors are key drivers of premature mortality, and social ills were identified as the leading factor for death – particularly unsafe sex and alcohol and drug abuse. TB and malaria are compounded by the AIDS epidemic, and the risk of contracting malaria and TB is 15% greater if a person is also infected with HIV, with a risk of 50% higher to die as a result (IHME, 2016).

As of the beginning of 2020 the coronavirus disease (COVID-19), causes illness in humans at a pandemic scale and has resulted in an increasing number of deaths worldwide. The viral outbreak is adversely affecting various socio-economic activities globally, and with reports of the increasing number of people testing positive, it is anticipated that this may have significant impacts on the operations of various economic sectors in Namibia too. The disease caused many countries to enter a state of emergency and lockdown mode, with dire economic consequences. In addition, these measures have a detrimental effect on tourism – and Namibia is in both cases no exception.

5.8.6. HERITAGE

In Namibia several mountains are closely coupled to heritage values, and it is possible that this applies to the elevated parts of the farm. A review of the National Heritage Council database was conducted, and no known heritage sites are recorded yet. In cases where heritage sites are discovered the chance find procedure will be used.

6 IDENTIFYING POTENTIAL IMPACTS

The key stage of the EIA process is the impact prediction and evaluation stage. This stage is the process of bringing together project characteristics with the baseline environmental characteristics and ensuring all potentially significant environmental and social impacts are identified and assessed. Impact prediction and evaluation involve envisaging the possible changes to the environment as a result of the proposed project. The recognized methodology was applied to determine the magnitude of impact and whether or not the impact was considered significant and thus warrant further investigation. The assessment is an iterative process which considers the entirety of the project, from the inception to the implementation (operational) stage.

6.1 LIMITATIONS, UNCERTAINTIES AND ASSUMPTIONS

This GEMP does not include measures for compliance with statutory occupational health and safety requirements. This will be provided in the health and safety management plan to be developed by the proponent.

Where there is any conflict between the provisions of this GEMP and any staff obligations under their respective contracts, including statutory requirements (such as licences, project approval conditions, permits, standards, guidelines and relevant laws), the contract and statutory requirements are to take precedence.

The information contained in this GEMP has been based on the project description as provided herein by the client and through desktop study. Where the bush control methods alter, this GEMP may require updating and potential further assessment undertaken.

A number of limitations and uncertainties were acknowledged during the assessment. In line with best practice, assumptions have been made based on realistic worst-case scenarios, thereby ensuring that the worst-case potential environmental impacts are identified and assessed. Table 4 below contains the assumptions and uncertainties identified during the assessment process.

TABLE 4: SUMMARY OF LIMITATIONS, UNCERTAINTIES AND ASSUMPTION

LIMITATION / UNCERTAINTY	ASSUMPTION
Number of workers and area they will come from	It is planned that an unknown number of workers will be employed for bush control activities. It is assumed that these workers will come from elsewhere in Namibia and will reside on the farm while they are employed. No final number of employees can be assumed.
Agreements	It is assumed that all agreements regarding supply and delivery, transporting and marketing will be in place during operations.
Sequencing and scale of activities	Bush control activities are planned on 3,000 – 4,000 hectares of the farm, over a period of 5 to 10 years. Information about priority areas, the scale of activities over time, total areas harvested and production figures are assumptive.

Where uncertainties exist, a cautious approach has been applied, allowing the worst-case scenario for potential impacts to be identified. Where limitation and uncertainties exist, assumptions have been made and applied during the assessment process.

6.2 ALTERNATIVES

Best practice calls for the consideration of alternatives to a proposed project as an attempt to identify the identification of the least damaging options.

If the status quo on Gemsbokoord prevails and no bush control activities are initiated, the current carrying capacity will further decrease and the biodiversity further reduce. Moreover the opportunities for commercial utilization of the woody resources would be lost and no additional employment created.

Initiating bush control activities on Gemsbokoord, to the contrary, has the opportunity to improve the productivity of the farm, improve the biodiversity, unlock the commercial opportunities of the harvested wood and create employment opportunities.

6.3 IMPACT ASSESSMENT DETERMINATION OF SIGNIFICANCE

The evaluation and prediction of the environmental and social impacts require assessment of the project characteristics against the baseline characteristics, ensuring all potentially significant impacts are identified and assessed.

The significance of an impact is determined by taking into consideration the combination of the sensitivity and importance / value of environmental and social receptors that may be affected by the proposed activities, the nature and characteristics of the impact, and the magnitude of potential change (Figure 11). The magnitude of change (the impact) is the identifiable changes to the existing environment which may be direct or indirect; temporary / short term, long-term or permanent; and either beneficial or adverse.

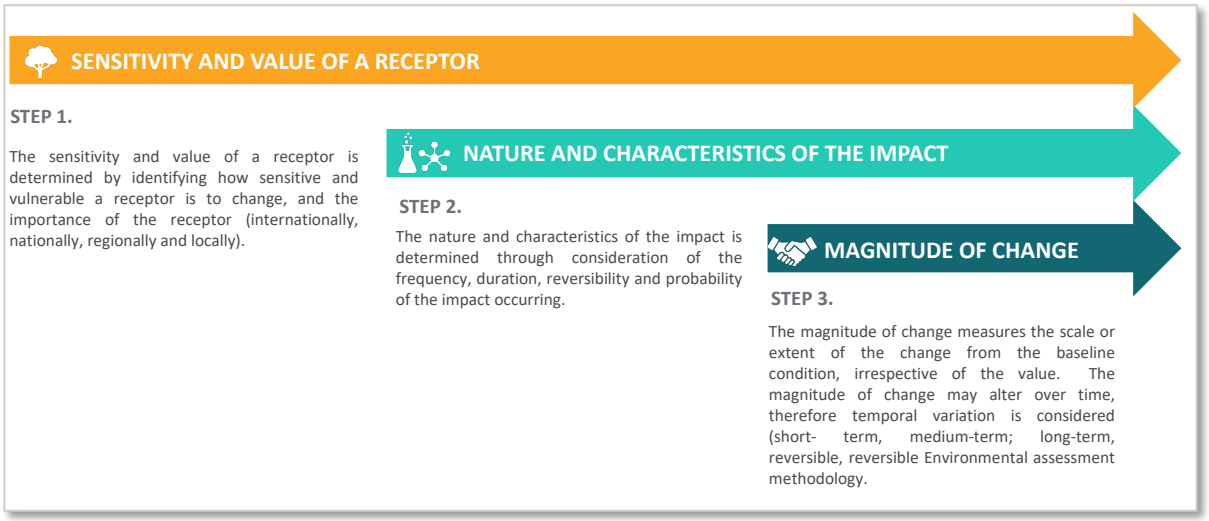

FIGURE 11:- DETERMINATION OF SIGNIFICANCE

The tables below set the description and thresholds used in determining impact significance.

TABLE 5: - NATURE OF IMPACT

NATURE	
Term	**Description**
Beneficial (Positive)	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Adverse (Negative)	An impact that is considered to represent an adverse change from the baseline or introduces a new undesirable factor.

TABLE 6:- TYPE OF IMPACT

TYPE	
Term	**Description**
Direct	Impacts causing an impact through direct interaction between a planned project activity and the receiving environment/receptors.
Indirect	Impacts that result from other activities that are encouraged to happen as a result / consequence of the Project. Associated with the project and may occur at a later time or wider area
Cumulative	Impacts that arise as a result of an impact and effect from the project interacting with those from another activity to create an additional impact and effect

TABLE 7:- REVERSIBILITY OF IMPACT

REVERSIBILITY	
Term	**Description**
Reversible	Impacts are reversible and recoverable in the future
Partly Reversible	Some parts of the impact can be reversed while others remain
Irreversible	Impacts which are not reversible and are permanent

TABLE 8: - MAGNITUDE OF CHANGE

MAGNITUDE OF CHANGE	
Term	**Description**
None / negligible	Very minor loss or detrimental alteration to one (or maybe more) characteristic, feature or element; or Very minor benefit to, or positive addition of, one (or maybe more) characteristic, feature or element.
Low / Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (or maybe more) key characteristic, feature or element; or Minor benefit to, or addition of, one (or maybe more) key characteristic, feature or element; some beneficial effect on attribute quality or a reduced risk of a negative effect occurring.
Moderate	Loss of resource, but not adversely affecting its integrity; partial loss of/damage to key characteristics, features or elements; or Benefit to, or addition of, key characteristics, features or elements; improvements of attribute quality.
High / Major	Loss of resource, and quality and integrity of resource; severe damage to key characteristics, features or elements; or Large scale or major improvement of resources quality; extensive restoration or enhancement; major improvement of attribute quality.
Very high / unknown	Loss of resource, significantly affecting the long term quality and integrity of a resource; irreparable damage or loss of key characteristics, features or elements; or the magnitude is too great to quantify as it is unknown.

TABLE 9:- DURATION OF IMPACT

DURATION	
Term	**Description**
Temporary	Transient; a period of less than 1 year
Short term	Impacts that are likely to last for the duration of the activity causing the impact and are recoverable (1-5 years)
Medium term	Impacts that are likely to continue after the activity causing the impact and are recoverable (5-15 years)
Long term	Impacts that are likely to last far beyond the end of the activity causing the damage (greater than 15 years with impact ceasing after decommissioning of the project)
Permanent	Permanent

TABLE 10 - SCALE OF CHANGE

SCALE OF CHANGE - EXTENT / GEOGRAPHIC SCALE	
Term	**Description**
On-site	Impacts that are limited to the boundaries of the proposed project site
Local	Impacts that occur in the local area of influence, including around the proposed site and within the wider community
Regional	Impacts that affect a receptor that is regionally important by virtue of scale, designation, quality or rarity.
National	Impacts that affect a receptor that is nationally important by virtue of scale, designation, quality or rarity.
International	Impacts that affect a receptor that is internationally important by virtue of scale, designation, quality or rarity.

TABLE 11 - PROBABILITY OF CHANGE

PROBABILITY	
Term	**Description**
Improbably (Rare)	The event may occur in exceptional circumstances yet, rarely occurs in the industry. The event could occur once every 100 years
Low probability (Unlikely)	The event has happened elsewhere yet, is unlikely to occur. The event could occur once every 10 years
Medium Probability (Possible)	The event could occur under some circumstances. The event could occur once every 5 years.
High Probability (Likely)	The event is expected to occur. The event could occur twice per year
Definite (Almost certain)	The event will occur. The event could occur once per month

TABLE 12 - SIGNIFICANCE DESCRIPTION

SIGNIFICANCE OF IMPACT	DESCRIPTION
Low – Major (Beneficial) All scores	Impacts are considered to be beneficial to the environment and society:
Low (negative) 0 - 25	Impacts are considered to be local factors that are unlikely to be critical to decision-making.
Minor (negative) 25 - 50	Impacts are considered to be important factors but are unlikely to be key decision-making factors. The impact will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value. Impacts are considered to be short-

	term, reversible and/or localized in extent.
Moderate (negative) 50 - 75	Impacts are considered within acceptable limits and standards. Impacts are long-term, but reversible and/or have regional significance. These are generally (but not exclusively) associated with sites and features of national importance and resources/features that are unique and which, if lost, cannot be replaced or relocated.
Major (negative) 75 - 100	Impacts are considered to be key factors in the decision-making process that may have an impact of major significance, or large magnitude impacts occur to highly valued/sensitive resource/receptors. Impacts are expected to be permanent and non- reversible on a national scale and/or have international significance or result in a legislative non- compliance.

TABLE 13:- SENSITIVITY AND VALUE OF RECEPTOR

SENSITIVITY AND VALUE	DESCRIPTION
Low	Of value, importance or rarity on a local scale; and/or not particularly sensitive to change or has considerable capacity to accommodate a change.
Medium	Of value, importance or rarity on a regional scale, and with limited potential for substitution; and/or moderate sensitivity to change, or moderate capacity to accommodate a change.
High	Of value, importance or rarity on an international and national scale, and with very limited potential for substitution; and/or very sensitive to change or has little capacity to accommodate a change.

TABLE 14 – SIGNIFICANCE OF IMAPCT

				Signifance of Impact			
			Signifance of Impact	Impacts are considered to be local factors that are unlikely to be critical to decision-making.	Impacts are considered to be important factors but are unlikely to be key decision-making factors. The impact will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value. Impacts are considered to be short-term, reversible and/or localized in extent.	Impacts are considered within acceptable limits and standards. Impacts are long-term, but reversible and/or have regional significance. These are generally (but not exclusively) associated with sites and features of national importance and resources/features that are unique and which, if lost, cannot be replaced or relocated.	Impacts are considered to be key factors in the decision-making process that may have an impact of major significance, or large magnitude impacts occur to highly valued/sensitive resource/receptors. Impacts are expected to be permanent and non- reversible on a national scale and/or have international significance or result in a legislative non- compliance.
	Biophysical	**Social**		**Low**	**Minor (2)**	**Moderate (3)**	**Major (4)**
Sensitivity	A biophysical recepeotr that is protected under legislation or internaiton conventions (CITES) listed as rare, threatened or endangered IUCN specidices. Highly valued/sensitive resource/receptors	Those affected people/communities will not be able to adapt to changes or continue to maintain-pre impact livelihoods.	**High (3)**	**Minor (3)**	**Moderate (6)**	**Major (9)**	**Major (12)**
	Of value, importance or rarity on a regional scale, and with limited potential for substitution; and/or Not protected or listed (gloabbally) but may be a rare or threatened species in coutnry; with little reslisence to ecosystem changes, imporant to ecosystem functions, or one under threat or popultion declinet.	Able to adapt with some difficulty and maintain preimpact status but only with a degree of support	**Medium (2)**	**Low (2)**	**Minor (4)**	**Moderate (6)**	**Major (8)**
	Not protected or listed as common / abundant; or not crtical to other ecosystems functions	Those affected are able to adapt with relative ease and maintain preimpacrt status. There is no perceptible change to people's livelihood.	**Low (1)**	**Low (1)**	**Low (2)**	**Minor (3)**	**Moderate (4)**

To ensure the beneficial impacts are brought out in the assessment, green has been applied to ensure the different type of impact is clear. The description for each level of significance presented in Table 13 was also followed when determining the level of significance of a beneficial impact.

The significance of impacts has been derived by applying the identified thresholds for receptor sensitivity and magnitude of change, as well as the definition of significance. **Moderate and major adverse impacts are considered as significant**. The following thresholds were therefore used to double check the assessment of significance had been applied appropriately; a significant impact would meet **at least one** of the following criteria:

- It exceeds widely recognized levels of acceptable change;
- It threatens or enhances the viability or integrity of a receptor or receptor group of concern; and
- It is likely to be material to the ultimate decision about whether or not the environmental clearance certificate is granted

6.4 CUMULATIVE IMPACTS

Cumulative impacts may arise as a result of other project activities or the combination of two or more projects in the project area.

6.4.1. CUMULATIVE IMPACT ASSESSMENT METHOD

The Cumulative Impact Assessment (CIA) has been undertaken by applying the International Finance Corporation (IFC) CIA Good Practice Handbook (IFC, 2013), which recommended a rapid CIA is undertaken. A rapid CIA takes into consideration the challenges associated with a good CIA process, which includes lack of basic baseline data, uncertainty associated with anticipated development, limited government capacity, and absence of strategic regional, sectoral or integrated resource planning schemes.

The five-step rapid CIA process has been followed:

- Step 1: Scoping - Determine spatial and temporal boundaries
- Step 2: Scoping - Identify valued environmental and social receptors and identify reasonably foreseeable developments
- Step 3: Determine present condition of valued environmental and social receptors (the baseline)
- Step 4: Evaluation of the significance of the cumulative impacts
- Step 5: Identification of mitigation measures to avoid or reduce cumulative impacts

The following information has been applied to the assessment in line with the above steps and IFC Guidance:

- The spatial and temporal boundaries of the CIA are the extent of the site boundaries and the duration of the decline development and operation phases of the proposed project (up to months from the date of commencement);
- Valued environmental and social receptors that may be affected are those presented in Chapter 5. No additional ones have been identified through this CIA;
- The predicted future conditions of common environmental receptors have been taken into consideration in the assessment;
- The assessment findings presented in Chapter 7 have been applied to the CIA in combination with professional judgment and published environmental assessment reports; and
- A review of mitigation and monitoring measures has been undertaken, with any additional ones identified.

7 MANAGEMENT OF THE ENVIRONMENTAL IMPACTS

7.1 MANAGEMENT OF THIS GEMP

The proponent will hold the Environmental Clearance Certificate for the proposed bush control activities on Gemsbokoord and shall be responsible for the implementation and management of this GEMP. This GEMP provides the necessary measures, guidelines, and procedures for managing and mitigating potential environmental impacts, as well as the monitoring and reporting requirements and sets responsibilities for those carrying out management and mitigation measures.

The implementation and management of this GEMP and thus the monitoring of compliance shall be undertaken through daily duties and activities and monthly inspections.

This GEMP shall be circulated to all personnel involved in the project and shall be made available on the Environmental Compliance Consultancy's (ECC) website.

7.2 ORGANISATIONAL STRUCTURE, ROLES AND RESPONSIBILITIES

The proponent shall be responsible for:

- Ensuring all members involved in the operations of bush control activities on the farm, comply with the procedures set out in this GEMP.
- Ensuring that all personnel are provided with adequate training, supervision, and instruction to fulfil this requirement.
- Ensuring that any personnel allocated specific environmental responsibilities are notified of their appointment and confirm that their responsibilities are clearly understood.

The proponent shall be responsible for ensuring and demonstrating that all personnel are compliant with this EMP, and meet the responsibilities listed above.

The key personnel and environmental responsibilities of each role are tabulated in Table 15.

TABLE 15 - KEY ROLES AND RESPONSIBILITIES

ROLE	RESPONSIBILITY & DUTIES
Proponent (farmer / owner)	– Ensure adequate resources are made available for implementation of this GEMP; – Responsible for providing the required resources (including financial and technical) to complete any required tasks; – Ensuring compliance with this GEMP including overseeing the day to day activities during operations, and routine and non-routine maintenance works during operations; – Ensure the environmental policy is communicated to all personnel; – Maintain an event register, and keep records of complaints, incidents and grievances; – Ensuring that best environmental practice is undertaken during all bush control activities; – Responsible for the management, maintenance and revisions of this GEMP; – Conducting meetings regularly to review tasks, status of tasks and schedule of upcoming tasks.
Farm manager or appointed supervisor (e.g. foreman)	– Responsible for ensuring compliance with this GEMP including monitoring and overseeing all day to day activities, including routine and non-routine works; – Ensure the environmental policy is communicated to all personnel; – Ensure all employees and contractors participate in induction and training prior to

ROLE	RESPONSIBILITY & DUTIES
	commencing work; – Implement appropriate environmental and safety management measures – Maintain an up to date register(s) of training; – Ensure all personnel are aware of the commitments made in this GEMP and any other relevant regulatory requirements applicable; – Ensure that all employees are conversant with the requirements of this GEMP, relevant to their roles and adhere to this GEMP at all times; – Ensuring appropriate corrective or remedial action is taken to address all environmental hazards, incidents and grievances reported; and – Report any non-compliance or accidents to the owner of the farm.
Employees (contractors as well as visitors where applicable)	– Responsible for being compliant with and adhering to this GEMP at all times; – Ensuring they are trained and are conversant with the requirements of this GEMP; and – Reporting of any operations and conditions that deviate from the GEMP or any non-compliant issues or accidents to the proponent.

7.3 Objectives and Targets

Environmental protection is the responsibility of management and if the management is environmentally aware, it motivates all employees and their associated guests to think and act in a more environmentally responsible manner. Environmental objectives and targets have been developed so that activities of Gemsbokoord No.477 farm can minimise potential impacts on the environment, as far as reasonably practicable.

Environmental objectives for the proposed bush control activities are:

- Zero pollution incidents
- Protect local flora and fauna
- Use water and other natural resources effectively and efficiently, and
- Appropriate waste management and pollution control

7.4 Register Of Potential Environmental Impacts

Table 16 provides a register of potential environmental impacts, which require mitigation and monitoring measures. This register also assign roles and responsibilities for the implementation of the tasks, is subject to regular review by the proponent and will be updated when necessary. The proponent will use this register to undertake monthly inspections to ensure that the bush control activities on Gemsbokoord is compliant with this GEMP.

Table 16 – POTENTIAL ENVIRONMENTAL IMPACTS, MANAGEMENT AND MITIGATION MEASURES

ACTIVITY	POTENTIAL IMPACT	MANAGEMENT / MITIGATION MEASURES	MONITORING REQUIREMENTS	RESPONSIBILITY
Manual and semi-mechanised bush control activities	Loss of protected species	– Avoid cutting protected trees (See Appendix A) – Protected trees must be marked (e.g. with hazard tape) and all staff should be made aware that marked trees are out of bounds. – All staff must be informed in writing about the consequences of breaking this rule, and it must be clear that the rule is understood.	Daily	All staff
	Loss of large, dead and evergreen trees	– Trees taller than 4 m, or greater than 18 cm diameter at the base, must be retained. (If the vegetation consists entirely of encroachers larger than 4 m, leave 300 – 500 per hectare.) – Evergreen trees must be retained. – Dead trees must be retained	Daily	All staff
	Loss of riverine vegetation	No living tree, bush or shrub within 100 m of a drainage line shall be removed	Daily	All staff
	Imbalance of ecology due to over-harvesting	– Leave a heterogeneous mix of trees and bush species of different size classes ('islands') totalling at least 10% of the target area and spaced so that there are some open patches and some dense patches, to provide a variety of habitats for animals. – Seek to create an environment with a matrix of grass, large trees and bush. (The TE-formula includes all sizes and species, including protected species. The outcome after bush control activities should be a park-like landscape, with some bushy 'islands'. Areas larger than 1 hectare as representative samples of the original habitat should be left as well.)	Daily	All staff
	Disturbance of sensitive plant habitats	– Ensure that there is no bush control activities in sensitive habitats – Identify sensitive habitats prior to bush control activities (e.g. riverine vegetation, termite mounds, presence of nests, residing and slow moving organisms) – Avoid harvesting on steep slopes where characteristic species dominate	Daily	All staff

	Loss of livestock and wildlife from poaching	– Killing of livestock or wildlife, and setting of snares, is strictly prohibited. Any person involved in such practices will be fired with immediate effect. – No person shall be in possession of a firearm or snare, such items should be confiscated if detected. A warning will be issued to the offender. – All personnel must be informed in writing about the consequences of breaking these rules and ensure that the rules are clear and well understood.	Daily	All staff
	Loss of livestock or wildlife because of fire	– Regular training of staff on fire prevention and fire-fighting – Fire management should be carefully planned – no burning during windy conditions, no fire in areas without firebreaks, early notification of neighbours, remove livestock from areas marked for burning, ensure escape routes, etc. – Keep fire-fighting equipment (e.g. beaters, backpack sprays, water carts with pumps, etc.) available – Implement an early warning system to take care of fires urgently – Open fires only permitted in designated areas – Clear areas (minimum of 3 m) around active kilns – No fire or burning kiln will be left unattended – Monitor areas with kilns and areas after a burn to prevent the re-occurrence of fires	Daily	All staff
	Escape of livestock or wildlife due to damaged fences and / or gates left open	– Ensure that the fences around the farm boundaries are well maintained and not damaged. – Ensure that the farm gates are always closed – The importance of these should be made clear to all staff and ensure that they are informed in writing about the consequences of breaking the rules.	Daily	All staff
	Disturbance of sensitive animals and birds	– Nests of large raptors such as eagles and vultures must be avoided by at least 100 m. In an event where such nests are found, the clump of vegetation around them should not be harvested. – Do not harm or disturb slow moving and reside species (e.g. tortoises and snakes).	Daily	All staff

	Loss of topsoil	– No bush on slopes steeper than 12.5% should be cut (i.e. 1-in-8). – Bush cutting is also not recommended on slopes of 5 – 12.5% (i.e. between 1-in-20 and 1-in-8). – Machinery should always move along the contours, not directly up and down on slopes of 5 – 12.5%. – Should the slopes be significantly encroached, set aside as part of the 50% of bush encroached areas per farm that will not be cut in the medium to long term.	Daily	All staff
	Erosion of riverbanks	– Cutting of any living trees, bushes or shrubs within 100 m of a watercourse, pan or spring is prohibited except: 1) Where bush has encroached into seasonal pans, one may clear the floor of the pan but not around the outside margins. 2) Alien invasive species such as *Prosopis* may be removed from within a watercourse and from riverbanks.	Daily	Employees
	Loss of soil fertility	– Invaders on soil susceptible to wind and water erosion should be thinned less vigorously (e.g. sandy soils without structure and thin, shallow soils like leptosols) – All sites should be harvested according to the TE – rainfall formula to reduce the potential of exposing soil to erosion (Appendix B).	Daily	Employees
Indirect impacts as a result of bush control activities	Pollution of water	– Spillages and leaks of hydrocarbons need to be contained where possible and clean-up measures should be applied immediately after such incidents. – Good maintenance and servicing should be in place to avoid breakdowns. – Waste disposal should be away from water bodies, and contained if possible.	Daily	Employees
	Air pollution	– Smoke from kilns, under certain conditions, can accumulate to harmful levels. – Training and supervision of employees as well as the use of retort kilns can improve the efficiency of the burning process – Good maintenance and servicing of vehicles, machinery and equipment that emit smoke can reduce their smoke potential	Daily	Employees

	Increased encroachment after bush thinning	– For some species it may be sufficient to apply methods such as hand application of herbicides or stem burning. – Ensure inspection / monitoring routine of bush density in previously harvested areas. – Aftercare is essential to prevent re-infestation. – Practicing shorter rotation time for bush harvesting may be necessary.	Weekly / Monthly	All staff
Aftercare activities	Killing of non-target trees and other effects of arboricides	The use of arboricides has implications for human and environmental health, therefore it is essential to use them correctly. – Only prescribed herbicides for bush control may be used. – Always read the Material Safety Data Sheet (MSDS) and follow the instructions of the manufacturer on how the chemical should be stored, disposed as well as the safety requirements. – Ensure appropriate Personal Protective Equipment (PPE) are worn when applying arboricides. – If the chemical require mixing, this should be done in a place that is either far away from non-target vegetation. – Application equipment should be properly calibrated, for dosages to be accurately applied. – Never wash spilled residues down a sewer system or clean and wash equipment near open bodies of water or boreholes – Ensure strict monitoring and management during application for chemicals not to be thrown away or sold. – It is advisable to conduct further research to calculate minimum dosages that achieve the desired effect	Daily	All staff
Job creation, skills development and business opportunities	Beneficial socio-economic impacts on a local and regional scale	– Maximise local employment and local business opportunities – Enhance the use of local labour and local skills as far as reasonably possible – Goods and services are sourced from the local and regional economy as far as reasonably possible	Monthly	Farmer / Farm manager or appointed supervisor

7.5 EMPLOYMENT

The proponent and all contractors shall comply with the requirements of the Regulations for Labour, Health and Safety, and any amendments to these regulations. The following shall be complied with:

- In liaison with local and regional authorities, the proponent shall ensure that local people have access to information about job opportunities and are considered first for contract employment positions.
- The number of job opportunities shall be made known together with the associated skills and qualifications. The maximum length of time the job is likely to last for shall be indicated.
- Every effort shall be made to recruit from the pool of unemployed workers living in the surrounding area.

7.6 ADHERENCE TO THE MAIN PRINCIPLES OF BUSH CONTROL ACTIVITIES

The *Strategic environmental assessment of large-scale bush thinning and value-addition activities in Namibia* (SAIEA, 2015) recommends strongly that "bush farming" (re-growth of encroaching species for the purpose of re-harvesting) should not be encouraged because this approach inhibits the repair of the water cycle, will not improve soil fertility, optimal biodiversity will not be achieved, and overall rangeland productivity is less likely. Bush farming will not allow the process of ecological succession to proceed to a climax state and is also contrary to the objectives of the Forestry Act and the Rangeland Management Policy and Strategy. Instead an approach of bush-thinning is preferred so that the landscape ecology can recover, a broad range of ecosystem services can be delivered on a sustainable basis (groundwater recharge, soil health, habitats for biodiversity) and the overall land productivity improve.

The Bush Control Manual (2017) sets the main principles for bush control in Namibia:

- *Concentrate bush control on species and individuals that are obviously part of encroacher growth and leave the others alone.*
- *Leave a mix of trees and bushes on the land: The veld should have a variety of tree species (including some of the encroacher species) of different sizes. They should be spaced in a way that there are some open patches and some dense patches. This provides a variety of habitats for animals and imitates the heterogeneity (patchiness) of natural landscapes.*
- *Thin bush in a phased approach: Avoid to "shock" the land by an abrupt change from dense bush to open veld.*
- *Protected plants should not be harvested. Exceptions can be made under supervision of Forestry officials in cases of high densities.*

- *If arboricides are being used, foliar (leaf spray) and stem-applied arboricides are recommended. Pellets should not be used, as they tend to get washed along the surface by rain and end up in non-target areas.*
- *Dry river beds tend to carry more and larger trees. Forestry regulations state that trees should not be thinned within 100 metres of a river course. Thinning is required in densely encroached river margins, but one should leave a higher density of trees than on the adjacent habitat. It is especially important to leave large trees along a river course. The exception to this is Prosopis, an exotic species that invades river beds, and should be eradicated completely.*
- *Training of the work force is necessary before harvesting starts. Workers need to know which trees to target and which to avoid. Work teams need to be managed so that any excessive harvesting or killing of the wrong species is noticed and corrected.*

7.7 Adherence to the Main Principles of Aftercare Activities

Aftercare is as important as bush thinning itself and an essential step to eventually restore the productivity of rangelands. Several studies and extensive research and review conform aftercare as the essential final component of a comprehensive bush control program (SAIEA, 2015). In short, aftercare is necessary to facilitate the process of ecological succession of savanna grasslands towards a climax state – i.e. dominated by perennial grasses and sufficient woody plants.

The natural response after bush clearing is the growing of more woody replacements. If bush control activities are more selective and the encroachers thinned less radically, larger individuals suppress smaller ones and less follow-up removals of unwanted species are required. The timing of aftercare intervention, the duration of an aftercare program and the type of aftercare activities differ from area to area. Monitoring is thus essential – to keep control over coppicing and the emergence of seedlings. Coppicing occurs quickly on stumps that were not killed during harvesting. The emergence of seedlings depend on water supply and is closely coupled to the rainy season.

Part of all aftercare programs is the removal of small, immature woody plants – mainly low coppice growth and saplings – to return the rangeland to the bush density achieved after the initial bush control activities (Bush Control Manual, 2017). Non-chemical methods are preferred because most of the small bush and saplings can be manually removed (e.g. chopping them off below ground level). Introducing browsers like goats on bush-controlled areas can keep sprouting and the emergence of seedlings under control, in addition. Controlled burning to kill off immature plants and saplings is another way to keep bush-controlled areas in check. Chemical aftercare is normally the last option of aftercare.

7.8 ADHERENCE TO SUSTAINABLE RANGELAND MANAGEMENT

Namibia's National Rangeland Management Policy and Strategy of 2012 emphasises eight widely applicable principles of sound rangeland management:

- Know the resource base: For any land manager it is essential to know which perennial grass species and which woody species dominate, to know the soil characteristics, differences and conditions, to know nutrient hotspots and to understand the general rangeland ecology to be able to evaluate the condition of the rangeland – whether it degrades, stabilizes or improves.
- Manage grasses for effective recovery and rest: Perennial and preferred grasses are usually grazed first and most intensely, by the most animals. Adaptive grazing management should be practiced – to allow recovery and seeding.
- Manage for effective utilization of grasses and shrubs: On savanna rangelands browsing is often neglected, while the herbaceous (grassy) component is often over-utilized. For this reason browser-based livestock enterprises are encouraged.
- Enhance soil conditions: Healthier soil conditions allow healthier grass cover. In short it means that the topsoil must be in a good condition – allowing water to infiltrate easily, containing nutrients and preventing that the soil leach out. A good vegetation cover, in turn, provides the soil with dead matter and prevents water and wind erosion.
- Control bush encroachment: When the woody component outcompetes the herbaceous (grassy) component, the grazing potential of rangelands diminishes resulting knock-on effects such as less biodiversity and disturbance of the water cycle.
- Plan for droughts: Timeous reduction of livestock numbers prevent fodder deficits. The availability of fodder fluctuates per season and it is simply wise to compile a fodder bank in times of surplus.
- Monitor the resource base: Good decisions about rangeland management are based on good information, and record keeping is an essential requirement in this regard.
- Plan land use infrastructure: Providing enough camps to facilitate effective rotational grazing management is one way of making sustainable rangeland management easier.

After bush control activities the treated landscape should not appear homogenous, but have a mosaic character with a mix of tree and bushes. Clumps are important to provide shelter and large trees suppress woody saplings. Bush control on steep slopes is risky and not recommended because of potential erosion. Woody fines should be left on the land to improve soil organic matter, to enhance soil moisture and seed germination, to increase nutrient levels and to reduce erodibility. Annual grasses normally capitalize after bush control activities, but form an unstable vegetation cover with insufficient nutrients to sustain fodder to grazing animals throughout the year. To enhance the re-establishment of perennial grass it is often necessary to leave more bush initially.

8 COMMUNICATION AND TRAINING

In order to ensure potential risks and impacts are minimised it is vital that personnel are appropriately informed and trained to ensure risks are mitigated. It is also important that regular effective communications are maintained with stakeholders (including neighbouring farmers) and made aware of potential impacts and how to minimise or avoid them.

8.1 COMMUNICATIONS

The proponent shall communicate environmental issues to all personnel through the following means (as and when required):

- Ensure all personnel are afforded the opportunity to attend an environmental site induction that sets out their requirements in relation to this GEMP
- Ensuring audits and inspections are undertaken regularly on a risk-based schedule
- Toolbox talks, including instruction on incident response procedures
- Deliver project specific environmental briefings where required
- Ensure all personnel have access to the GEMP
- Ensure operators of key activities and environmentally sensitive operations are briefed and understand their requirements.

8.2 ENVIRONMENTAL EMERGENCY AND RESPONSE

TABLE 17 - EMERGENCY CONTACT DETAILS

TOWN	AMBULANCE	POLICE	INTELLIGENCE SUPPORT AGAINST POACHING	FIRE BRIGADE
Khorixas	+264 (67) 331- 064	+264 (67) 10 -111	+264 81 169 4715	+264 (67)331- 057

For any other significant environmental incidents, all relevant local and regional authorities (including traditional authorities, line ministries, I&APs) should be contacted as required and the MEFT office informed of the incident (telephone +264 61 284 2111, Windhoek). All correspondence with MEFT should be undertaken by the farmer / farm manager or appointed supervisor.

For the clean-up of smaller chemical spills, the relevant MSDS should be consulted to determine the appropriate clean-up procedure. Basic chemical spill response training will be provided as part of the site environmental induction, spill response equipment.

8.3 CONSENT

The proponent is responsible to communicate his intentions to implement bush control activities on Gemsbokoord with his neighbours and other I&APs prior to commencement. For this reason the signing of letters of consent is recommended to warrant transparency, consistency and good record keeping. The consent letters contain information about the nature, scale and sequencing of activities.

8.4 COMPLAINTS HANDLING AND RECORDING

Any complaints received verbally or in writing by any personnel on the project site shall be recorded by the receiver on a complaint register that will detail the name and contact details of the complainant, date and time of the complaint, nature of complaint, action taken to resolve issues, and date of complaint handover. The proponent shall be responsible for nominating the correct personnel to coordinate and resolve the issue.

The workforce shall be informed about the complaints register, its location and the person responsible, in order to refer residents or the general public who wish to lodge a complaint. The complainant shall be informed in writing of the results of the investigation and action to be taken to rectify or address the matter(s). Where no action is taken, the reasons why are to be recorded in the register.

The complaints register shall be kept on the farm and will be available for government or public review upon request.

8.5 TRAINING AND AWARENESS

All employees shall be competent to perform tasks that have the potential to cause an environmental impact. Competence is defined in terms of appropriate education, training and experience.

All personnel shall be inducted with specific environment and social awareness training. The environment and social awareness training shall ensure that personnel are familiar with the principles of this EMP, the environment and social aspects and impacts associated with their activities, the procedures in place to control these impacts and the consequences of departure from these procedures. The proponent shall ensure a register of completed training is maintained.

9 REPORTING, COMPLIANCE AND ENFORCEMENT

The proponent must have an accident and incident reporting system that covers all applicable statutory requirements. The section below sets out the minimum requirements for incident reporting and should be used as a basis for incident reporting, in the event that no incident reporting system exists.

Any incident or “near miss” involving an employee, any contractor or any third party’s personnel, property, plant, or equipment, must be

- Orally reported to proponent:
  - immediately and without delay
  - regardless of whether injury to personnel has occurred
  - or property or equipment has been damaged.
- Written up and handed to the proponent by the end of the shift. The written report should:
  - state all known facts and conditions at the time of the incident and
  - include a preliminary assessment of the most likely potential causes of the incident under the current circumstances.

For any serious incident involving a fatality, or permanent disability, the incident scene must be left untouched until witnessed by a representative of the Police. This requirement does not preclude immediate first aid being administered and the location being made safe.

Transgressions, disciplinary actions and accidents have to be reported as well. The cause of incidents and accidents and the full array of circumstances (especially in the case of disciplinary action and transgressions as well as suspension / expulsion) need to be investigated and recorded in the register.

The proponent must provide the results of the investigation and recommendations on how to prevent a recurrence of such incidents.

9.1 Environmental Inspections and Compliance Monitoring

Annual inspections and audits of the farm will be managed and undertaken. The operational infrastructure and management arrangements will be inspected to ensure compliance and operations as per specification.

Any non-conformance shall be recorded, including the following details: brief description of non-conformance; the reason for the non-conformance; the responsible party; the result (consequence); and the corrective action taken, the time line to correct, and any necessary follow up measures required.

9.1.1. DAILY COMPLIANCE MONITORING

A copy of this GEMP shall be on-site throughout the duration of the project and shall be available upon request. It is the responsibility of the proponent to ensure this GEMP is complied with through their daily roles. Daily, weekly and monthly inspections will be undertaken. Any environmental problems or risks identified shall be notified to the proponent and actioned as soon as is reasonably practicable.

9.1.2. MONTHLY COMPLIANCE MONITORING

Monthly inspections shall be undertaken by the proponent to check that the standards and procedures set out in this GEMP are being complied with and pollution control measures are in place and working correctly. Any non-conformance shall be recorded.

9.2 NON-COMPLIANCE

Where it has been identified that work is not compliant with this GEMP, the proponent shall ensure corrective actions are implemented so that the work returns to being compliant as soon as possible. In instances where the requirements of the GEMP are not upheld, a non-conformance and corrective action notice shall be produced. The proponent shall be responsible for ensuring a corrective action plan is established and implemented to address the identified shortcoming.

A non-compliance event / situation, for example, is considered if:

- There is evidence of contravention of this GEMP and associated indicators or objectives,
- The proponent has failed to comply with corrective or other instructions issued by an authority, or
- The proponent fails to respond to complaints from the public.

9.3 DISCIPLINARY ACTION

This GEMP is a legally binding document and non-compliance with it shall result in disciplinary action being taken against the perpetrator/s. Such action may take the form of (but is not limited to):

- Fines / penalties
- Legal action
- Monetary penalties imposed by the proponent

- Withdrawal of licence/s, and
- Suspension of work.

The disciplinary action shall be determined according to the nature and extend of the transgression / non-compliance, and penalties are to be weighed against the severity of the incident.

10 LIST OF REFERENCES

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APPENDIX A - LIST OF PROTECTED SPECIES

Species name	**Common names** (English)	**Reasons to be protected** (ES = Ecosystem Services; EU = Extent of use)
Acacia erioloba E. Mey.	Camel-thorn	EU (Heavily utilized by humans andanimals - medicinal, cash crop, unsustainable harvesting of fuel wood for export, slow growth rate, cultural value, economic value, ES (keystone species)
Acacia nigrescens Oliv	Knob-thorn	EU (Used by humans and animals -wood used for construction, utensils, fuel, tanning, browsed by game), ES (retains river banks)
Acanthosicyos horridus Welw. Ex Hook.f.	Nara	Cultural and economic value, ES (Dune stabiliser)
Adansonia digitata L.	Baobab	ES2 (Keystone species) EU (heavily utilised by humans and animals)
Adenia pechuelii (Engl.)	Harms Elephants-foot	EU (unsustainable harvesting for horticultural trade), slow growth rate, Slow and/or episodic recruitment
Adenium boehmanium Schinz	Bushman poison	EU (unsustainable harvesting for horticultural trade)
Afzelia quanzensis Welw.	Pod mahogany	EU (Extensively used by humans and animals- curios, medicinal, timber, potential as ornamental trees, browsed by animals), slow growth rate, Restricted range.
Albizia anthelmintica (A.Rich.) Brongn.	Worm-cure albizia	EU (Utilized by humans and animals - medicinal, utensils, browsed by livestock and game)
Aloe dichotoma Masson	Quiver tree	EU (unsustainable harvesting for horticultural trade), Slow growth rate, Cultural value, Slow and/or episodic recruitment
Aloe pillansii L. Guthrie	Giant quiver tree	Slow growth rate, Restricted range, Slow and/or episodic recruitment
Aloe ramosissima Pillans	Maiden's quiver tree	Slow growth rate, Restricted range, Slow and/or episodic recruitment
Baikiaea plurijuga Harms	Zambezi teak or Rhodesian teak	EU (heavily utilised for timber, implements, utensils, wood carvings)
Berchemia discolour	Bird-plum	EU (heavily utilised by humans and animals)

(Klotzsch) Hemsl.		
Boscia albitrunca (Burch.) Gilg & Gilg-Ben.	Shepherd's tree	EU (heavily utilised by humans and animals)
Burkea africana Hook.	Burkea	EU (heavily utilised by humans - timber, firewood, implements)
Caesalpinia merxmeullerana A.Schreib.	Orange-river caesalpinia	Restricted range
Citropsis daweana Swingle & M.Kellerm.		EU (Wild crop relative - genetic resource), Restricted range
Colophospermum mopane (J. Kirk ex Benth.) J. Kirk ex J. Léonard	Mopane	EU (heavily utilised by humans and animals (browse and forage) - charcoal, timber, fuel wood, construction, medicine, host to important edible caterpillar), slow growth rate, cultural value.
Combretum imberbe Wawra	Leadwood	EU (heavily utilised by humans and animals - fuel wood, construction material, implements, illegally harvested for charcoal, other purposes, browse, shade) Cultural value, Extremely slow growth rate.
Commiphora capensis (Sond.) Engl.	Namaqua corkwood	EU (illegally harvested for horticultural trade), Restricted range
Commiphora cervifolia J.J.A.van der Walt	Antler-leaved corkwood	EU (illegally harvested for horticultural trade), Restricted range
Commiphora dinteri Engl.	Namib corkwood	EU (illegally harvested for horticultural trade)
Commiphora gariepensis Swanepoel	Orange River corkwood	Restricted range
Commiphora giessii J .J. A. van der Walt	Brown-stemmed corkwood	Restricted range
Commiphora gracilifrondosa Dinter ex J. J. A. van der Walt	Karee corkwood	Restricted range, EU (illegally harvested for horticultural trade), Restricted range
Commiphora kraeuseliana Heine	Feather-leafed corkwood	EU (illegally harvested for horticultural trade), Restricted range
Commiphora namaensis	Nama corkwood	EU (illegally harvested for horticultural trade)

Schinz		
Commiphora oblanceolata Schinz	Swakopmund corkwood	Very small, widely scattered populations, Restricted range
Commiphora saxicola Engl.	Rock corkwood	EU (illegally harvested for horticultural trade)
Commiphora virgata Engl.	Slender corkwood	Value (cultural - host to edible caterpillar)
Commiphora wildii Merxm.	Oak-leaved corkwood	EU (resin for perfume), Value (cultural - perfume)
Cyphostemma bainesii (Hook. F.) Desc.	Gouty vine	EU (illegally harvested for horticultural trade), Restricted range
Cyphostemma currorii (Hook. F.) Desc.	Kobas	EU (illegally harvested for horticultural trade)
Cyphostemma juttae (Dinter & Gilg) Desc.	Blue kobas	EU (illegally harvested for horticultural trade), Restricted range
Cyphostemma uter (Exell &Mendonça) Desc.	Kaoko kobas	Restricted range
Dialium engleranum Henriq.	Kalahari podberry	EU (Extensively used by humans – fruit an important part of diet of San and Kavango peoples, medicinal, timber, implements)
Diospyros mespiliformis Hochst. Ex A.DC.	Jackal-berry	EU (Heavily utilised by humans and animals - important fruit tree, timber, cash crop, utensils, watos, fuel wood, medicinal, fruit eaten by animals and frugivorous birds), slow growth rate.
Elephantorrhiza rangei Harms	Karas elephant-root	Restricted range and habitat
Entandrophragma spicatum (C.DC) Sprague	Owambo wooden-banana	Cultural value, slow growth rate, Restricted range
Erythrina decora Harms	Namib coral-tree	Small populations scattered over wide area, Cultural value, potential horticultural value
Euclea asperrima Friedr.-Holzh.	Mountain guarri	Restricted range
Euclea pseudebenus E. Mey. Ex A. Dc.	Wild ebony	ES (Keystone species, prevent erosion of water courses), Slow growth rate

Faidherbia albida (Delile) A.Chev.	Ana tree	ES (Important component of riparian fringe, prevents erosion of river beds, Keystone species), EU (heavily utilised by stock and game, important shade tree in arid west).
Ficus burkei (Miq.) Miq.	Strangler fig	EU (fruit for humans and animals), Restricted range
Ficus cordata Thunb.	Namaqua rock-fig	EU (fruit for humans and animals)
Ficus sycomorus L.	Sycamore fig	EU (fruit for humans and animals)
Guibourtia coleosperma (Benth.) J. Léonard	False mopane	EU (Heavily utilised by humans and animals - food, cash crops, very important shade tree, timber, watos, utensils)
Hyphaene petersiana Klotzsch ex Mart.	Makalani palm	EU (heavily utilised by humans and animals - utensils, basketry, thatching, fuel, ropes, palm wine, food)
Kirkia dewinteri Merxm. & Heine	Kaoko kirkia	Restricted range
Lannea discolor (Sond.) Engl.	Live-long	EU (used by humans and animals), Restricted range
Maerua schinzii Pax	Ringwood tree	EU (heavily used by humans and animals), slow growth rate
Moringa ovalifolia Dinter & A.Berger	Phantom tree	EU (heavily used by humans and animals - horticultural value, browse, tourism)
Neoluederitzia sericeocarpa Schinz	Silk-seed bush	Restricted range
Ozoroa concolor (C. Presl. Ex Sond.) De Winter	Green resin-bush	Restricted range, scattered distribution
Ozoroa namaquensis (Sprague) Von Teichman & A. E. van Wyk	Gariep resin-tree	Restricted range
Pachypodium lealii Welw.	Bottle tree	Slow growth rate, EU (unsustainable harvesting for horticulture trade)
Pachypodium namaquanum (Wyley ex Harv.) Welw.	Elephant-trunk	Slow growth rate, EU (unsustainable harvesting for horticulture trade), Restricted range
Pappea capensis Eckl. & Zeyh.	Jacket-plum	ES (Keystone species, prevents erosion in rivers), EU (utilised by humans and animals - important shade tree, edible fruit, browsed)
Philenoptera violacea (Klotzsch) Schrire.	Apple-leaf, rain tree	ES (important component of riparian and floodplain canopy) EU (utilised by humans and animals - fences, watos, medicines, browse, fodder)

Protea gaguedi J. F. Gmel.	African white protea	Restricted range, EU (heavily utilised by humans – medicinal overharvesting of roots)
Pterocarpus angolensis DC.	African teak, kiaat	Value (economic), EU (heavily utilised for timber, implements, utensils, wood carvings)
Salix mucronata subsp. Capensis (Thunb.) Immelman	Small-leaved willow, river willow	ES (stabilisation of river banks, shade), EU (Heavily utilised by humans – overharvesting for fuel wood, potentially threatened), Restricted range
Schinziophyton rautanenii (Schinz) Radcl.-Sm.	Manketti	EU (heavily utilised by humans and animals - utensils, curios, musical instruments, timber, shade, fruit a very important food and cash crop)
Schotia afra (L.) Thunb. var. *angustifolia* (E. Mey.) Harv.	Karoo schotia	EU (Utilised by humans for wood), Restricted range
Sclerocarya birrea (A. Rich.) Hochst.	Marula	EU (Heavily utilised by humans and animals for fruit, shade, browse, medicines, wood).
Searsia lancea (L. F.) F. A. Barkley	Karee	ES (Prevent erosion of river banks)
Sesamothamnus benguellensis Welw.	Kaoko sesame-bush	EU (Illegally harvested for the horticultural trade), slow growth rate, Restricted range
Sesamothamnus guerichii (Engl.) E. A. Bruce	Herero sesame-bush	EU (Illegally harvested for the horticultural trade), slow growth rate
Sesamothamnus leistneri Giess ex Ihlenf., ined.	Large-leaved sesame-bush	EU (Illegally harvested for the horticultural trade), slow growth rate, Restricted range
Spirostachys africana Sond.	Tamboti	EU (Heavily utilised by humans - timber)
*Sterculia africana (*Lour.) Fiori	African star-chestnut	Economic value (tourism and horticulture) EU (utilised by humans – medicinal and food)
Sterculia quinqueloba (Garcke) K. Schum.	Large-leaved sterculia	Economic value (tourism and horticulture), restricted habitat
Strychnos cocculoides Baker	Corky monkey-orange	Economic value (cash crop), EU (heavily utilised by humans and animals - fruit)

Strychnos potatorum L. F.	Black bitterberry	ES (Important component of river and flood plain vegetation) EU (utilised by humans (fish poison, shade) and animals (food and shade), Restricted range.
Strychnos pungens Soler.	Spine-leaved monkey-orange	Economic value (cash crop), EU (heavily utilised by humans and animals - fruit, medicinal)
Strychnos spinosa Lam.	Spiny monkey-orange	Economic value (cash crop), EU (heavily utilised by humans and animals - fruit and furniture), Restricted range
Tamarix usneoides E. Mey. Ex Bunge	Wild tamarisk	ES (prevents erosion of river beds and river banks, important component of riparian vegetation), EU (browsed by game)
Tylecodon paniculatus (L. F.) Toelken	Southern botterboom	EU (unsustainable harvesting – horticultural trade), Restricted range
Welwitschia mirabilis Hook f.	Welwitschia	Cultural value, scientific value, economic value (tourism)
Ziziphus mucronata Willd.	Buffalo-thorn	ES (prevents erosion of river beds and river banks, important component of riparian vegetation) EU (Utilized by humans and animals - medicinal, construction, implements, fuel wood, browsed by livestock and game.

APPENDIX B - RECOMMENDED DENSITY OF TREES AFTER BUSH THINNING

This appendix defines what level of bush thinning is most appropriate, categorized according to the main encroacher species. The information is based on De Klerk (2004), the draft policy on bush encroachment (2004), and the opinion of six bush experts (Dave Joubert, Nico de Klerk, Axel Rothauge, Ben Strohbach, Cornelis van der Waal, Roelie Venter).

The recommendations use a formula based on tree equivalents (TEs) and average annual rainfall. A TE is defined as a woody tree / bush of 1.5 metres height. Thus a 3 m tree represents 2TE. A 0.75 m tree/bush represents half a TE.

Main principles:

- All bush thinning should aim to leave a heterogeneous mix of trees and bush. The veld that remains should have a variety of tree species (including some of the encroacher species), of different size classes, and spaced so that there are some open patches and some dense patches, to provide a variety of habitats for animals.
- Bush thinning should be carried out in a phased approach so that the system is not shocked by an abrupt change from dense bush to open veld.
- If arboricides are going to be used, only foliar (leaf spray) and stem-applied arboricides are recommended. Pellets should not be used, as they tend to get washed along the surface by rain, and end up in non-target areas.
- Dry river beds tend to carry more trees, and larger trees. Forestry regulations state that trees should not be killed within 100 m of a river course. Thinning is required in densely encroached river margins, but one should leave a higher density of trees than on the adjacent habitat. It is especially important to leave the large trees and protected species along a river course. The exception to this is *Prosopis spp.*, which invades river beds, but should be eradicated.
- Judicious thinning should leave behind a sufficient number of trees (applying the formulas provided) to create a more stable savanna that does not need major intervention at short intervals after the initial thinning.
- Training of the work force is necessary before harvesting starts, so that workers know which trees to target and which to avoid. Work teams need to be managed so that any excessive harvesting or killing of the wrong species is noticed and corrected.

DOMINANT SPECIES	TREE EQUIVALENT (TE)
Acacia spp.	– Leave large trees with a stem greater than 18 cm diameter – Leave protected species – Leave enough *Acacias* so that the total density of TEs per hectare = 1.5 times the average

DOMINANT SPECIES	TREE EQUIVALENT (TE)
	rainfall. i.e. in an area with ~400 mm rain, the total density of all trees should be ~600 TEs / ha. – In sandy substrates, leave enough *Acacias* so that the total density of TEs per hectare = 2 times the average rainfall. i.e. in an area with ~400 mm rain and sandy soil, the total density of all trees should be ~800 TEs / ha.
Dichrostachys cinerea	– Leave large trees with a stem greater than 18 cm diameter, as well as individuals with a stem greater than 10 cm diameter (these are taller). – Leave enough *Dichrostachys* so that the total density of TEs per hectare = 1.5 times the average rainfall i.e., in an area with ~400 mm rain, the total density of all trees should be ~600 TEs / ha. – Protect the soil surface by packing brush – Aftercare is essential to prevent re-infestation
****Terminalia sericea***	– Leave large trees with a stem greater than 18 cm diameter – Leave enough *Terminalias* so that the total density of TEs per hectare = 3 times the average rainfall i.e., in an area with ~400 mm rain, the total density of all trees should be ~1,200 TEs / ha. This recognizes the extra importance of the trees is supplying nutrients to the sandy soil. **(A large *Terminalia sericea*, approx. 6 m high, is 4 TEs!)**
Mopane	– Leave large trees with a stem greater than 18 cm diameter – Leave protected species – Leave enough mopanes so that the total density of TEs per hectare = 2 times the average rainfall. i.e. in an area with ~400 mm rain, the total density of all trees (all species) should be ~800 TEs / ha. This recognizes the importance of mopanes as fodder. – All cases where thinning is planned in mopane-dominated veld, especially where the veld is degraded (e.g. lack of grass, soil erosion) should first be inspected by DoF officials or a bush expert, to assess the level of harvesting that should be done. It might be advisable in such conditions to leave more trees than the 2x rainfall amount specified above.
****Rhigozum trichotomum***	– Leave enough *Rhigozum* so that the total density of TEs per hectare = 2 times the average rainfall i.e., in an area with ~200 mm rain, the total density of all trees and bushes should be ~400 TEs / ha. **(A *Rhigozum* bush is usually ~0.75 m tall, i.e. 0.5 TEs. If there are no other trees or bushes, the density of *Rhigozum* should be ~800 bushes / ha**

DOMINANT SPECIES	TREE EQUIVALENT (TE)
Prosopis spp.	– Take out all Prosopis trees. – Use only approved methods, such as manual chopping or responsible use of arboricides. Do not use polluting methods such as applying engine oil to cut stems.

*Species that are not expected to occur on the farm