

**ENVIRONMENTAL IMPACT ASSESSMENT
FOR THE PROPOSED CHARCOAL HARVESTING AND
CONSTRUCTION OF A CHARCOAL PRODUCTION PLANT
AT M'BELA NO.201 FARM ET AL., OKAHANDJA DISTRICT,
OTJOZONDJUPA REGION, NAMIBIA**



**ENVIRONMENTAL SCOPING REPORT
FINAL
JUNE 2022**



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Acronyms

TERMS	DEFINITION
BID	Background Information Document
CA	Competent Authorities
DAS	De-bushing Advisory Service
EAP	Environmental Assessment Practitioners
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
ET AL	and other farms (refer to Appendix B No.4)
GDP	Gross Domestic Product
FSC	Forest Stewardship Council
GHG	Greenhouse Gasses
ISO	International Organization for Standardization
I&Aps	Interested and Affected Parties
JBIC	Junior Baiano Industrial Consultants
MEFT: DEA	Ministry of Environment, Forestry and Tourism's Directorate of Environmental Affairs
PPE	Personal Protective Equipment

Executive Summary

Junior Baiano Industrial Consultants (JBIC) cc has been engaged by **Kudu Biomass Group (Pty) Ltd** to conduct an Environmental Impact Assessment (EIA), develop an Environmental Management Plan (EMP) and apply for an Environmental Clearance Certificate (ECC) for the Construction and Operation of the Kudu Biomass Charcoal Production Plant in M'Bela Farm No.201, Okahandja district in the Otjozondjupa region, Namibia.

The proposed project entails construction of project infrastructure, harvesting of wood biomass in areas affected by bush encroachment and charcoal production in retort carbonisers.

Charcoal Harvesting and Operation of the Charcoal Production Plant Activities

The project activities can be summarised as follows:

- Mapping of wood biomass harvesting areas and siting of project infrastructure
- Construction of project infrastructure
- Harvesting of wood biomass
- Wood processing and charcoal production
- Packaging and transportation of charcoal to customers

Anticipated Environmental Impacts

- Low potential environmental impacts because the proposed site is already disturbed by bush encroachment.
- Adding on a management plan has been developed to mitigate any anticipated possible impacts of the project to the environment.
- Relative or moderate social impact (positive)

Social Impact

The project is generally expected to improve the socio-economic environment of the Okahandja district through a major boost in business through integrations, employment and improved transport system on the long term. Interested and Affected Parties were notified of the project through Site notices and newspaper adverts and all relevant information on consultation is covered in Chapter 4 of this document and Appendix A of the document.

Recommendation

It is concluded that most of the impacts identified during this Environmental Assessment can be addressed through the recommended mitigation and management actions for both the construction and operation phases of the solar farm. Should the recommendations included in this report and the EMP be implemented the significance of the impacts can be reduced to reasonably acceptable standards and durations. All developments could proceed provided that general mitigation measures as set out are implemented as a minimum.

It is therefore recommended that the proposed solar farm get an approval receive Environmental Clearance, provided that the recommendations described above and the EMP are implemented.

1 CHAPTER ONE: BACKGROUND

1.1 INTRODUCTION

Kudu Biomass Group (Pty) Ltd recognises that charcoal production in Namibia is an environmentally friendly viable economic business that has the beneficial impact of controlling bush encroachment. Charcoal production is a unique and sustainable alternative for rehabilitation of degraded savannah ecosystems that have been affected by bush encroachment. This is a particularly lucrative business venture because of the high quality charcoal that is found in Namibia. The country has high quality charcoal mainly because of the following reasons: most encroacher species have a high wood particle density; weather conditions in Namibia, usually high temperature and very low relative air humidity, are favourable for wood drying; and the wood charcoal from commonly used encroacher species lights easily, reaches cooking temperature rapidly and is known to impart a woody flavour to food (NCA, 2018).

It is against this background that, Kudu Biomass Group intends to capitalise on this potential and spearhead the charcoal production project at M'Bela No. 201 Farm, Okahandja district in the Otjozondjupa region, Namibia. In terms of the Namibian environmental legislation (Environmental Management Act, No. 7 of 2007), an EIA is required to obtain an Environmental Clearance Certificate (ECC) from the Ministry of Environment and Tourism (MET) before the project can proceed. In this context the company has set out to conduct the Environmental Impact Assessment (EIA) for its charcoal production activities. The EIA is the official appraisal process to identify, predict, evaluate and justify the ecological, social and related biophysical impacts of the charcoal production activities on both the environment and, affected and interested stakeholders. It provides insight on alternatives and measures to be adopted to prevent or mitigate any impacts/risks that may ensue from the charcoal production activities.

As per the requirements of the Environmental Management Act No. 7 of 2007, Kudu Biomass Group has appointed JBIC to conduct the EIA and develop an Environmental Management Plan (EMP) for the proposed project. In this respect, this document forms part of the application to be made to the DEA's office for an ECC for the proposed charcoal production project, in accordance with the guidelines and statutes of the Environmental Management Act No.7 of 2007 and the environmental impacts regulations (GN 30 in GG 4878 of 6 February 2012).

1.2 PROJECT LOCATION

The project site is located on M'Bela Farm No.201, Okahandja district in the Otjozondjupa region, Namibia. It is about 150 km west of Okahandja and approximately 40km southwest of Hochfeld. The coordinates of the site are shown in the table below.

Table 1-1: Project Site Coordinates

Latitude	Longitude
21°40'34.68"S	18°3'5.10"E
21°40'38.24"S	18°3'11.10"E
21°40'31.68"S	18°3'22.15"E
21°40'27.36"S	18°3'19.47"E

The location (surrounded by the red boundary) of the project site is shown in Figure 1-1 and Image 1-1.

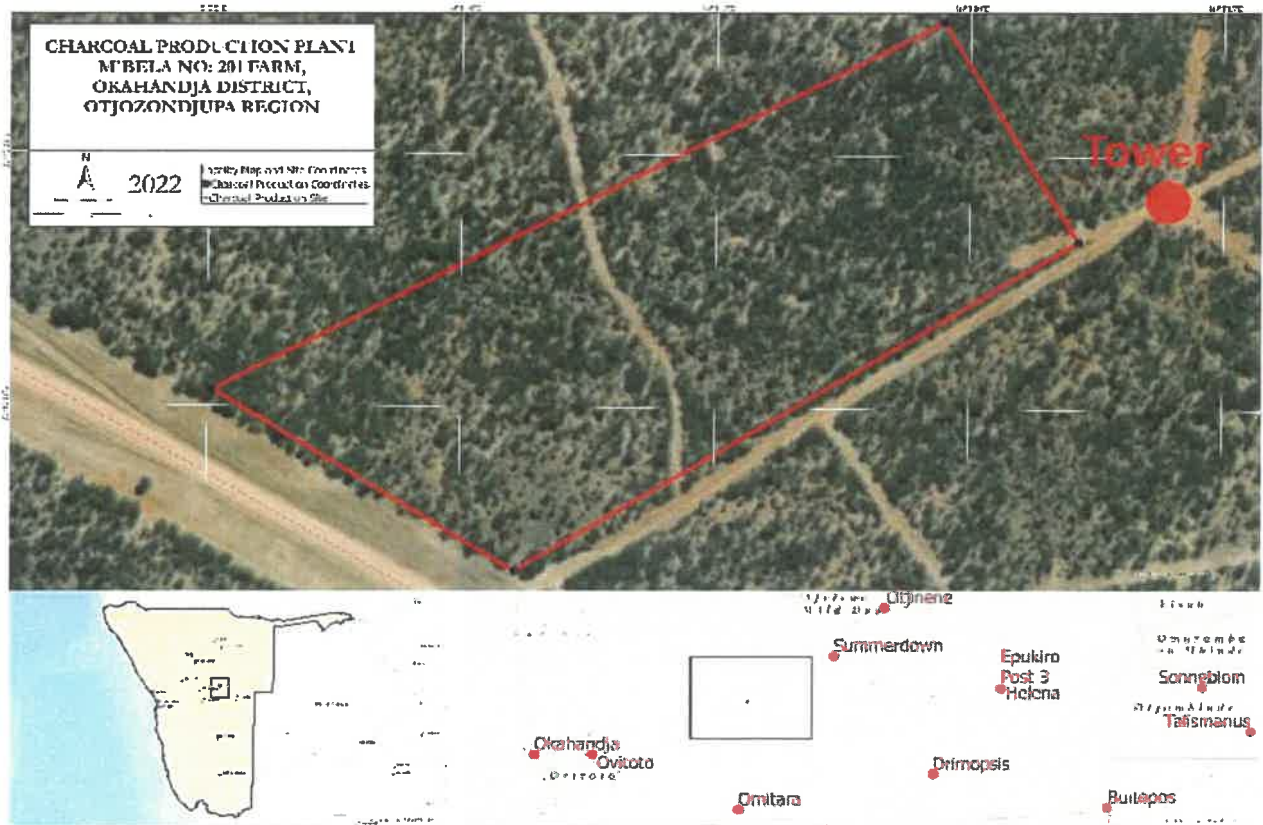


Figure 1-1: Project Location



Image 1-1: Signage: Entrance into the Otjozondjupa region along the C30 road

The charcoal production retort carbonisers are to be located in M'Bela Farm No.201. The harvesting of wood biomass is to occur within a 30km radius of charcoal plant in the following farms: Kataneno, Okanjesu West No. 210, Okowiruru No. 105, Ondunduwazirapi No. 299 and M'Bela Farm No.201.

1.3 PROJECT OVERVIEW

The project entails mapping of wood biomass harvesting areas and siting of project infrastructure, harvesting wood, processing it in retort carbonisers and ultimately transportation for sale to customers. The project operations are depicted in the summarized process flow chart in the figure below...

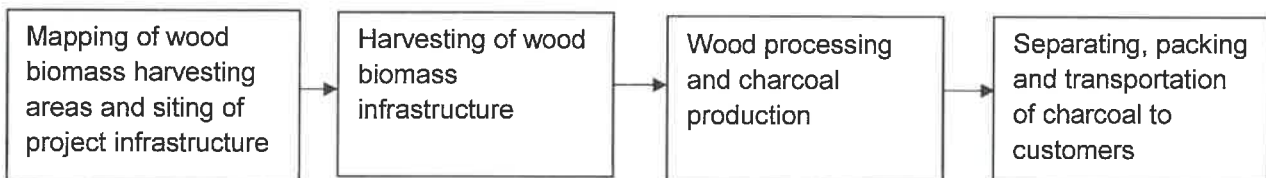


Figure 1-2: Project Process Chart

The objectives of the project include to:

- Capitalize on opportunities and economic benefits that bush encroachment offers through charcoal production.
- Control bush encroachment in the project area thereby ensuring maintenance of critical ecosystem services that are essential for biodiversity conservation, livestock production, groundwater recharge as well as tourism. The project addresses the challenge of bush encroachment, a natural phenomenon characterized by the excessive expansion of bush (trees and shrubs) at the expense of other plant species, especially grasses.

1.4 DETAILED PROJECT DESCRIPTION

1.4.1 Siting of Project Infrastructure and Mapping of Harvesting Areas

a) Siting of Project Infrastructure

A site layout plan for the plant has been compiled and this attached in Appendix B. The plant, which will be located in M'Bela Farm No.201, will have the following components:

- Electrical connection to Nampower grid. A new transformer will be erected and this is to be done by a certified contractor and in accordance to Nampower specifications.
- The site will be enclosed by a 2.4m high fence for safety and security reasons.
- The whole site will be compacted and steel structures erected - 15x20, 45x10, 20x30m each - all conform to engineering drawings.
- A site ablution facility for staff
- A workshop, store room and office
- A generator room to house a generator in case of power cuts
- Housing, ablution, kitchen and dining area for staff on site
- A sewerage system (French drain) will be put in place for site effluent
- A 14kl diesel storage tank with steel bunding
- 4 x 10kl tanks are to be erected to supply water to site. These to supply water for the plant as well as domestic use.

During the project's construction period, ten or so workers will be accommodated on site. They are to be housed in tents and ablution facilities established on site for their use. Borehole water will be used for construction and this is to be pumped in to tanks. Approximately 40kl of water per day is to be used during this phase.

Existing access roads/routes will be utilised for the project. However, where this is required new ones may be constructed.

Infrastructure is to be constructed in such a way as to restrict vegetation clearance to only those sites that are strictly necessary.

b) Mapping

Wood biomass harvesting is to take place within 30 km radius of the plant. The project site is to be mapped in order to identify areas that require bush control and to draw up a harvesting plan. This involves site assessments and where necessary determination of bush densities. It is important that the proponent has adequate knowledge of the local ecology of the area in order to conduct this process effectively. This enables proper identification of bush encroachment control sites as well as establishment of the bush density to be left after harvesting.

The physical contrast between the "original" growth of woody plants that flourished before rangeland degradation and the "encroacher" growth that occurred as a result of bush encroachment is usually evident and distinct.

The "original" growth consists mostly of larger, thicker, more mature plants of a variety of species, as well as the young ones growing up here-and-there to replace dying old trees. The "original" growth is to be left standing.

The "encroacher" growth is characterised by thin and multi-stemmed, same-size, same-age bush of the same species or a small variety of known encroacher species. They look distinctly different to the "original" growth and are to be removed nearly totally. A few immature specimens are to be left on the land because they could be part of the generational chain of the "originals" and are not true members of the "encroachers".

1.4.2 Wood Biomass Harvesting

Harvesting is to be done mechanically using a bush roller. Where necessary semi-mechanised methods (e.g. using the conventional bush cutter, heavy duty bush cutter and chain saw) and manual methods (e.g. axes, pangas and spade) maybe used as well. Harvesting is to be done according to the harvesting plan that will be set. The following are to be considered during harvesting:

- Thinning rather than clearing of the bush. This is to avoid negative environmental impacts such as reduced soil fertility.
- Measuring of trees and stems wider than 18 cm are to be left standing.
- Concentration on encroacher species and others are to be left alone. Where protected species are encountered these will not be harvested.
- A mix of bushes and trees are to be left on land. The aim is to 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.
- Limited or no harvesting on sensitive soils, especially sodic and duplex soils as they are highly erosive.
- Leaving fine material in the veld to improve soil organic matter and moisture, and nutrient levels after mineralization.
- Adherence to forestry regulations in any encountered river bed areas. 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 employees on harvesting process so that they 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.

1.4.3 Wood Processing and Charcoal Production

Wood is processed in retort carbonisers where it is converted to charcoal. Retort technology is known for expelling fewer emissions and producing good quality charcoal compared to standard kilns.

In the carbonisers charcoal is formed by slow pyrolysis of the wood material. In this process, the wood is slowly exposed to high temperatures (starts at 350°C–550 °C and goes up to 700 °C–1000 °C) in a limited supply of oxygen. The process of pyrolysis is very complex and consists of both simultaneous and successive reactions. These reactions are mainly moisture evaporation, degasification and carbonization as summarised in Table 1-2.

Table 1-2: Summary of Pyrolysis Reactions

Moisture evaporation	→	Degasification	→	Carbonization
Moisture accumulation in the wood evaporation in order to initiate the carbonization process		The wood is degasified in the temperature range of 370°C to 400°C. This involves removal of volatile gases such as nitrogen (N ₂), carbon monoxide (CO), carbon dioxide (CO ₂), hydrogen (H ₂), flammable gases (CH ₄ , C ₂ H ₄), etc.		The degasified wood is further treated with high temperatures (700°C to 1000°C). This results in the quick concentration of elemental carbon

Rate and extent of decomposition of the wood depends on the process parameters such as **carboniser temperature; wood heating rate; pressure; carboniser configuration; feedstock**; etc. Therefore, it is essential to ensure that they are within the optimal range in order to maximize process efficiency and minimize waste. If the process temperatures are too low, excessive amounts of volatiles will remain in the charcoal and cause heavy smoke when it burns.

1.4.4 Briquette Production

The briquetting of charcoal enhances and offers a more effective use of biomass-based energy sources including wood and agricultural wastes. In this process agglomerating charcoal fines produced by the wood biomass is necessary either before or after the carbonization process. Briquettes of charcoal that are sold commercially are typically comprised of a binder and filler. In order to make sure the particle size is small enough, the charcoal is finely crushed and sent through a number of screens. The particles are mixed with water and a binder, usually starch. Due to its low cost and wide availability, starch is chosen over other substitutes (e.g. wax and wood pitch) (Demirbas, 2016).

Charcoal comprises 75% of the briquette mixture, while water and starch comprise 20% and 5%, respectively (Demirbas, 2016). The press for briquetting will be well designed, strongly built, and capable of agglomerating the mixture of charcoal and binder sufficiently for it to be handled through the drying process (Demirbas, 2016).

1.4.5 Packing and Transportation to Customers

The charcoal produced as a result of the process is packed and then transported to customers. Any materials that cannot be sold will be spread out in land areas.

1.4.6 Air emissions

Briquettes are widely acknowledged as a cleaner-burning fuel in both domestic and foreign markets. Low wood sulphur concentration means that any potential noxious sulphur emissions are minimal. Given the potential for significant dust emission that is associated with charcoal production, workers will be equipped with the appropriate protective gear (Demirbas, 2016).

1.4.7 Air Emissions Control

The charcoal production will result in a number of gaseous emissions as well as combustible gas. An industrial dust collector system, called LCP cartridge dust collectors, will be used to capture and handle the dust and gas emissions from the production process during normal operations.

LCP cartridge dust collectors are designed for continuous operation in process and general dust extraction applications with free-flowing dust. The system collects dust particles of 2.5mm size. The system includes equipment that prevents explosions due to the gases and combustible dust. However, to ensure that no people or products/property are damaged in any way, the LCP cartridge dust collectors will vent any explosions that do happen into a safe atmospheric environment (Envirox, 2020).

1.4.8 Summary of Project Components

Table 1-3 shows a summary of the project components.

Table 1-3: Summary of Project Components

Component	Activity/Issue	Details
Biomass harvesting and charcoal production	General Details	<ul style="list-style-type: none"> • Bush encroachment control through mechanical harvesting wood biomass. Harvesting will take place at M'Bela No. 201, and other farms that fall within 30 km radius (refer to Appendix B No.4). • Charcoal production in retort carbonisers. The retort carbonisers are to be located at M'Bela No. 201 farm. Harvesting of biomass is to occur within a 30 km radius of the retort carbonisers.

Component	Activity/Issue	Details
	Plant & machinery	<p>The machinery to be used in the charcoal production activities include:</p> <ul style="list-style-type: none"> • Retort carbonisers including LCP cartridge dust collector system • 2-wheeled loggers (4) • Tractors with trailers (4) • Front end loader (1) • Vehicles (4x4), for personnel and operational use (2)
	Workforce	<p>A total of about 16 employees are to be involved in the charcoal production and these are to include supervisors and general hands, etc</p>
	Surface buildings/infrastructure	<ul style="list-style-type: none"> • Retort carbonisers; water tanks; office; guard house; parking, ablution facilities, workshop, Main Distribution Board (MDB), Transformer, Generator, weighbridge, Diesel Tank and pump, timber storage areas, boundary fence housing units etc.
	Transportation	<ul style="list-style-type: none"> • Road transport is the mode of transport that is to be used for all operations i.e. for transportation requirements both within and outside the site.
	Consumption of materials (e.g. chemicals; water; petroleum; electricity)	<p>The main chemicals/materials used on site include:</p> <ul style="list-style-type: none"> • Petroleum fuels (diesel and fuel) and vehicle/pump maintenance materials. Petroleum fuel are to be used in powering generators, machinery, vehicles etc • Gas e.g. acetylene and oxygen in workshops • The charcoal production process does not use a lot of water. Water is to be used mainly during construction and for domestic purposes. • Electricity for various uses at the plant as well as domestic purposes is to be drawn from the national grid. A generator is to be installed as back-up in cases when grid's electricity supply is not available.

Component	Activity/Issue	Details
	Fuel	Diesel and petrol are the fuel source at the project site powering machinery and vehicles.
	Water source	Borehole water will be used for all project operations including domestic purposes. The water table is approximately 33-40m from ground level and there are 4 boreholes in the project area. Approximately 40kl of water per day will be used during construction. Relatively small quantities of water will be used for the manufacturing process of the charcoal.
	Health & safety	Employee housing is to be built on site. French drain sewer system will for used for sewage waste. In order to ensure occupational health and safety one of the main issues to be considered at the site is the provision of Personal Protective Equipment (PPE). PPE to be provided at the project site includes: <ul style="list-style-type: none"> • Overalls/Worksuits • Safety shoes • Gloves • Hardhats and ear protection where necessary
	Properties of waste	<ul style="list-style-type: none"> • Domestic Solid Waste • Workshop wastes e.g. petroleum fuels/products containers, spent solvents and oily rags, etc. • Wood and charcoal wastes
	Waste and Waste disposal	<ul style="list-style-type: none"> • Wood/charcoal waste and domestic solid waste is to be disposed appropriately after application of the 4Rs of waste management. • Waste materials at the site are to be disposed in accordance with legislative requirements.

1.4.9 Summarised Environmental Flow Chart

Figure 1-4 shows a summary of the project's environmental flow chart.

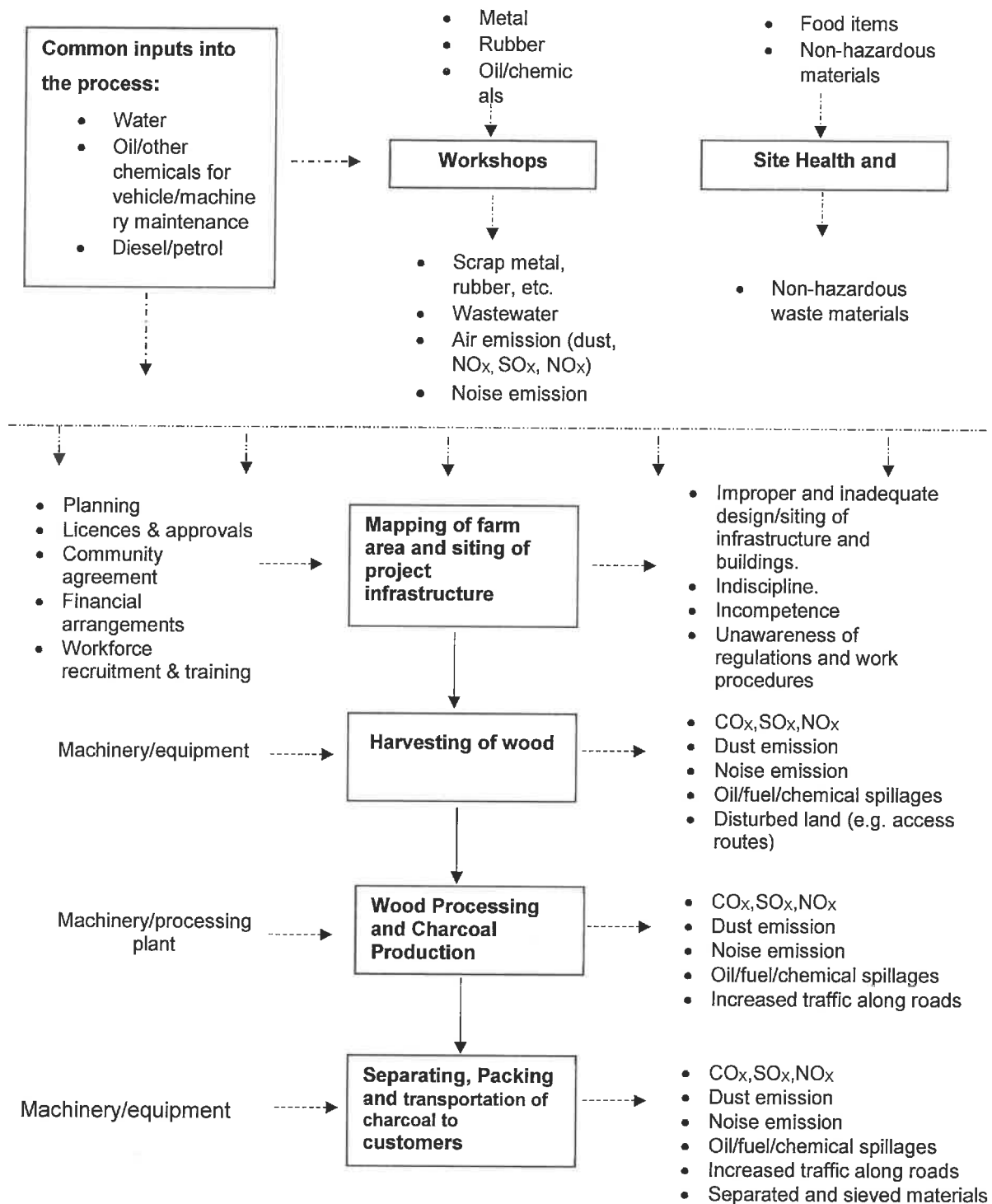


Figure 1-3: Summary of the project's environmental flow chart

1.5 ACCESSIBILITY

As shown in Image 1-2 and Figure 1-4 below, the area in and around the project served by an all-weather gravel road (C30).



Image 1-2: C4 Gravel Road



Figure 1-4: Overview of the road network the area around the project site

The C30, which runs through the project site, connects to Gobabis. It also connects to other major roads which ultimately link to important commercial hubs like Okahandja and Windhoek. On the project site, there are already access roads that may be used to get to the locations where wood biomass will be harvested. Access roads may be constructed where they do not exist, if it is deemed necessary.

1.6 INFRASTRUCTURE AND SERVICES

- **Water:** Borehole water is to be used for domestic purposes as well as for the charcoal production activities. It is to be ensured that all those on site have access adequate and clean water for domestic use.
- **Ablution:** ablution facilities are to be constructed onsite.
- **Housing:** accommodation is to be provided for employees on site. Standard housing units, that are structurally stable and well ventilated, are to be constructed
- **Electrical energy:** There is a 33kV powerline that runs through the site. Connections maybe extended from this powerline for project operations. A new transformer of 100kVA is to be installed on site. An additional 80kVA generator is also to be installed for times where electricity may not be available
- **Communication:** The site is connected with MTC, TN Mobile and satellite phones.

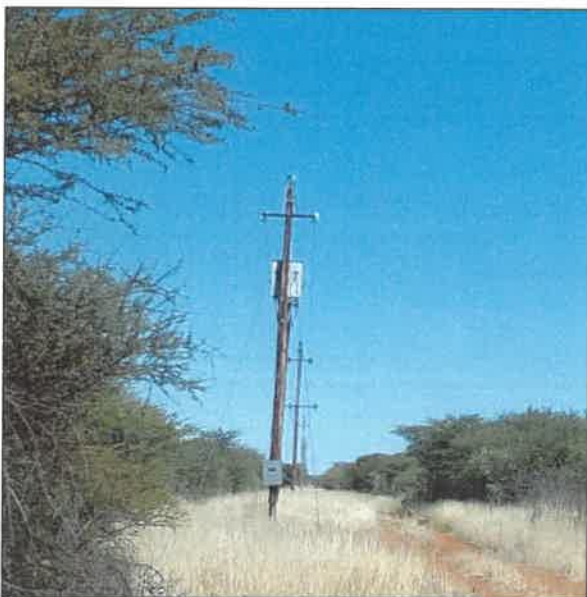


Image 1-3: 33kV running through the site



Image 1-4: Telecommunication tower in project area

In order to ensure that proper buffer zones/corridors are maintained around electrical and telecommunications infrastructure, the proponent is to consult with service providers. Buffer corridors/zones are used to manage the risk to people and property, and to ensure that the electricity and telecommunications transmission networks, are protected

1.7 NEED AND DESIRABILITY

Bush encroachment is a national challenge in Namibia. As indicated in Figure 1-5 below approximately 55% of the country is encroached by bush (SAEIA, 2016). The project site is within the area affected by bush encroachment. Approximately 26-30 million hectares of farmland have been affected by bush encroachment causing negative impacts such as reduced livestock carrying capacity, erosion, loss of groundwater potential, etc. Agricultural productivity in Namibia has declined by two-thirds throughout the past decades, mainly due to the negative impact of bush encroachment. Beef production losses alone are projected to be worth N\$ 1.4-1.6 billion per year (UNIDO, 2018).

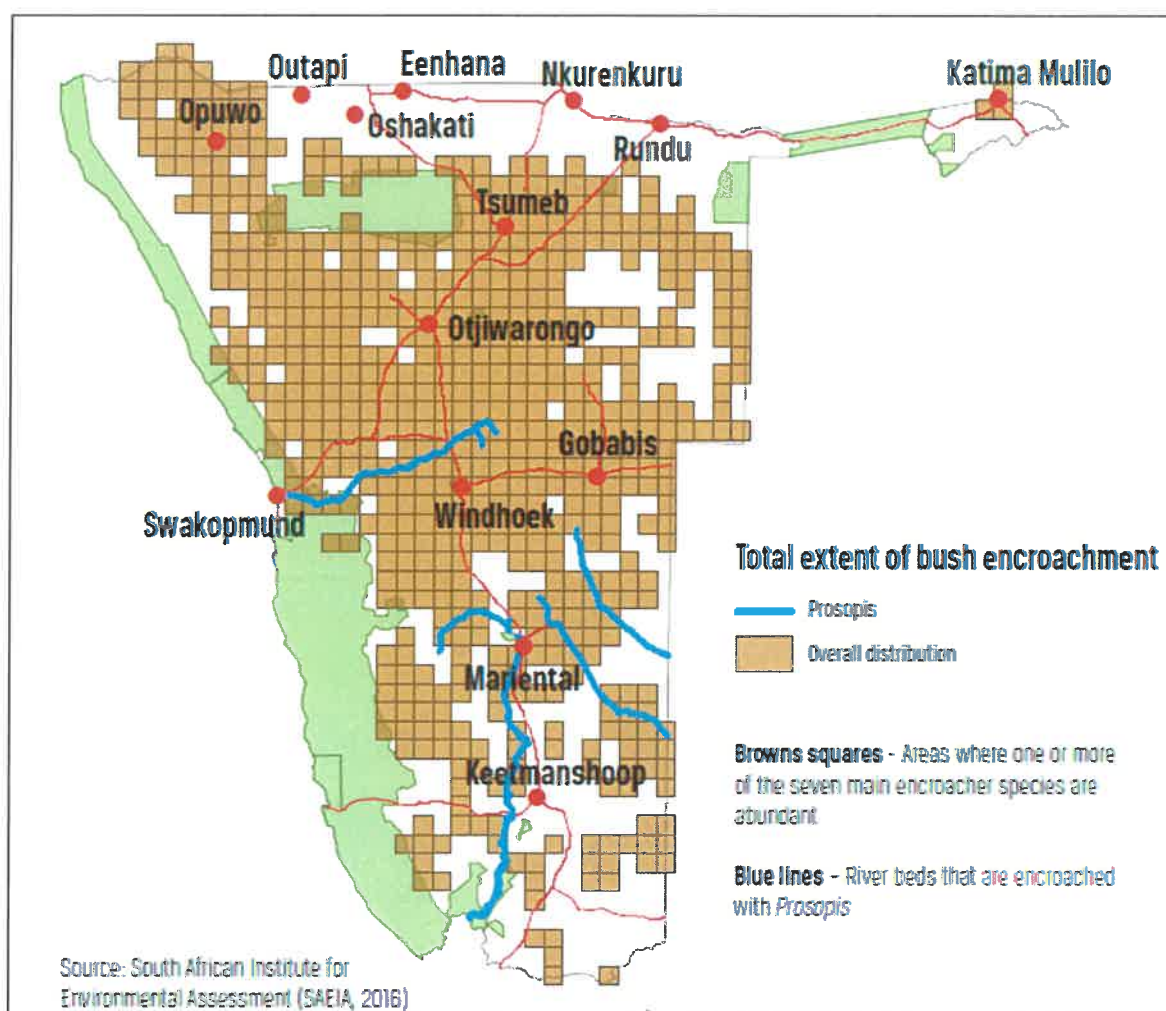


Figure 1-5: Bush Encroachment in Namibia

Source: South Africa Institute for Environmental Assessment (SAEIA, 2016)

In the project site bush encroachment is a major problem (see Image 1-5). Local farmers report that this has had a huge negative impact on ground water recharge as well as livestock and wildlife rangeland.



Image 1-5: Bush encroachment in the project area

Therefore, it is critical to implement measures to combat bush encroachment. The project will clearly be a positive impact in this regard as this is one of its main objectives.

It is also important to take into cognisance that bush encroachment control results in woody biomass which is a valuable economic resource. Based on an assumed 26-30 million hectare and a harvest of 10 t/ha on average, the encroacher bush theoretically offers 260-300 million tons of biomass (DECOSA, 2015). This opens an enormous potential and opportunities for value added production. Generation of charcoal from biomass is one of these opportunities.

Charcoal production is of overriding importance in Namibia. It is the main contributor to de-bushing and the only real industry (mainly for exports) based on invader bush. The table below provides an overview of Namibia's charcoal sector based on available data (NCA, 2020).

Table 1-4: Overview of Namibia's Charcoal Sector

Item	Description
Number of active producers	650
Main production areas	Grootfontein, Outjo, Otjiwarongo and Tsumeb. Smaller production areas around Windhoek/Okahandja, Otavi, Gobabis/Leonardville, Omaruru, Okakarara and Aranos
Direct and indirect employment	10,000 people
Annual production	200 000 t
Market	99% export for barbeque

Source: Namibia Charcoal Association (NCA, 2020)

The markets for barbeque charcoal (in particular in Europe) are under-supplied and there are indications that the gap between demand and supply will further increase (NCA, 2019). The production and export of charcoal are expected to rise significantly, along with the associated advantages including the creation of jobs. This is demonstrated by increase in charcoal production and in the sector's employment rate in the last couple of years (see figures below).

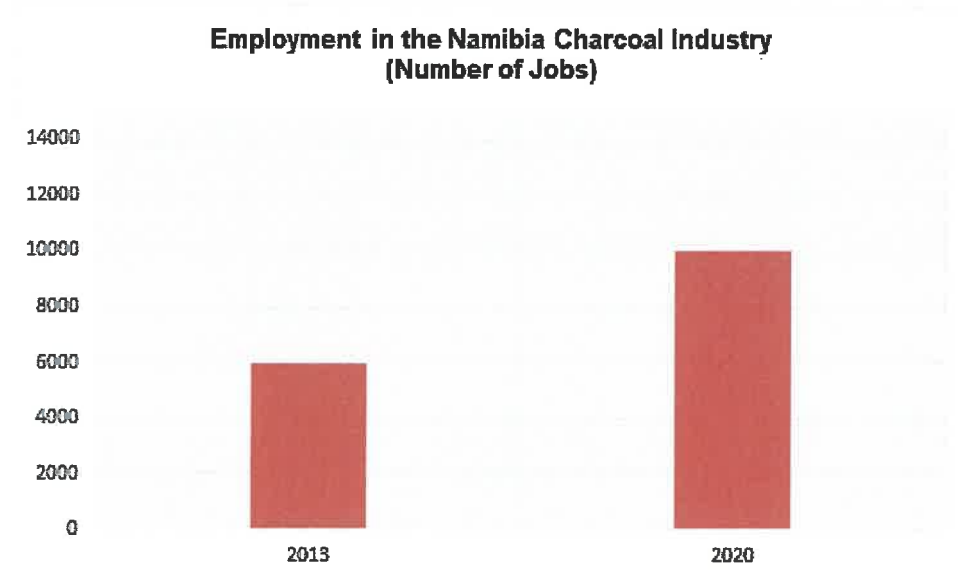


Figure 1-6: Employment in the Namibia Charcoal Industry

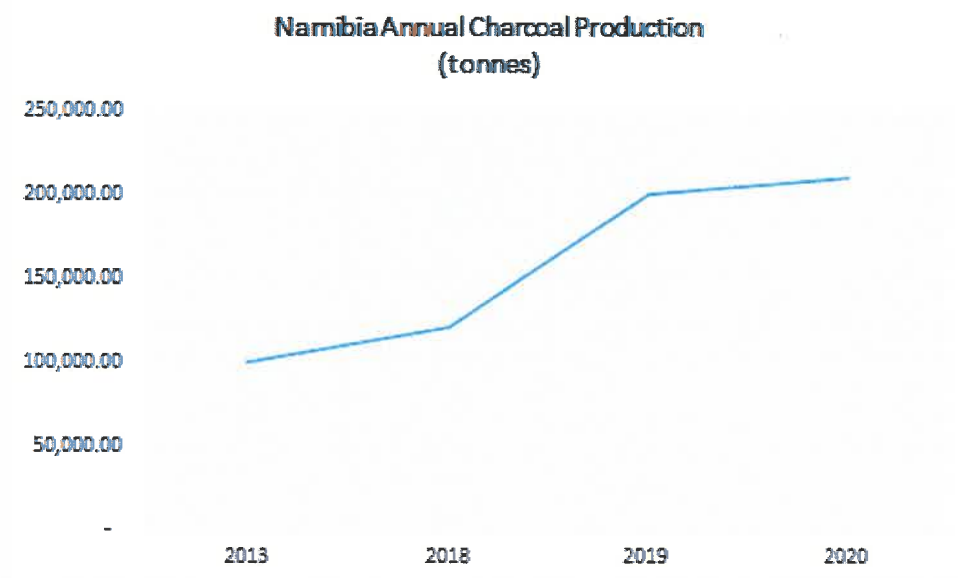


Figure 1-7: Namibia Annual Charcoal Production

Taking into account the trends in Figure 1-6 and Figure 1-7 as well as other considerations it clear that the charcoal production industry in Namibia has significant potential. As a result, Kudu Biomass Group has embarked on its charcoal production project in order to take advantage of this opportunity and contribute to the country's GDP.

1.8 PROJECT ALTERNATIVES

1.8.1 Site Location Alternatives

Table 1-5 highlights potential plant location sites and provides comments for each site. Geotechnical characteristics of the alternative plant locations, which have an impact on the structural stability of the facility, have primarily dictated the siting of the charcoal plant.

Table 1-5: Alternatives for Plant Site Location

Site A (Northern Side of Powerline)	Site B (Southern Side of the Powerline)
This location has been chosen to build the plant due to its geological characteristics. Relative to Site B, the site has sufficiently consolidated and stronger underlying rock. This provides for a stable foundation and consequently a strong and resilient structure once construction is complete.	Site B's upper subsurface geology consists primarily of sandy loam soils and it is located within a wetland. These features present geotechnical limitations that will negatively impact the stability and safety of the plant structure. Therefore the site has been deemed not suitable for building the plant.

1.8.2 Wood Harvesting Methods Alternatives

Wood biomass harvesting methods that have been taken into account are shown in Table 1-6.

Table 1-6: Alternatives for Wood Harvesting Methods

Method	Equipment	Cost Estimate (NAD)	Comment
Manual	Axes, pangas and spade	1,000–3,000/ha	Manual bush control is most suited for small-scale operations where cost and time are less important than selectivity of control.
Semi-mechanised	Conventional bush cutter, heavy duty bush cutter and chain saw	1,500–2,000/ha	Makes manual bush control much easier, faster and cheaper by shrinking unit cost due to improved productivity
Mechanical	Heavy mechanised cutting machine with clippers, small	750–4,000/ha	Selectivity of control and costs vary with the size of the machine. Small machines can generally extract encroacher bush

Method	Equipment	Cost Estimate (NAD)	Comment
	bulldozer with circular saw, heavy bulldozer and bush roller		much more selectively than larger machines, although some large extractors also handle every bush individually and are thus highly selective.
Chemical: manual application of arboricides	Pump sprayers and by hand	500–2,600/ha	Of all the bush control methods used in Namibia, it appears that chemical control is in most widespread use. In general, controlling encroacher bush by chemical means is an effective method. However, incorrect use can cause more damage than good.
Planned fire	Axe, spade, shovels, hoe, picks (manual) and mechanised machinery such as graders and tractors	About 100/ha	Planned fires seldom control existing dense mature bush but rather kill woody seedlings and saplings while they are still fire-tender. The best use of planned fires is for aftercare.

Source: Bush Control Manual, De-bushing Advisory Service Namibia, 2017

General comment – although it requires relatively high capital investment and has greater operational costs, mechanical harvesting is a more suitable harvesting method for the project. This is mostly attributable to the higher harvesting rates, which provide greater yields/returns per unit of time. The high profits more than outweigh the initial investment and operational costs.

1.8.3 Charcoal Production Plant Technology Alternatives

The charcoal production plant technology alternatives are listed below in Table 1-7.

Table 1-7: Charcoal Production Plant Technology Alternatives

Standard Kilns		Retort carbonisers	
Advantage	Disadvantages	Advantage	Disadvantages
<ul style="list-style-type: none"> • Easy production by local welders. • Easy transport by rolling them to the harvesting areas. • Limited skills required for operation. 	<ul style="list-style-type: none"> • Small capacity of in average 285kg charcoal per kiln, • Low yields with an average ratio of 5t wood : 1t charcoal, • Risk of bushfire, if the area around the kilns is not properly cleaned. 	<ul style="list-style-type: none"> • Bigger capacity and greater charcoal yields • Reduced air emissions • Produce better quality charcoal • Lesser risk of bushfires 	<ul style="list-style-type: none"> • Larger capital investment • Required a certain level of skill in operation • Require specialised production skills and technology

Standard Kilns		Retort carbonisers	
Advantage	Disadvantages	Advantage	Disadvantages
<ul style="list-style-type: none"> • Low investment of about N\$ 2 000-3 000 per kiln. 			

General comments: Due to their higher production rates compared to standard kilns and lower environmental risks, retort carbonisers will be used for the project's operations.

1.8.4 NO-GO Alternative

The project will not be implemented if the No-Go option is selected. This means that environmental impact associated with the current land use will be maintained. The status quo needs to be measured against the proposed facility to determine whether the environmental and socio-economic benefits warrant the approval thereof or whether the status quo should be maintained.

This alternative implies that bush encroachment with its associated negative effects (e.g. degraded rangelands, reduced livestock production, low ecosystem productivity) will persist. In addition the socio-economic benefits associated with the project such as employment creation, improved agricultural production and increase in the nation's GDP will be not be realised.

Due to the project's numerous environmental and socio-economic benefits, and that the identified environmental impacts can be suitably mitigated it has been determined that the No Go option can be eliminated. Should the Competent Authorities (CA) refuse the authorisation of the proposed charcoal production, the 'No Go' option will be "implemented" and the status quo of the site will remain intact - leaving the site in its present state.

1.8.5 Conclusion

The project will go ahead, with mechanical wood harvesting and retort carboniser technology as a viable option for producing environmentally friendly charcoal. Furthermore, the initiative will result in the control of bush encroachment, allowing for increased livestock and wildlife output.

2 CHAPTER TWO: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 INTRODUCTION

An important part of the EIA is identifying and reviewing the administrative, policy and legislative situation concerning the proposed activity, to inform the proponent about the requirements to be fulfilled in undertaking the construction and land servicing activities. This section looks at the legislative framework within which the proposed project will operate under. The focus is on the compliance with the legislation during the planning, construction and operational phases. All relevant legislations, policies and international statutes applying to the project are highlighted in Table 2-1 below as specified in the Environmental Management Act, 2007 (Act No.7 of 2007) and the regulations for Environmental Impact Assessment as set out in the Schedule of Government Notice No. 30 (2012).

2.2 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The pursuit of sustainability is guided by a sound legislative framework. In this section, relevant legal instruments as well as their relevant provisions have been surveyed. An explanation is provided regarding how these provisions apply to this project.

Table 2-1: Legal Compliance

LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
<p>The Constitution of the Republic of Namibia (1990)</p>	<p>The articles 91(c) and 95(i) commits the state to actively promote and sustain environmental welfare of the nation by formulating and institutionalizing policies to accomplish the sustainable objectives which include:</p> <ul style="list-style-type: none"> - Guarding against overutilization of biological natural resources, - Limiting over-exploitation of non-renewable resources, - Ensuring ecosystem functionality, - Maintain biological diversity. 	<p>-Through implementation of the environmental management plan the proposed development will be conformant to the constitution in terms of environmental management and sustainability, through bringing development in an environmentally sensitive way.</p>

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LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
<p>Vision 2030 and National Development Plans</p>	<p>Namibia's overall Development ambitions are articulated in the Nations Vision 2030. At the operational level, five-yearly national development plans (NDP's) are prepared in extensive consultations led by the National Planning Commission in the Office of the President. Currently the Government has so far launched a 4th NDP which pursues three overarching goals for the Namibian nation: high and sustained economic growth; increased income equality; and employment creation.</p>	<p>The proposed charcoal production project will not only contribute to the nation's GDP and employment, but will also facilitate improved production in the agricultural and tourism industry as well.</p>
<p>Environmental Assessment Policy of Namibia 1994</p>	<p>The Environmental Assessment Policy of Namibia requires that all projects, policies, Programmes, and plans that</p>	<p>-The construction and operation of the charcoal production plant will only commence after being awarded an</p>

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LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
	<p>have detrimental effect on the environment must be accompanied by an EIA. The policy provides a definition to the term "Environment" broadly interpreted to include biophysical, social, economic, cultural, historical and political components and provides reference to the inclusion of alternatives in all projects, policies, programmes and plans.</p>	<p>environmental clearance certificate, thus by abiding to the requirements of the Environmental Assessment Policy of Namibia. The EIA and EMP will cater for the sustainable management of biophysical environment.</p>

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LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
<p>Environmental Management Act No. 07 of 2007</p>	<p>The Act aims at</p> <ul style="list-style-type: none"> - Promoting the sustainable management of the environment and the use of natural resources by establishing principles for decision-making on matters affecting the environment; - To provide for a process of assessment and control of projects which may have significant effects on the environment; <p>The Act gives legislative effect to the Environmental Impact Assessment Policy. Moreover, the act also provides procedure for adequate public participation during the environmental assessment process.</p>	<p>-This document is compiled in a nature that project implementation is in line with the objectives of the EMA. EIA guiding procedures developed by MET were also used in the course of this project.</p>
<p>Public Health Act (No. 36 of 1919)</p>	<p>Under this act, in section 119:</p>	<p>-The project proponent will ensure that all legal requirements of the project in</p>

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LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
	<p>"No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."</p>	<p>relation to protection of the health of their employees and surrounding residents is protected.</p> <p>-Personal protective equipment shall be provided for employees in construction.</p> <p>-The development shall follow requirements and specification in relation to water and sanitation so as not to threaten public health of future residents on this piece of land.</p>
<p>Soil Conservation Act 76 of 1969</p>	<p>The objectives of this Act are to:</p> <ul style="list-style-type: none"> - Make provisions for the combating and prevention of soil erosion, - Promote the conservation, protection and improvement of the soil, vegetation, sources and resources of the Republic. 	<p>-Where necessary soil protection measures will be employed and preservation of trees as much as possible.</p>

LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
<p>Nature Conservation Ordinance 1996</p>	<p>To consolidate and amend the laws relating to the conservation of nature; the establishment of game parks and nature reserves; the control of problem animals; and to provide for matters incidental thereto.</p>	<p>The proposed project implementation is not located in any known or demarcated conservation area, national park or unique environments. The project site was selected with this ordinance in mind to ensure that Namibian nature is conserved.</p>
<p>Protected Areas and Wildlife Management Bill</p>	<p>This bill, when it comes into force, will replace the Nature Conservation Ordinance 4 of 1975. The bill recognizes that biological diversity must be maintained, and where necessary, rehabilitated and that essential ecological processes and life support systems be maintained. It protects all indigenous species and control the exploitation of all plants and wildlife.</p>	<p>Environmental recommendations and considerations on this project has ensured that the proposed activities will not fall within the boundaries of any protected area and that the project will not affect heavily endangered vegetation and animals on its site.</p>

LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
<p>Forest Act, 2001 (Act No. 12 of 2001)</p>	<p>The Act gives provision for the protection of various plant species through the Ministry of Agriculture, Water and Forestry (MAWF), Directorate of Forestry).</p>	<ul style="list-style-type: none"> -The project is to involve thinning rather than total clearing of vegetation. The objective will be to control bush encroachment. Bush encroacher species, tree height, width as well as bush densities are to be taken into account in planning for wood harvesting and management of bush encroachment. -The proponent will also have to ensure that there is no indiscriminate cutting down of trees during construction and operation -Care is to be taken during project activities and where protected species are identified these will not be cut down.

LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
National Rangeland Policy and Strategy, 2012	The policy aims at enabling resource users (farmers and managers) to manage their rangeland resources in a sustainable manner and sustainable in that they are economically viable, socially acceptable, environmentally friendly and politically conducive.	-This proposed project will ensure that the local community benefits both economically and socially from the project, this in line with the recently declared Harambee Prosperity Plan and NDP 4&5.
National Biodiversity Strategy and Action Plan (NBSAP2)	The action plan was operationalised in a bid to make aware the critical importance of biodiversity conservation in Namibia putting together management of matters to do with ecosystems protection, biosafety, biosystematics protection on both terrestrial and aquatic systems.	-The project proponent has been advised by JBIC and recognises the need for ecosystems protection through the control of bush encroachment. -This project is one of the drivers to reduce bush encroachment, rehabilitate affected ecosystems and conserve biodiversity.

LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
<p>National Policy on Climate Change for Namibia, 2010</p>	<p>In harmony with the findings of the IPCC over time and the Earth Summits held annually, the policy seeks to outline a coherent, transparent and inclusive framework on climate risk management in accordance with Namibia's national development agenda, legal framework, and in recognition of environmental constraints and vulnerability. Furthermore, the policy pursues the strengthening of national capacities to reduce climate change risk and build resilience for any climate change shocks.</p>	<p>-Measures are to be put in place to ensure that the project reduces its carbon footprint.</p>
<p>Wetland Policy, 2004</p>	<p>The policy provides a platform for the conservation and wise use of wetlands, thus promoting inter-</p>	<p>-In compliance to this Policy, the development will ensure a standard environmental planning such that it</p>

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	<p>generational equity regarding wetland resource utilization. Furthermore, it facilitates the Nation's efforts to meet its commitments as a signatory to the International Convention on Wetlands (Ramsar) and other Multinational Environmental Agreements (MEA's).</p>	<p>does not affect any wetlands within its locale through recognition of wetlands to promote the conservation and wise utilization of wetlands resources.</p>
<p>Water Resources Management Act, 2013 (Act No. 11 of 2013)</p>	<p>This Act provides for the management, protection, development, use and conservation of water resources. This also forms the regulation and monitoring of water resources.</p>	<p>-Water supply will be obtained from a nearby borehole, the water abstraction license is valid.</p>
<p>National Heritage Act 27 of 2004</p>	<p>Heritage resources to be conserved in development.</p>	<p>-During the project implementation as soon as objects of cultural and heritage interests are observed such as graves, artefacts and any other object believed to be older than 50</p>

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LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
		years, all measures will be taken protect these objects until the National Heritage Council of Namibia have been informed, and approval to proceed with the operations granted accordingly by the Council.
<p>National Monuments Act of Namibia (No. 28 of 1969) as amended until 1979</p>	<p>"No person shall destroy, damage, excavate, alter, remove from its original site or export from Namibia: (a) any meteorite or fossil; or (b) any drawing or painting on stone or a petroglyph known or commonly believed to have been executed by any people who inhabited or visited Namibia before the year 1900 AD; or</p>	<p>-The proposed site of development is not within any known monument site both movable or immovable as specified in the Act, however in such an instance that any material or sites or archeologic importance are identified, it will be the responsibility of the developer to take the required route and notify the relevant commission.</p>

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	<p>(c) any implement, ornament or structure known or commonly believed to have been used as a mace, used or erected by people referred to in paragraph (b); or</p> <p>(d) the anthropological or archaeological contents of graves, caves, rock shelters, middens, shell mounds or other sites used by such people; or</p> <p>(e) any other archaeological or palaeontological finds, material or object; except under the authority of and in accordance with a permit issued under this section.</p>	
<p>Pollution Control and Waste Management Bill</p>	<p>-This bill has not come into force. Amongst others, the bill aims to "prevent and regulate the discharge of</p>	<p>-To control air, water and land pollution as agitated by the Act the project proponent will ensure that</p>

LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
	<p>pollutants to the air, water and land” Of particular reference to the Project is: Section 21 “(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of pollutants or waste into any water or watercourse.”</p> <p>Section 55 “(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human health or the environment.”</p>	<p>waste management practices do not threaten public health, adding on an integrated pollution management strategy following the EMP provided herein.</p>
<p>Convention on Biological Diversity (CBD)</p>	<p>Namibia is a signatory of the Convention on Biological Diversity and thus is obliged to conserve its biodiversity.</p>	<p>The project will result in biodiversity conservation and will preserve tree species on as part of their plans for greed and sustainable development.</p>

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LEGISLATION/POLICY/GUIDING DOCUMENT	PROVISION	PROJECT IMPLICATION
<p>United Nations Convection to combat Desertification</p>	<p>Namibia is bound to prevent excessive land degradation that may threaten livelihoods.</p>	<p>It will be the responsibility of the proponent to conserve vegetation on and around the area, to avoid encroachment of the desert environs in the area.</p>

2.3 FSC STANDARDS AND GUIDELINES

It is noteworthy to state that charcoal markets (nationally, regionally and internationally) are increasing calling for charcoal producers that are certified by organisations such as the Forest Stewardship Council (FSC). FSC is an international organisation that provides a system for voluntary certification. It promotes responsible management of forest resources and ecosystem services. FSC sets a number of rules for production and marketing but at the same time it calls for compliance to national legislation. These are set out in principles outlined in *The FSC National Forest Stewardship Standard for the Republic of Namibia, 2020*. A summary of the FSC principles and their application to the project is tabulated below.

Table 2-2: Summary of FSC Principles

Principle	Summary of Principle Requirements	Project Implication
Principle 1: Compliance With Laws	The organization shall comply with all applicable laws, regulations and nationally-ratified international treaties, conventions and agreements.	-The proponent is to ensure that all legal documentation (e.g. title deeds, land certificates, etc) is in place. Clearing permits are already in place. - The company is to ensure that it maintains a register of its legal obligations and that work personnel are aware of the obligations that apply to them.
Principle 2: Workers' Rights and Employment Conditions	The organization shall maintain or enhance the social and economic wellbeing of workers.	Employees are to be provided with a healthy and safe work environment. A system is to be put in place to ensure Labour law provisions are adhered to and that employee concerns are captured and addressed.
Principle 3: Indigenous Peoples' Rights	The organization shall identify and uphold Indigenous Peoples' legal and customary rights of ownership, use and management of land, territories and resources affected by management activities.	All project activities are to be undertaken considering local community customary laws, culture and traditions. A system to capture stakeholder concerns is to be instituted. In the course of project

Principle	Summary of Principle Requirements	Project Implication
		operations, these issues will be noted and resolved.
Principle 4: Community Relations	The organization shall contribute to maintaining or enhancing the social and economic wellbeing of local communities.	Socio-cooperate responsibility initiatives shall be identified and carried out as necessary. The initiatives will be chosen in collaboration with all interested and affected stakeholders.
Principle 5: Benefits from the Forest	The organization shall efficiently manage the range of multiple products and services of the Management Unit to maintain or enhance long-term economic viability and the range of social and environmental benefits.	As part of its business plan the company is to include business sustainability and continuity aspects. The aim is to ensure that current and future processes continue to function and are improved. This also provides a system to navigate uncertainties and guide businesses through market changes.
Principle 6: Environmental Values* And Impacts	The organization shall maintain, conserve and/or restore ecosystem and environmental values of the Management Unit, and shall avoid, repair or mitigate negative environmental impacts.	The organization is to implement and adhere to the project EMP.
Principle 7: Management Planning	The organization shall have a management plan consistent with its policies and objectives and proportionate to scale, intensity and risks of its management activities. The management plan shall be implemented and kept up to date based on monitoring information in order to promote adaptive management. The associated planning and procedural documentation shall be sufficient to guide staff, inform affected	The company will incorporate in its operations a risk management plan. This will facilitate identifying, assessing and controlling threats to the company's capital and earnings. These risks may stem from a variety of sources including financial uncertainties, legal liabilities, technology issues, strategic management errors, accidents and natural disasters. The risk management plan will intertwined with

Principle	Summary of Principle Requirements	Project Implication
	<p>stakeholders and interested stakeholders and to justify management decisions.</p>	<p>organizational strategy and business plan.</p>
<p>Principle 8: Monitoring And Assessment</p>	<p>The organization shall demonstrate that, progress towards achieving the management objectives, the impacts of management activities and the condition of the Management Unit, are monitored and evaluated proportionate to the scale, intensity and risk of management activities, in order to implement adaptive management.</p>	<p>The company is conduct periodic evaluations in order assess and manage performances so that appropriate improvements can be made in line business objectives and targets. Practices that promote efficient use of resources are to be identified and data collected to guide strategic planning, to design and implement programmes and projects, and to allocate, and re-allocate resources in better ways.</p>
<p>Principle 9: High Conservation Values</p>	<p>The organization shall maintain and/or enhance the High Conservation Values (HCV) in the Management Unit through applying the precautionary approach.</p>	<p>The organization will implement and adhere to the project EMP.</p>
<p>Principle 10: Implementation Of Management Activities</p>	<p>Management activities conducted by or for the organization for the Management Unit shall be selected and implemented consistent with The Organization's economic, environmental and social policies and objectives and in compliance with the Principles and Criteria collectively.</p>	<p>The organization will implement and adhere to the project EMP. Consideration will also be given to the project's risk management plan as well as the business sustainability and continuity plan.</p>

3 CHAPTER THREE: RECEIVING ENVIRONMENT

3.1 SOCIO-ECONOMIC

The project is located in the Okahandja constituency/district in the Otjozondjupa region (see Figure 1-1). It is one of the seven electrical constituencies in the in the Otjozondjupa Region and has a surface area of 5,903.2 km² (ORC, 2021).

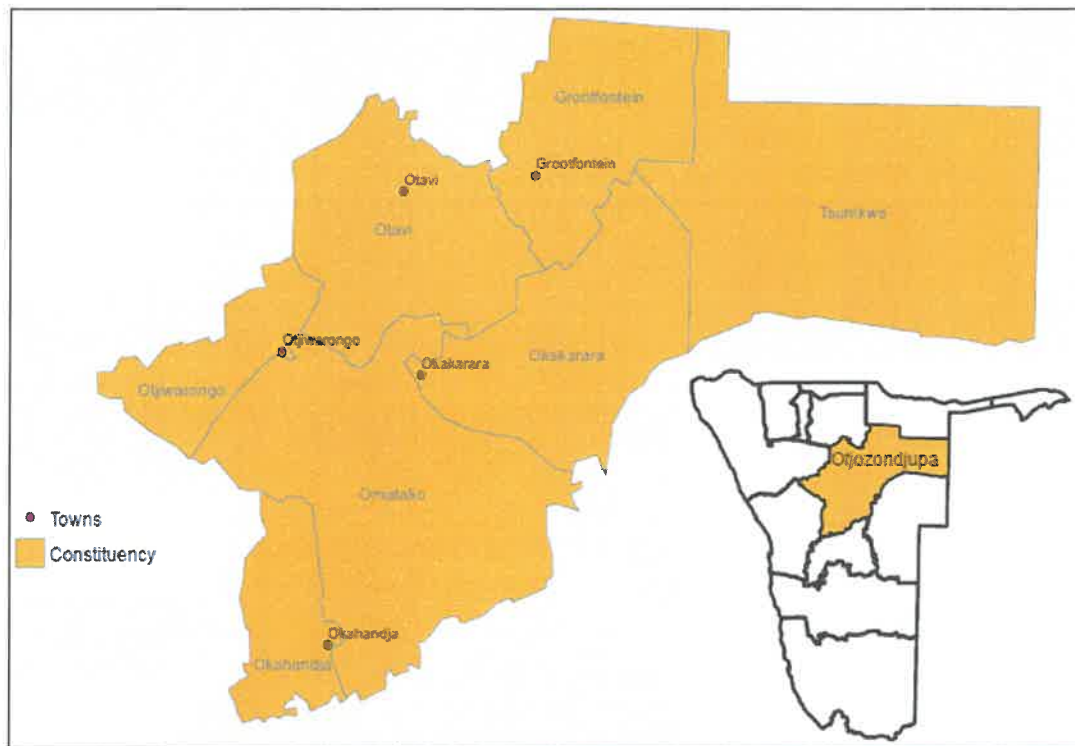


Figure 3-1: Otjozondjupa Region

Source: Otjozondjupa 2011 Census Regional Profile, NSA, 2011.

The borders of the constituency are as follows: Omatoko Constituency on the eastern, Khomas Region on the Southern and Erongo Region on the Western. There are about 24,451 people living in the district. 12,352 of them are women and 12,099 of whom are men (NSA, 2012).

Okahandja town is the district's capital and has a total surface area of 164.2km² and situated on the Trans Kalahari Highway in the central part of Namibia, 70 km north of north of Windhoek the capital city of Namibia. The important B1 and B8 trunk highways, which run from south to north linking Okahandja, Otjiwarongo, Grootfontein and Otavi, pass through the constituency. Additionally, an excellent network of asphalt and gravel roads serves the area. It also has good-quality telecommunication systems (ORC, 2021).

The Okahandja constituency's local economy is dependent on cattle farming, just like it is in much of the Otjozondjupa region. The district also has a great potential to establish industries connected with such farming activities and by-products of it. It further has the advantage of combining communal and commercial farming in the same region. Although to a lesser extent, the local economy is also influenced by the growth of grain crops and tourism. It has some of the best game and hunting farms in the country. Common game found in the area include Oryx (*Oryx gazelle*) and Kudu (*Tragelaphus strepsiceros*) (ORC, 2021).

Extrapolating from the national unemployment statistics, the constituency has an unemployment rate of 33.40% and youth unemployment rate of 46.10% (Namibia Central Bureau of Statistics, 2019). This shown in the figure below.

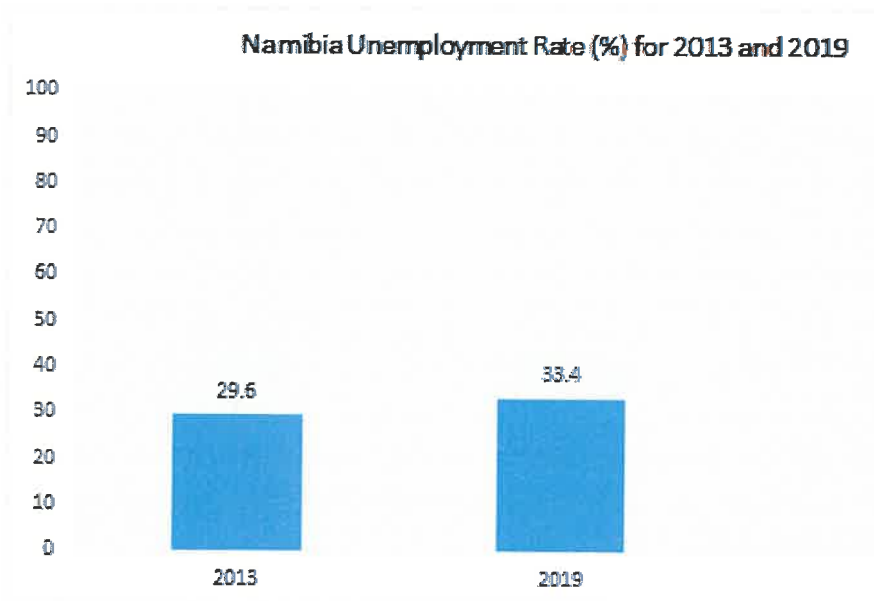


Figure 3-2: Namibia Unemployment Rate and Youth Unemployment Rate

The project will support the district's need for employment as well as the expansion of the local economy. Numerous employment opportunities are to be created for work personnel throughout the project phases. In addition other forms of employment are likely to result from spillover effects, through indirect services such as supply of raw materials, equipment, machinery, etc.

Through the project's control of bush encroachment, the rangeland ecology will function better and support increased livestock output. It will lead to an enhanced wildlife habitat, facilitating the conservation of biodiversity and generating more revenue for the tourism sector.

3.2 CLIMATE

The climate in the project region is characterized by a local steppe climate. There is little rainfall throughout the year, averaging approximately 360 mm. June is the driest month, with an average rainfall of 0 mm. January, on the other hand, is the wettest month, with an average rainfall of 96 mm. October through March are the hottest months of the year. Temperatures during this time of year might have highs that range from 35 °C to 45°C. Winter generally runs from June until August. During this season, it is possible to have low temperatures below 0 °C.

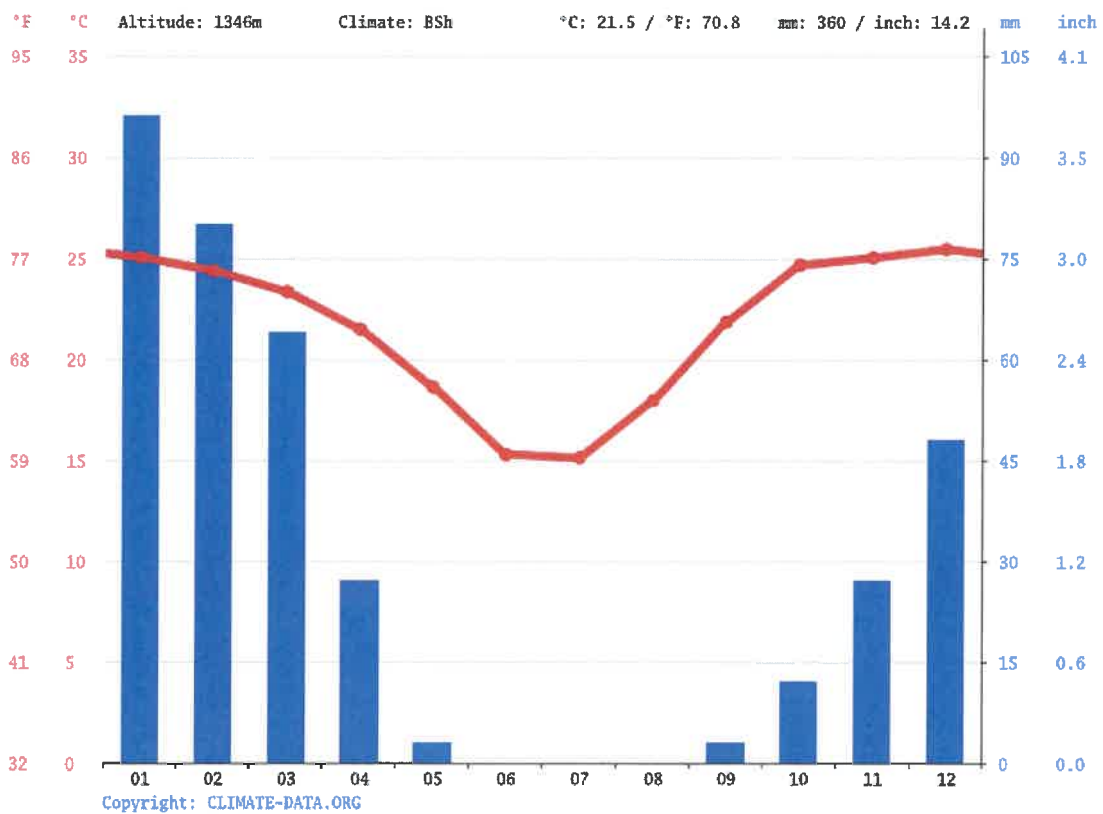


Figure 3-3: Okahandja Climatic Graph

Source: Climate-data.org, 2022

As shown in Figure 3-4 the prevailing winds of the project are from northeast and southwest. However, the northeasterly winds are predominant.

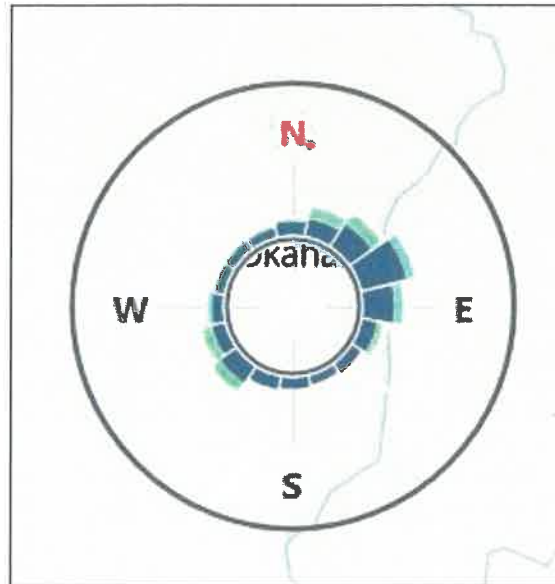


Figure 3-4: Area's Prevailing Winds

Source: Windy Weather World Inc, 2022

Taking into account the climate conditions of the project area there is need for appropriate planning and preparation both in the establishment of the project and its operation. The area is susceptible to droughts and extended dry periods. The type of impacts/risks that may occur under these conditions include:

- Inadequate water supply
- Possible conflicts with local community and other businesses regarding the utilisation of shared water sources.
- Bush fires in the dry and hot season.

High temperatures during summer can also affect project workers. The major impact associated with high temperatures and exposure to the sun is heat stress. Heat stress impacts may affect workers' health (through heat related illnesses), safety (inhibiting abilities to perform tasks in already hazardous environments), productivity (thermally stressful conditions may result in decreased pace of work) and morale.

3.3 FLORA

The vegetation of the area can be classified as thornbush savanna. Dominant tree species are *Vachellia erioloba*, *Acacia erubescens*, *Acacia karroo* and *Acacia mellifera*, *Acacia reficiens*, *Grewia flava*, *Grewia flavescens*, *Crton gratissimus*. The grass species found in and around the project area include *Stipagrostis ciliata*, *Stipagrostis uniplunis* and *Cenchrus ciliaris*.

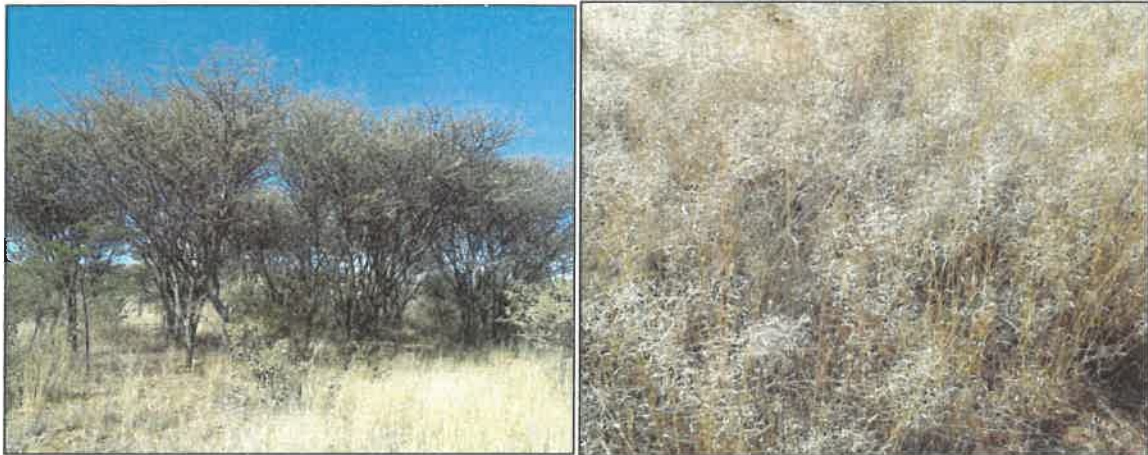


Image 3-1: Trees and grasses the project site

Bush encroachment is a major issue of concern in the area as evidenced by high bush densities in some parts of the site as well as minimal undergrowth in affected areas.



Image 3-2: Area affected by bush encroachment

Healthy savannahs are characterised by a balance between grass and bush, with the proportions of each depending on local ecological conditions. Although not easily apparent to human observers, the grasses and woody plants in a savannah are in constant competition with each other. Solid grass cover provides fuel to feed an occasional fierce fire that kills young bushes, whereas the widespread roots of bushes and trees dry out the surrounding soil, making it difficult for grass to grow. Therefore it is necessary to control bush encroachment in order to ensure healthy ecosystem functioning.

3.4 FAUNA

Antelope species are the main large mammals found in area and these range from Kudu (*Tragelaphus strepsiceros*), Orxy (*Oryx gazelle*) and Eland (*Taurotragus oryx*), to the diminutive Damara dik-dik (*Madoqua kirkii*). Image 3-3 shows antelope droppings encountered during field surveys.



Image 3-3: Antelope droppings

Smaller mammals include jackal (*Canis aureus*), bat-eared fox (*Otocyon megalotis*), honey badger (*Mellivora capensis*), warthog (*Phacochoerus africanus*), steenbok (*Raphicerus campestris*) and the ubiquitous ground squirrel (*Xerus princeps*). Bird species found in the area include Southern Yellow-billed (Tockus leucomelas), Fork-tailed Drongo (*Dicrurus adsimilis*), White-browed Sparrow-Weaver (*Plocepasser mahali*), Rock Martin (*Ptyonoprogne fuligula*), Grey Go-Away-Bird (*Corythaixoides concolor*), Crimson-breasted Gonolek (*Laniarius atrococcineus*) and Ring-necked Dove (*Streptopelia capicola*). While some species, including the cheetah (*Felis nigripes*) and leopard (*Panthera pardus*), do occasionally pass through the area, they do not necessarily live there permanently. Reptiles are also present. Snakes, tortoises, and monitor lizards are a few of the commonly found reptiles.

The presence of open grasslands interspersed with trees provides a good habitat for a number of invertebrates. The area is known to host diverse invertebrates which include the following Orders of insects: butterflies (*Lepidoptera*), spiders, scorpions (*Arachnids*), grasshoppers (*Orthoptera*), termites (*Isoptera*), ants, wasps, bees (*Hymenoptera*), flies

(*Diptera*), beetles (*Coleoptera*) and plant bugs (*Hemiptera*) and many others which can be identified if surveys are to be carried during the breeding wet season.

The wildlife co-exist amicably with livestock, mainly cattle, are kept by farmers in the area. The project is expected to result in improved ecosystem services therefore wildlife and livestock are expected to benefit from the project.

3.5 GEOLOGY AND HYDROLOGY

The area falls within the Damara Supergroup and Gariep Complex characterised by the Khomas group rock type (Mendelsohn, Jarvis, Roberts, et al., 2002). The soil in the area is dominated by schists. The subject area falls within the Central Namib Hydrogeological region. It falls within the Swakop catchment, together with other towns such as Windhoek, Karibib, Usakos, Otjimbingwe, and Swakopmund. Elevations in the area 1325 metres above mean sea level (mamsl). It has ephemeral drainage lines with numerous tributaries.

According to the 1: 250 000 geological series for Namibia, the surface geology of the project area is characterized by Swakop River alluvial deposits, successions of quaternary sand deposits (mainly carbonates or Otavo lithologies) and mica schist, meta greywacke and migmatite, of the Damara Granite Group. Damaran granite rocks present in this unit include schists of the basal Nosib Group; marbles of the Ugab and Kudis Subgroups; schist, phyllite and amphibolite of the Chuos Formation; and marble, schists and amphibolites of the Karibib and Kuiseb Formations, including the Matchless Amphibolite Belt (Earthwise, 2021).

According to the Ministry of Agriculture, Water and Rural Development (2011) the soils that characterize the greater project area is classified as Leptosols (very shallow soil over a hard rock or a deeper soil that is gravelly and/or stony), Acrisols (clay-rich subsoil), Ferrasols (red and yellow weathered soils whose colours result from an accumulation of metal oxides, particularly iron and aluminium) and Vertisols (high content of expansive clay minerals).

The terrain forms vary from one area to another. There are hilltops on some areas with others that are flat and dominated by grassland and some plantations.

4 CHAPTER FOUR: PUBLIC CONSULTATION

4.1 OVERVIEW

The public consultation process forms an important component of the Environmental Assessment process. It is defined in the EIA Regulations (2012), as a “*process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters*” (S1). Section 21 of the Regulations details steps to be taken during a given public consultation process and these have been used in guiding our process.

Formal public involvement has taken place via public consultations and focal meetings, newspaper announcements to inform the public that such a large-scale project is under consideration. The public consultation process has been guided by the requirements of Environmental Management Act (EMA) No. 7 of 2007 and the process has been conducted in terms of regulation 7(1) as well as in terms of the EMA Regulations of GN 30 of 6 February 2012 and the World Bank EIA standards and project ToR.

Its overriding goals have been to ensure transparency in decision making and to.

- ✓ Ensure stakeholder concerns are incorporated in project design and planning;
- ✓ Increase public awareness and understanding of the project and
- ✓ Enhance positive development initiatives through the direct involvement of affected people.

The objectives of the public participation is to build credibility through instilling integrity and of conducting the EIA, Educate the stakeholders on the process to be undertaken and opportunities for their involvement and build stakeholders by establishing an agreed framework accordingly. This requires accessible, fair, transparent and constructive participation at every stage of process. Inform stakeholders on the proposed project and associate issues, impacts and mitigation and using the most effective manner to disseminate information.

In this section of the report, the results of consultations with various classes of stakeholders are summarized. The results of consultations with other stakeholders and community members who took part in this EIA are attached as Appendices.

The consultation was facilitated through the following means:

- ❖ A Background Information Document (BID) containing the project description, the EIA process and an invitation to participate was shared with stakeholders and community members.
- ❖ Invitation to participate notices were published in the local newspapers (New Era and Confidante) as shown in Table 4-1 below and Appendix A of this document.
- ❖ Announcement of EIA process verbally in the common public meeting points.
- ❖ Placement of a public notice at the project site and town centre.

Table 4-1: Details of public notification of the EIA study

Method	Area of Distribution	Language	Date Placed
The Confidante	Country Wide	English	09 June 2022
			16 June 2022
Windhoek Observer	Country Wide	English	09 June 2022
Site notices	Project site	English	16 June 2022
	Nearby Farms (WhatsApp Group)	English	6 to 13 June 2022
Public Meeting	Kataneno Farm	English	16 June 2022



Image 4-1: Public meeting held on 26th of April 2022 at Kataneno Farm

✓ *Key Stakeholder Engagement Meeting*

A public meeting was organised on 26th of April 2022 at Kataneno Farm. Proof of public consultation is given in Appendix A of this document as well the attendance register explaining the project and the EIA study. Given below are the details of the meeting which was held:

- The farmers welcomed the project and stated that the control of bush encroachment would result in rehabilitated farm rangelands. This will turn lead to improved livestock production, groundwater recharge and ecosystem function.
- They emphasized the importance of fire prevention as the project activities are undertaken. Appropriate firebreaks should be maintained between farm boundaries and in areas near roadways.
- Increased traffic movement, especially with heavy charcoal loads, along the area's gravel roads was mentioned as a major concern. More traffic movement on roads, notably the road to Okahandja, may result in road deterioration during the wet season and increased dust in the dry months.

✓ *Identification of Interested and Affected Parties (I&APs)*

The EIA team identified and consulted the following I&APs & key stakeholders for the proposed project:

- ❖ Farmers
- ❖ Community Members.

Other I&APs were allowed to register to the EIA team and compiled a database containing their names and correspondence details. The registration was accomplished over a period of 14 days.

✓ *Consultation with Stakeholders*

Experts in relevant fields, leaders of thought in environmental matters, local communities have been consulted for their opinions on issues relating to the potential ecological and socio-economic impacts of the proposed project. This provided an opportunity for stakeholders and the public at large to engage in the process and to make comments or express their concerns regarding the proposed development.

Table 4-2: Key findings of the public consultation process

SUMMARY OF ISSUES	
THEME	ISSUE
Economic	<ul style="list-style-type: none"> ✦ Employment of general labour must consider employing local people from the area. ✦ The company must take the social responsibility in the area. ✦ Improve the life being of the local residents.

SUMMARY OF ISSUES	
	<ul style="list-style-type: none"> ⚠ Ensure that project activities do not negatively affect road infrastructure
Health and Safety	<ul style="list-style-type: none"> ⚠ Waste management concerns including both solid waste and wastewater. ⚠ Potential air, noise and water pollution due to development. ⚠ The company must provide enough health care to employees
Ecological	<ul style="list-style-type: none"> ⚠ Maintenance of fire breaks in line with legal requirements. ⚠ Concerns regarding impacts on and conservation of natural vegetation. ⚠ Limited cutting down of trees should be observed by the construction company ⚠ Resources such as air and water should not be polluted during operations because communities, wild animals and livestock rely on these resources.
Communication	<ul style="list-style-type: none"> ⚠ Clear communication needs to be promoted between relevant authorities and the local community. ⚠ Clarify nature of new property (how it works, what processes involved).

5 CHAPTER FIVE: ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

5.1 OVERVIEW

The proponent recognises the importance of undertaking the project operation in line with sustainable development objectives and applicable legal requirements. To this end an Environmental Management Plan (EMP) for the project is being developed in order to address negative environmental impacts and enhance positive impacts. The EMP takes into account identification of potential impacts, assessment of the significance of the risks associated with these impacts and the establishment of preventive actions as well as mitigation measures. The EMP will be monitored, reviewed, and updated as necessary with the aim of continuous improvement, taking into account various changes in project operations, the biophysical environment and socio-economic circumstances.

5.2 ASSESSMENT OF IMPACTS

This section outlines how the overall methodology to assessing the project's possible environmental and social impacts. Each potential impact must be assessed in order to properly evaluate its significance. The definitions and explanations for each criterion are set out below in Table 5-1.

Table 5-1: Assessment Criteria

Duration – What is the length of the negative impact?	
None	No Effect
Short	Less than one year
Moderate	One to ten years
Permanent	Irreversible
Magnitude – What is the effect on the resource within the study area?	
None	No Effect
Small	Affecting less than 1% of the resource
Moderate	Affecting 1-10% of the resource
Great	Affecting greater than 10% of the resource
Spatial Extent – what is the scale of the impact in terms of area, considering cumulative impacts and international importance?	
Local	In the immediate area of the impact
Regional / National	Having large scale impacts
International	Having international importance

Type – What is the impact	
Direct	Caused by the project and occur simultaneously with project activities
Indirect	Associated with the project and may occur at a later time or wider area
Cumulative	Combined effects of the project with other existing / planned activities
Probability	
Low	<25%
Medium	25-75%
High	>75%

(Adopted from ECC-Namibia, 2017)

Table 5-2: Impact Significance

Class	Significance	Descriptions
1	Major Impact	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.
2	Moderate Impact	Impacts are long term, but reversible and/or have regional significance.
3	Minor	Impacts are considered short term, reversible and/or localized in extent.
4	Insignificant	No impact is expected.
5	Unknown	There are insufficient data on which to assess significance.
6	Positive	Impacts are beneficial

(Adopted from ECC-Namibia, 2017)

Table 5-3: Environmental Impacts and Aspects Assessment

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
TOPOGRAPHY	Landscape Scenery	Visual aesthetic impact	Construction and Operation	Moderate	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
SOIL	Soil	Contamination to soil from waste disposal	Construction and Operations	Moderate	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Soil	Spillages of fuel, oil and lubricants.	Construction	Short	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Soil	Erosion	Operations	Moderate	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
LAND CAPABILITY	Terrestrial ecology and aquatic ecosystems	Change in land use	Construction and Operations	Moderate	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Carrying capacity	Increase in human activities in the environment	Construction and Operations	Moderate	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CHARCOAL HARVESTING AND OPERATION OF THE KUDU BIOMASS CHARCOAL PRODUCTION PLANT, AT M'BELA FARM NO.201, ET AL., OKAHANDJA DISTRICT, OTJOZONDJUPA REGION-NAMIBIA

Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
WATER	Surface water quality	Water pollution from oils and lubricants from vehicles and machinery.	Construction and Operations	Moderate	Small	Local	Direct	Low <25%	Moderate	Carbonisers; harvesting sites
	Surface water quality	Turbidity and high sediment load	Construction & Operation	Moderate	Small	Local	Direct	Low <25%	Moderate	Carbonisers; harvesting sites
	Soil, Vegetation, Infrastructure	Flooding	Construction & Operation	Moderate	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
AIR QUALITY	Air Quality	Dust and emissions generated during the construction phase and from the movement of vehicles during operation	Construction & Operation	Moderate	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
WASTE	Groundwater quality	Hazardous waste such as waste oil and lubricants.	Construction and Operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites

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Environmental Impact	Value/Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
	Surface water quality	Threatened from plant stormwater discharge into the river.	Construction and operations	Moderate	Moderate	Local	Direct	Medium 25 - 75%	Minor	Carbonisers; harvesting sites
	Topography and Landscape	Visual impacts due to use of unsustainable disposal methods	Construction and Operations	Short	Small	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
FAUNA	Terrestrial ecology and biodiversity	Loss of habitat and driving away of local animals and aquatic animal species	Construction and Operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Avifauna	Bird electrocution, and physical crashes	Construction and Operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Aquatic life	Antifouling paints	Construction and Operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Terrestrial ecology and biodiversity	Destruction of vertebrate fauna (e.g. road kills; and fence)	Construction and Operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites

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Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
FLORA	Terrestrial ecology and biodiversity	Proliferation of invasive species inland	Construction and Operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Terrestrial ecology and biodiversity	Illegal collection of firewood	Construction and Operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Terrestrial ecology and biodiversity	Loss of unique flora and special habitats in the local environment because of general nuisance and animal migrate.	Construction and Operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Terrestrial ecology and biodiversity	Uncontrolled fires	Construction and Operations	Moderate	Great	Regional / National	Direct	Medium 25-75%	Major	Carbonisers; harvesting sites
SOCIAL	Noise Pollution	Increased noise levels	Construction and operations	Moderate	Moderate	Local	Direct	Low <25%	Minor	Carbonisers; harvesting sites
	Socio Economic Activities	Temporary and permanent	Construction and operations	Long	Moderate	Regional	Direct	Medium 25 – 75%	Positive	Carbonisers; harvesting sites

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Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
		employment prospects.								
	Socio Economic Activities	Climate change impacts due to usage of sold charcoal	Operations	Long	Moderate	Global	Direct	High >75%	Major	Carbonisers; harvesting sites
	Contribution to National Economy	Employment, development/maintenance of essential infrastructure, local procurement, duties and taxes.	Construction and Operations	Short	None	Regional / National	Direct	Low <25%	Positive	Carbonisers; harvesting sites
	Electrical powerlines and telecommunication infrastructure in the project area	Property damage resulting in disruption of services	Construction and Operation	Moderate	Great	Local	Direct	Low <25%	Major	Carbonisers; harvesting sites
Heritage/Archaeology	Artefacts, archaeological high value components	Destruction or affecting paleontological and archaeological artefacts	Construction and Operation	Moderate	Moderate	Local	Direct	Low <25%	Insignificant	Carbonisers; harvesting sites

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Environmental Impact	Valued Ecosystem Component	Impact	Project Phase	Duration	Magnitude	Extent	Type	Probability	Significance	Infrastructure
HEALTH AND SAFETY	Health Sanitation	Poor ablution and waste management facilities may be detrimental to human health.	Construction and Operation	Moderate	Moderate	Local	Direct	Medium 25 – 75%	Moderate	Carbonisers; harvesting sites