Memorandum

Subject: **ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED ENCROACHER BUSH BIOMASS POWER PROJECT IN NAMIBIA**

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

NamPower proposes the construction and operation of the Otjikoto Biomass Power Station, which will generate electricity by the combustion of wood chips. A harvesting area of approximately 100 km radius surrounding the Project Site has been identified from where encroacher bush will be harvested, processed and transported to the Project Site as its source of fuel. As a result of a site selection process and the preceding EIA scoping phase, NamPower selected the site near Tsumeb for the construction of the proposed Otjikoto Biomass Power Station, which is in close proximity to their existing Otjikoto Substation.

Applications for two separate environmental clearance certificates (ECCs) were submitted, comprising the following:

- Construction and operation of the 40 MWe Otjikoto Biomass Power Station, near Tsumeb, which includes the transmission substation and transmission lines; and
- Related fuel supply activities, including the harvesting, processing, and logistics of supplying encroacher bush wood chips as the fuel source for the Otjikoto Biomass Power Station.

The EIA process for the above mentioned project has been completed. The Final EIA report was submitted to the Ministry of Mines and Energy (MME) and the Ministry of Environment Forestry and Tourism (MEFT) ('Forestry Department') on the 1st of December 2020, for their review and recommendations to the MEFT (Department of Environmental Affairs (DEA)), for their final review and decision.

Please note the following:

1. EIA Report (not Scoping Report)
    - The scoping phase of the EIA was completed in 2018 and the Scoping Report accepted by the Ministry of Environment Forestry and Truism (MEFT) on 21 May 2018.
    - The Executive Summary of the EIA Report is hereby attached.
    - This EIA Report considers the potential impacts associated with all project components/activities, including the following:
        - Construction and operation of the Otjikoto Biomass Power Station, the transmission substation and transmission lines; and
        - Related fuel supply activities, including the harvesting, processing, and logistics of supplying encroacher bush wood chips as the fuel source for the Otjikoto Biomass Power Station.
2. Environmental Management Plans (EMPs)
    - Due to the fact that two separate applications for Environmental Clearance Certificates (ECCs) were submitted to the two competent authorities and MEFT, two separate EMPs have been developed as follows:
        - EMP for the activities associated with the proposed Power Station and overhead powerline.
        - EMP for the harvesting and associated activities (including the transport of the biomass to the Power Station).
3. Consent letter
    - Once the MME and MEFT ('Forestry Department') have completed their review, they will share the reports as well as their recommendations with the MEFT: Department of Environmental Affairs (i.e. office of the Environmental Commissioner) for their final review and decision regarding the application (MEFT Application numbers - APP-001500 and APP-001501).
    - A "Consent Letter" can therefore not be uploaded by SLR at this stage, due to the fact that the correspondence will take place between MME and MEFT, as per the above mentioned.

4. Further Consultation
   - Interested and affected parties (I&APs) were notified about the availability of the EIA Report and EMP's for their review and comment. Further consultation was also undertaken, by means of Key Stakeholder meetings. Proof of this "further consultation" and comments received are herewith attached.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED ENCROACHER BUSH BIOMASS POWER PROJECT IN NAMIBIA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EXECUTIVE SUMMARY

Prepared for: NamPower

SLR Project No: 734.05062.00001
Revision No: 1
Month/Year: November 2020

EXECUTIVE SUMMARY

1 INTRODUCTION

This executive summary provides a synopsis of the Environmental Impact Assessment (EIA) report prepared as part of the EIA process executed by SLR Environmental Consulting (Namibia) (Pty) Ltd (SLR) for the proposed Encroacher Biomass Power Project (the "Project") by the Namibia Power Corporation (Pty) Ltd (NamPower) in Namibia.

1.1 PROJECT OVERVIEW

NamPower proposes the construction and operation of the Otjikoto Biomass Power Station (Project Site), which will generate electricity by the combustion of wood chips. A harvesting area of approximately 100 km radius surrounding the Project Site has been identified from where encroacher bush will be harvested, processed, and transported to the Project Site as its source of fuel.

As a result of a site selection process and the preceding EIA scoping phase, NamPower selected the site near Tsumeb for the construction of the proposed Otjikoto Biomass Power Station, which is in close proximity to their existing Otjikoto Substation. Refer to Figure 1 for the regional location of the proposed Power Station. The Otjikoto Biomass Power Station will have sufficient electricity generating capacity to evacuate 40 megawatt of electricity (MW_e) and will be connected to the Namibian electricity grid at the Otjikoto Substation via a new 66 kilovolt (kV) overhead power line.

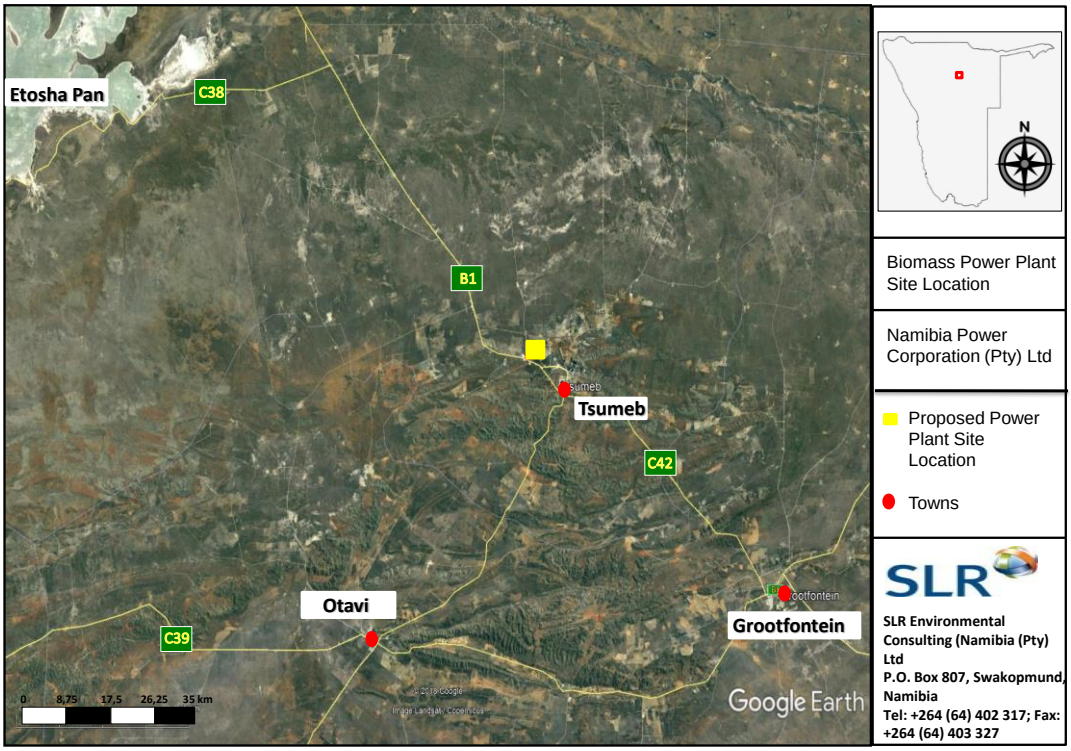

FIGURE 1 REGIONAL LOCATION OF THE PROPOSED OTJIKOTO BIOMASS POWER STATION

The proposed Project will consist of the following key components:

- Construction and operation of a 40 MW_e biomass power station and access road at the Otjikoto Site for at least 25 years which depending on the operating regime may have an annual fuel requirement of up to 245 000 tonnes of wood chips processed from encroacher bush;

- Harvesting, processing and storage of encroacher bush within the harvesting area which covers approximately 100 km radius surrounding the Project Site (roughly 3.1 million hectares (ha) excluding all no-go areas and other constraints in the harvesting area);
- Logistics, which include but are not limited to the transportation and stockpiling of the encroacher bush or wood chips from the harvesting area and delivery to the Otjikoto Biomass Power Station; and
- Construction and operation of a transmission substation at the Project Site, interconnection of the substation to the Namibian electricity grid with a 66 kV overhead power and rerouting of other power lines traversing the Project Site (in particular a 132kV power line owned by NamPower) .

1.2 PROJECT MOTIVATION (NEED AND DESIRABILITY)

It is estimated that approximately 26 million ha, mainly located in the north-central and central regions of Namibia, are covered by encroacher bush. Bush encroachment sees indigenous thorny bush and shrub species, found in natural rangelands, grow in such abundance that this encroacher bush has significant negative impacts. These negative impacts include; the suppression of grass reducing the livestock and wildlife carrying capacity of the affected areas, and the reduction of rainwater penetration required to recharge the important underground water resources. The encroacher bush provides a significant fuel resource that can be used for electricity generation.

The proposed Power Station will contribute positively to the Namibian economy allowing it to generate electricity from its own sources, thus reducing its dependency on external suppliers. It would assist with the stability of the electricity grid by delivering a base load capacity, and assist in providing ancillary support services associated with thermal Power Stations to a significant load centre, close to the Project Site, within the Namibian electricity network.

Other than the benefits associated with the electricity generation, the implementation of the proposed Encroacher Bush Biomass Power Project will have additional benefits such as; contributing to “combatting bush encroachment” and the restoration of rangeland through bush thinning practices, increasing land productivity, increased rain water infiltration, and improved business, employment and skills development opportunities. The overall goal of the Encroacher Bush Biomass Power Project is therefore to provide electricity through a sustainable and renewable forest production model. However, a secondary environmental related goal of the Project is to improve rangelands where the encroacher bush will be harvested.

The construction of the Power Station, the purchase of machinery for bush thinning, and the direct, indirect and induced economic benefits will boost the local, regional and national economy.

2 APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The EIA is based on the Namibian Environmental Management Act (Act. No. 7 of 2007) and associated EIA Regulations, as well as supporting policies and guidelines. SLR has been appointed as the Environmental Assessment Practitioner to undertake the EIA process, including the public participation process and the compilation of the relevant EIA reports for the Project and its associated activities. The final EIA Report will be submitted to the Ministry of Mines and Energy (MME) (i.e. the Competent Authority) for consideration and further submission to the Ministry of Environment, Forestry and Tourism (MEFT) as regulator in order to consider the application for the two separate environmental clearance certificates (ECCs) comprising the following:

- Construction and operation of the 40 MW_e Otjikoto Biomass Power Station, near Tsumeb, which includes the transmission substation and transmission lines; and
- Related fuel supply activities, including the harvesting, processing, and logistics of supplying encroacher bush wood chips as the fuel source for the Otjikoto Biomass Power Station.

A full EIA process is required for the proposed project therefore, a screening (and project initiation) phase and scoping phase were already conducted and a final Scoping Report subsequently submitted to the relevant competent authorities and MEFT. This EIA Report is the outcome of the Impact Assessment Phase of the EIA.

2.1 PRE-APPLICATION MEETINGS AND SUBMISSION OF APPLICATION FORMS

Initiation meetings were held with the MME (the competent authority for the energy generation, transmission and storage activities) and MEFT: Directorate of Environmental Affairs (DEA). An application for environmental clearance was formally submitted to the MME on 1 June 2017.

Similarly, an initiation and introductory meeting was held with the Ministry of Agriculture, Water and Forestry (MAWF), now the Ministry of Agriculture Water and Land Reform (MAWL), and the application for environmental clearance was submitted to the MAWF on 9 October 2017. At the time, the MAWF was the competent authority for the fuel supply related and forestry activities.

Forestry activities now fall under the MEFT and the MAWL is no longer the Competent Authority for the fuel supply related and forestry activities.

Both Applications were registered on MEFT's online system in June 2020.

2.2 THE SCOPING PHASE

During the scoping phase of the EIA which commenced in May 2017 and continued until March 2018, six potential sites were considered and investigated for the potential construction of biomass power station. Public and focus group meetings were conducted at each of the locations during the scoping phase which included; Gobabis, Windhoek, Okahandja, Otjiwarongo, Otavi, and Tsumeb.

At the end of the scoping phase, all applicable comments that were received from Interested and Affected Parties (I&APs) were addressed and included in the final Scoping Report that was submitted to the MME, the MAWF, and ultimately the MEFT. The Scoping Report was accepted by the MEFT on 21 May 2018.

2.3 THE IMPACT ASSESSMENT PHASE

Although two separate applications for ECCs were submitted to the two relevant competent authorities, respectively, a single detailed EIA Report has been compiled covering all consolidated activities related to the complete Project. The EIA Report further considers all potential and cumulative impacts associated with the Project activities.

However, due to two separate applications for ECCs being submitted to the above mentioned competent authorities, two separate Environmental Management Plans (EMPs) have been developed, as detailed below:

- EMP for the construction and operation of the 40 MW_e Otjikoto Biomass Power Station, near Tsumeb, which includes the transmission substation and transmission lines; and
- EMP for the related fuel supply activities, including the harvesting, processing and logistics of encroacher bush or wood chips for the Otjikoto Biomass Power Station as the main fuel source.

Various specialist studies were completed, and the findings were incorporated into the above mentioned documents. The specialist studies included; air quality, archaeology, biodiversity (including fauna and flora), noise, socio-economic, soil, ground and surface water, traffic, and visual impacts. Furthermore, a full greenhouse gas emission assessment of the Project was conducted in accordance with the European Investment Bank Guidelines.

2.4 OPPORTUNITY TO COMMENT

I&APs were invited to comment on this EIA Report, which was available for a 4-week comment period from **23 October to 20 November 2020**. Comments had to be sent to SLR at the address, telephone number, or e-mail address shown below by no later than **20 November 2020**.

SLR Environmental Consulting (Namibia) (Pty) Ltd
Attention: Werner Petrick
8 General Murtala Muhammed Street, Eros, Windhoek
Tel: +264 61 231 287; Fax: +264 61 231 289
E-mail: wpetrick@slrconsulting.com

The following steps were undertaken during the remainder of the Impact Assessment Phase:

- Notify I&APs on the availability of EIA Report and EMP's:
  - The EIA report executive summary was distributed to all authorities and I&APs that are registered on the project's public involvement database via e-mail. Bulk text messages were sent to I&APs without emails (see email and text message wording in Appendix 16.1).
  - Electronic copies of the full report were available on the SLR website (SLR website: https://slrconsulting.com/public-documents and data free website: http://slrpublicdocs.datafree.co/publicdocuments) and on special request to SLR.
  - The availability of the report will was advertised on the Namibian Broadcasting Corporation (NBC) national radio in various languages (see radio announcement wording in Appendix 16.1).
  - The availability of the report was advertised in the following newspapers on the 23 of October 2020: Republikein, Allgemeine Zeitung and the Sun See proof advert in Appendix 16.1) .
  - Hard copies of the report were disseminated in the formats and at the locations listed in Table 1.
- Information sharing meetings with focus groups and key stakeholders were held in Tsumeb during the review period of the EIA report and EMPs, as follows:
  - Focus group meetings with the Tsumeb Municipality representatives on 10 November 2020;
  - Focus group meeting with representative bodies of the San and other marginalised groups within the harvesting area on 8 November 2020; and
  - Focus Group meeting with representative Farmers Association(s) within the area on 9 November 2020.

  The minutes of meetings, attendance registers and presentation are included in Appendices 16.2 and 16.3.

TABLE 1 LOCATIONS FOR THE REVIEW OF THE EIA REPORT

Location	Name of Facility	Physical Address	Details
Tsumeb	Tsumeb Public Library	Dr Sam Nujoma Drive, Tsumeb.	Hard copy and electronic copy (CD) of the full report (including Appendices).
	Tsumeb Municipality	264 Moses Garoëb Street, Tsumeb.	Hard copy of the Main EIA Report (this report) and electronic copy (CD) of the full report (including Appendices).
Windhoek	National Library in Windhoek	1 Eugene Marais Street, Windhoek.	Hard copy of the Main EIA Report (this report) and electronic copy (CD) of the full report (including Appendices).
	NamPower Head Office	15 Luther Street, Windhoek.	Hard copy of the Main EIA Report (this report) and electronic copy (CD) of the full report (including Appendices).

All comments received by I&APs are included in Appendix 16.4. All comments, questions and concerns raised by IAPs are summarised in the Comments and Reports Report (CRR), with detailed responses and reference to relevant sections of the EIA reports (where relevant). See Appendix 16.5 for the IRR.

3 OTJIKOTO BIOMASS POWER STATION DESCRIPTION

The following section provides a brief description of the key aspects of the Otjikoto Biomass Power Station which were considered when assessing the potential impacts for the construction and operation of the Power Station.

3.1 GRID CONNECTION INFRASTRUCTURE

The proposed Power Station will be connected to the national grid at the existing Otjikoto Substation via a new 66 kV transmission line (±3 km in length). The tie-in at the Otjikoto Substation will include the construction of a new feeder bay and expansion of the existing 66 kV yard. There will be a new transmission substation constructed on the Power Station site in order to step up the voltage from 11 kV to 66 kV.

There are existing transmission lines that traverse the Project Site that will be re-routed to ensure minimal interference with the proposed construction activities and optimal use of the Project Site.

3.2 OTJIKOTO BIOMASS POWER STATION TECHNICAL DESCRIPTION

The proposed technical description for the Otjikoto Biomass Power Station are as follows:

- Size: 40 MW_e (net export capacity);
- Grate fired boiler technology;
- Dry cooling via an air cooled condenser;
- Net electrical efficiency at full load approximately 28~30%;
- Capacity factor (CF): 70~85%;
- Availability: 92%;
- Fuel requirements: 200,200 tonnes at 70% CF (likely scenario), 245,000 tonnes at 85% capacity factor (worst case scenario); and
- Design lifetime: 25 years, (30 years is considered typical).

The proposed Power Station will have a footprint of 10 ha at its maximum without ash storage. With onsite ash storage, fuel stockpiling, and receiving facilities, this is expected to be approximately 25 ha. It is estimated that a 7 - 90 day stockpile will be required for the Power Station to operate at full capacity and accommodate any interruption in the fuel supply.

3.3 BOILER AND ENERGY CONVERSION PROCESS

Grate fired boiler technology is proposed due to its proven track record, simplistic design, lower construction and maintenance costs, which will offset the slightly higher efficiency advantages from fluidised bed technology. In addition, the grate fired technology is considered robust and as such can handle a larger woodchip size, whereas fluidised bed technology requires a finer and smaller woodchip size, which means more processing and higher fuel costs.

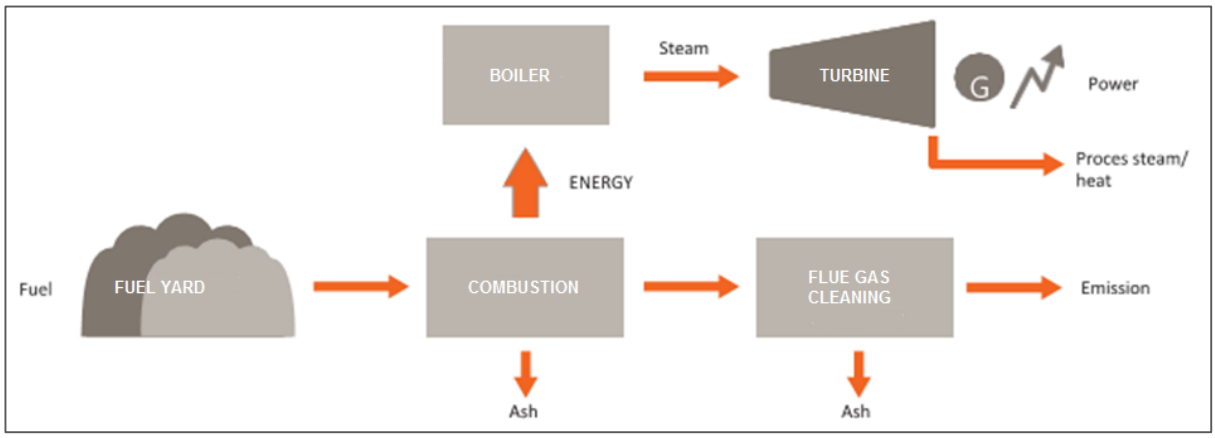

FIGURE 2 TYPICAL CONFIGURATION OF A BIOMASS COMBUSTION PLANT

Figure 2 shows that a boiler converts the energy from the combustion of woodchips into high-pressure steam. The steam is transformed into electrical energy through a steam turbine, which drives a generator producing electricity. After the steam has passed through the turbine, it is condensed back into water and recycled back to the boiler, where it is reheated into steam again. The boiler and steam turbine are the most commonly used technology to produce electricity from a conventional fuel source such as biomass.

3.4 EMISSIONS AND FLUE GAS CLEANING

During combustion, various kinds of impurities and pollutants are generated and passed through the process as flue gas (i.e. the exhaust gas coming from the boiler). These include; fine ash particles, oxides of nitrogen (NO_x), sulphur dioxide (SO_2), carbon monoxide (CO), and greenhouse gases (GHG) such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The temperature in the primary combustion is insufficient to eliminate all emissions and pollutants from the process, a secondary treatment system may therefore be required. Typically for biomass boilers, dust and particulates within the air from the primary combustion system pose a problem and are considered the main pollutant of concern.

A cleaning system, such as bag house filters or electrostatic precipitators, will be installed for the removal of particulate matter (PM). If future emission values require further flue gas cleaning (based on the monitoring requirements included in the power station EMP), NOx emissions can be reduced by primary measures such as flue gas recirculation or retrofitting a selective non-catalytic reduction (SNCR) system in the combustion chamber of the boiler.

During the EIA an optimum stack height was calculated as part of the initial plant design (see the Air Quality, Climate Change, and Health Risk Assessment Report included in Appendix 5). This was based on Good Engineering Practice (GEP) and dispersion modelling. These simulations were conducted to demonstrate the reduction in ground level concentrations (GLCs) to sensitive receptors surrounding the Power Station as a result of a GEP stack design. The Power Station parameters, based on 6% oxygen, are provide in Table 4.

TABLE 2 POWER STATION STACK PARAMETERS

Stack Height	Stack Diameter	Exit Velocity	Exhaust Vol.-Flow	Exit Temp (°C)
60 – 75 m	1.75 m	15 (m/s)	36.08 m^3/s	125 °C

3.5 BOTTOM ASH AND FLY ASH

During the combustion process, two different types of ash with different physical and chemical characteristics will be produced. Both bottom ash and fly ash are classified as non-hazardous.

Bottom ash from the residue of the combustion process, will be temporarily stored on either a demarcated concrete area designed to contain surface water runoff, or within dedicated bottom ash skips.

The fly ash, extracted from the bag-house filter or electrostatic precipitators, will be temporarily stored in a dedicated fly ash silo for easy handling and transportation off-site.

The fuel analysis completed during the Feasibility Study, shows that ash represents approximately 6% of the biomass fuel. Laboratory tests were conducted on ash samples from a smaller biomass boiler in Namibia, to analyse for total concentrations and particle grading, as well as water soluble content. Another ash sample from a bushfire was taken and analysed for the same parameters. The bottom ash and fly ash mostly differ in their particle grading with the bottom ash having much coarser fractions and the fly ash being very fine. The chemical properties of the two types of ash are very similar. Various ash disposal methods have been identified as a result of these tests, and are presented in further detail within the EIA report. In summary, these options include the following:

- Taking the ash back to the farms or areas where the bush was harvested (i.e. for use as fertilizer);
- Use the ash as a fertilizer at irrigation farms in the nearby area;
- Use the ash to cover waste facilities; or
- Use in the construction industry, possibly in combination with the other potential uses.

Other (less favourable) options include:

- Dispose of as a waste at a new facility at the Power Station site; and
- Dispose of as a waste on an existing landfill site.

NamPower will conduct a detailed ash analysis shortly after operation commences. A cost benefit analysis will then be conducted to determine the best option, from those provided above, based on the assessed impacts and potential restrictions of the local procurement regulations.

3.6 WATER SOURCE, USAGE AND INFRASTRUCTURE REQUIREMENTS

A geohydrological study indicated that the proposed Project Site is located in a high groundwater potential area where the water requirements for the proposed Otjikoto Biomass Power Station, estimated to be 5 m^3/hr, can be sustainably met without significantly impacting the water supply in the region.

3.7 FUEL SPECIFICATION AND VOLUMES

In order to derive the fuel specification for the Otjikoto Power Station, various laboratory analyses were conducted on biomass woodchips harvested at the initial six locations as part of the Feasibility Study. The fuel specification for the Power Station will be set to a P100 specification according to EN ISO 17225 (which implies biomass woodchips with majority of the size weighted between ≤ 100 mm in length). It should be noted that the Power Station will make provision to accept larger wood or bush extracts for further processing on Site.

The results from the laboratory results show that the calorific value (CV) of Namibian biomass and more specifically the samples taken from the Otjikoto region have an average net CV of 17.7 MJ/kg on a dry weight basis. The assumption for the calorific value (CV) of the fuel has been taken as 14.7 MJ/kg (as received with 15 % moisture and 6 % ash).

Table 3 shows the average fuel requirements (dry basis) for the power station operating at the worst case (base load) Capacity Factor (CF) 85%. Table 3 assumes the following:

- Effective biomass per hectare (dry weight basis) 12.65 t/ha
- Calorific value of fuel (dry weight basis) approximately 14.7 to 16.7 MJ/kg

- Expected moisture content ranging between approximately 45 % (rainy season) to 5% (dry winter months)

TABLE 3: TYPICAL BIOMASS POWER STATION FUEL REQUIREMENTS

Parameter	40 MWe
Hourly fuel demand (100% MW_{th})	26.89 tonnes/hr
Annual fuel demand (85% CF)	245 000 tonnes/a
Harvested area required p.a.	Approximately 20 000 ha/a

3.8 CONSTRUCTION

The construction of the Otjikoto Biomass Power Station will be executed by appointing an Engineering, Construction and Procurement (EPC) contractor, administered by NamPower through the Central Procurement Board in accordance with the Namibian Public Procurement Act of 2015. Approximately 300 jobs would be created during the peak times of the planned 35 month construction phase of the Project.

The employment of local people near to the Project Site during the construction phase would be preferred, particularly for unskilled and semi-skilled labour works.

During operations, NamPower anticipates that approximately 62 employees will be required to operate the Otjikoto Biomass Power Station. The employment will be made up of 35 operational/maintenance staff and 27 service staff; the majority of the staff will be skilled and semi-skilled workers who will be permanently employed by NamPower. As Tsumeb is a mining and processing hub, it is likely that some skilled, semi-skilled, and unskilled personnel maybe sourced locally for the operations and maintenance of the power station.

4 PROJECT RELATED FUEL SUPPLY ACTIVITIES

The following section describes and details the harvesting related activities for the Project that were considered when assessing the potential associated impacts.

4.1 IDENTIFIED HARVESTING AREA AND RESOURCE ASSESSMENT

A detailed resource assessment was undertaken as part of the EIA scoping phase and the Feasibility Study for the Project in order to investigate the potential quantity of encroacher bush available. A harvesting radius of 100 km around the Project Site was identified as part of the resource assessment, which is approximately 3.1 million hectares including no-go zones and protected areas.

A harvesting area of approximately 396 250 ha is necessary to sustain a biomass power station of 40 MWe over its design lifetime of 25 years. To place this requirement in perspective, it translates to approximately 12.8% of the investigated harvestable area. Similarly, a total of 39.215 million tonnes of encroacher bush can be conservatively extracted from the harvesting area, which is enough to power a 40 MWe biomass power station for 195 years at baseload. NamPower is therefore confident that there is sufficient resource to sustainably operate the plant without considering any inevitable regrowth of encroacher bush. If part of the farm cuts the boundary of the harvesting area that farm is included in the harvesting area. NamPower will conduct an assessment of the specific farms falling in and out of the harvesting area, subject to approval of the ECC.

Restricted or protected harvesting locations were further identified and refined through the EIA scoping study and are indicated in Figure 3, which includes:

- National Parks (i.e. Etosha and Waterberg National Park);
- Slopes exceeding 12.5% gradient;
- Sensitive bioclimatic endemism; and
- Communal areas.

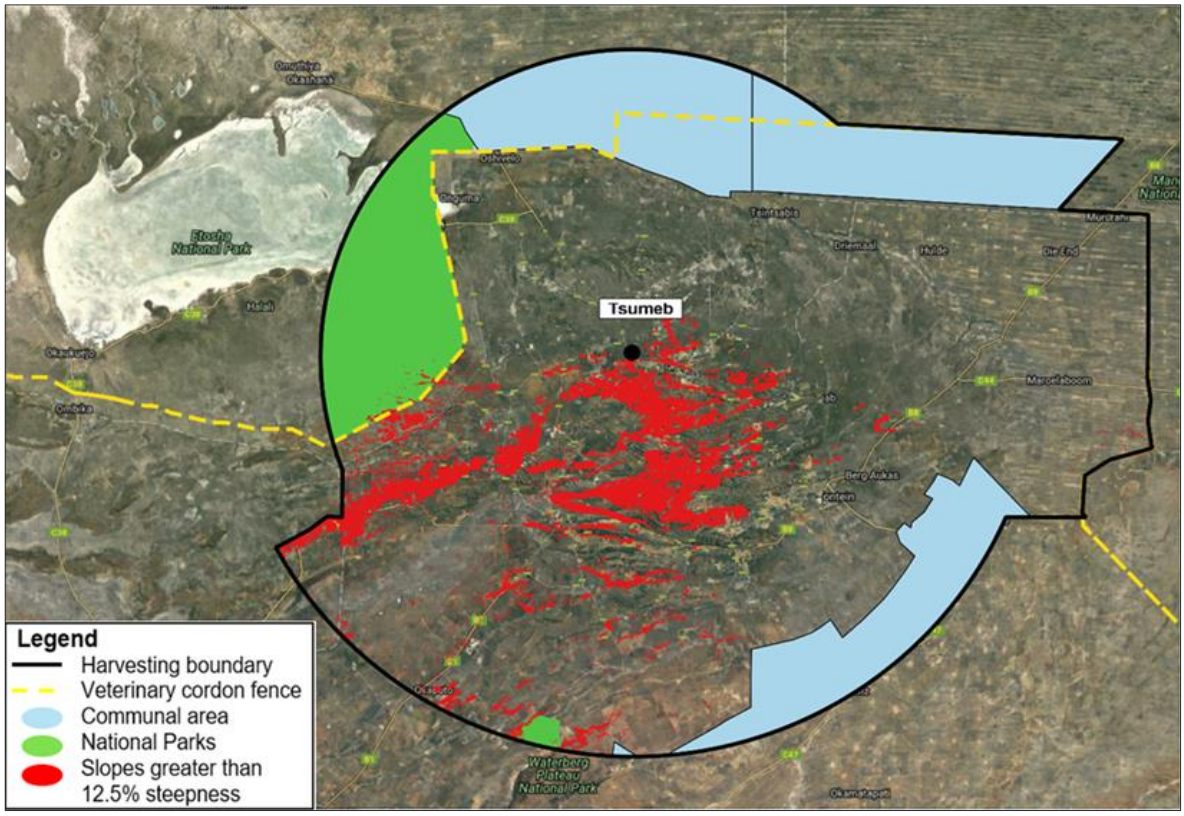

FIGURE 3: LOCALITY MAP FOR THE PROPOSED HARVESTING AREA

4.2 TARGET SPECIES FOR HARVESTING

For the purpose of this Project, only Namibian encroacher bush was selected as a fuel source. Namibian encroacher bush is available in abundance and is considered a renewable energy source due to its tendency to rapidly regrow and increase in numbers or coppice in their original habitat through inappropriate chopping or burning. The target species to be harvested are summarised in Table 4 (this list may include other species as advised by the MEFT).

TABLE 4 TARGET SPECIES TO BE HARVESTED

Target Species		Protection status
Scientific name	**Common name**	
Acasia mellifera	Black-thorn acacia, swarthaak, omusaona	Not protected
Acasia reficiens	Red umbrella-thorn, rooihaak, rotrindenakazie	Not protected
Acasia luderitzii	Kalahari acacia	Not protected
Acasia erubescens	Yellow-bark acacia, omungongomwi, withaak, berkebos	Not protected
Acasia fleckii	Sandveld acacia, blade-thorn, mungamba	Not protected
Acasia nebrownii	Water-thorn, /nubib, orupunguya, slapdoring, pfannenstrauch	Not protected
Dichrostachys cinerea	Sickle-bush, omutjete, sekelbos, papwielbos, farbkätzchenstrauch	Not protected

Terminalia sericea	Silver cluster-leaf, mugaro, omugolo, za'o, geelhout, vaalboom, fahlbaum, gelbholz	Not protected
Colophospermum mopane	Mopane	Protected. Thinning is only allowed in cases of high densities.[1]
Rhigozum trichotomum	Three-thorn rhigozum, //hau.b/s, okatakambindu, driedoring, dreidorn	Not protected
Prosopis	Prosopis	Not protected

4.3 CONTRACTING METHODOLOGY AND HARVESTING WORKFORCE

NamPower is planning to contract long term fuel suppliers which will supply at least 140,000 tonnes/annum. In addition, NamPower plans to contract a number of ad hoc fuel suppliers to supply at least 30,000 tonnes /annum to increase the spread of social and economic benefits of the Project. The wood chip quantities allocated to both long term and ad-hoc fuel suppliers will be set to ensure the complete fuel requirements of the Otjikoto Biomass Power Station are met.

Both ad-hoc and long term fuel suppliers will be required to enter into formal fuel supply agreements with NamPower that will contain clauses enforcing compliance to the EMP and ECC conditions through a set of contractual agreements.

4.4 ACCESS TO THE RESOURCE

Access to the resource is influenced mainly by the physical infrastructure (i.e. access roads and gates, bush density, harvesting equipment and topography) as well as the related commercial arrangements with the respective resource owners.

One of the critical roles associated with the fuel suppliers is to secure access to land with suitable resource for harvesting. For the execution of this Project, it is anticipated that the majority of the encroacher bush will be sourced from agricultural (commercial) farmland, as the additional approvals required for harvesting on Communal Land (i.e. Communal Land Act of 2002 and the Forestry Act of 2001) may currently prevent harvesting of biomass on communal or state lands. Regardless of the land classification, it is important that the fuel supplier obtains the requisite consent and rights to harvest from the correct and rightful owner(s). This consent will be provided by virtue of a harvesting agreement that will be signed by the landowner and the long term fuel supplier, in the event that they are separate entities.

The fuel suppliers and respective resource owners will need to compile and submit a verifiable Site Specific Harvesting Plan (SSHP) indicating the agreed areas for harvesting, all no-go areas, access roads, and other areas to be avoided. This Site Specific Harvesting Plan will be reviewed and approved by NamPower, in accordance with the EMP and will form part of the harvesting agreement.

4.5 HARVESTING METHODOLOGIES

Different felling equipment can be used to harvest bushes and will vary depending on the size of the bushes to be harvested and the level of mechanisation of the harvesting operation.

[1] The conditions under which the *Colophospermum mopane* is classified as a protected plant is not for its population size, but due to its extent of use (EU). The species is heavily utilised by humans and animals (browse and forage) - charcoal, timber, fuel wood, construction, medicine, host to important edible caterpillar, its slow growth rate and its cultural value. (Forest Regulations 2015: Forest Act (Act. No. 12 of 2001)).

For small-scale harvesting; manual (labour intensive) felling methods are typically used. These manual and semi-mechanised harvesting methods involve the use of one or more of the following equipment :

- Axe, panga / machete, pruning and pruning shears, hand saws;
- Trolley with power driven saw type cutters or bit type circular cutters;
- Tractor drawn slasher ('Power take-off (PTO) driven);
- Multi-circular saw PTO driven (limited application); and
- Hand held chain saws (limited application, mainly because of the bush shape and high abrasive de-bushing conditions in Namibia).

For larger harvesting operations larger, fully mechanised methods are used to harvest. These fully mechanised biomass harvesting methods involve the use of one or more of the following equipment in combination:

- Skidsteer harvester equipped with horizontal rotary cutter or circular sawblade;
- Three wheel loader equipment with buncher and hydraulic cutter;
- Hydraulic grab and or buncher with blade cutter;
- Hydraulic grab and tree puller/bush lifter (for soft, wet sandy soils and riverbed clearing); and
- Bush combined harvester and grinder plant on tracks with shuttle bucket.

Although all methodologies were considered in the impact assessment, the fully mechanised process is likely to provide the bulk of the fuel required, as the volumes required for the Otjikoto Biomass Power Station may not be reliably met with only the manual harvesting methods.

The type of equipment and harvesting method to be used will be dictated by the requirements in the EMP and Harvesting Guidelines (SAIEA, 2017), which include but are not limited to requirements relating to bush thinning, avoiding sensitive species and habitats, and avoiding large trees.

Following the felling of bush, it is racked or pushed on to heaps and dried in windrows (typically 4 – 6 weeks), after which it is chipped, grinded or shredded to the required fuel specification. The biomass wood chips or log wood may be temporarily stored in field until a sufficient quantity has been accumulated for transportation to the Otjikoto Biomass Power Station.

5 PROTECTING BIODIVERSITY AND AFTERCARE COMMITMENTS

One of the benefits of the proposed Project is the restoration of degraded savannah through bush thinning practices. This will create opportunities to restore ecological structure, function, and composition in a way that will simultaneously improve agricultural rangeland productivity and should provide an overall increase in biodiversity. To maximize the potential biodiversity improvement the type of equipment and harvesting method used will be dictated by the requirements in the EMP and Harvesting Guidelines (SAIEA, 2017), relating amongst others to bush thinning, avoiding sensitive species and habitats, avoiding large trees, etc.

The biodiversity specialists confirmed through their studies that herbaceous biomass increases after woody plant harvesting, but that aftercare is required to sustain a high herbaceous production (i.e. an open savannah state) over longer time frames. How the harvesting is conducted and how the harvesting area is managed after harvesting will greatly impact on the effort required to maintain the open savannah state.

The EIA determined that aftercare will need to be conducted, and the responsibility will therefore need to be ensured and audited through the custody of the harvesting and fuel supply agreements. Aftercare in the current context deals mainly with the coppice (sprouts) of harvested plants, existing saplings of encroacher species not harvested and emerging woody recruits. Aftercare methods differ with regards to the potential impact on the environment, which may be positive or negative. The methods that were assessed as part of the EIA are summarised as follows.

- Recommended methods include the following:
    - Treatment of cut stump surfaces with registered arboricide;

  - Foliar spot treatment of resprouting / emerging woody plants between 2-8 months after harvesting with a registered arboricide e.g. arboricides with active ingredients such as Picloram; and
  - Manual uprooting of regrowth, saplings and seedlings (simply cutting/sawing of plants is not effective)
- Less desirable methods include the following:
  - Fire; and
  - Browsers such as goats. Game are considered too difficult to control to be effective as an aftercare method.
- Methods that are not recommended include the following:
  - Soil applied arboricides;
  - Heavy mechanised machinery such as rollers, bulldozers, chains, etc.

Due to the various harvesting and aftercare methods available and the limited research done on the long term effects of harvesting and aftercare, an adaptive management approach is proposed that will ensure that as the Project progresses the harvesting and aftercare methodologies can be monitored, adjusted, and improved.

6 PROJECT AND ENVIRONMENTAL BASELINE DESCRIPTION

An understanding of the environmental and social context within which the proposed Project activities are being located is important to understand the specific sensitivities and potential impacts of the Project. For this EIA, the receiving environment is defined as the geophysical system, the biophysical system (which includes flora, fauna, and the general ecosystem dynamics), the social environment (including farms, settlements, and relevant towns) and the economic environment (including livelihoods and commercial activities).

Existing knowledge and evidence suggest that the region encompassed by the proposed harvesting area is encroached by several species, with prominent species being sickle bush (*Dichrostachys cinerea*), black thorn/swarthaak (*Acacia mellifera*) and mopane (*Colophospermum mopane*). Previous rough estimates show that the density of encroacher species is relatively high in the proposed harvesting area. The receiving environment is described in detail in Section 6 of the EIA report.

7 ENVIRONMENTAL IMPACT ASSESSMENT

The current (receiving) environment was studied and the environmental aspects and potential environmental impacts associated with the activities and facilities were identified as part of the EIA process. Potential environmental impacts were identified by SLR in consultation with I&APs, regulatory authorities, specialist consultants, and NamPower. The impacts are discussed under issue headings in Chapter 7 of the EIA report.

Impacts were considered in a cumulative manner where possible, such that the impacts of the proposed Project can be compared to the baseline conditions described in Section 6 of the EIA report. Key management and mitigation measures to address the identified impacts are discussed in this section and included in more detail in the two EMPs that are attached in Appendices 14 and 15 of the EIA report.

Table 5 and Table 6 provide a summary of all the issues and impacts identified, the significance rating in the unmitigated and mitigated scenarios arising from the assessment , and a summary of key management and mitigation (or enhancement) measures and further monitoring and audit activities for the Power Station and its related fuel supply activities, respectively. For an exhaustive list please refer to the Environmental Management Plans for the Power Station and related harvesting activities respectively.

7.1 OTJIKOTO BIOMASS POWER STATION

TABLE 5: IMPACTS AND MITIGATION MEASURES FOR THE POWER STATION ACTIVITIES

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
Traffic	Impact on road capacity and road condition/deterioration – TR 1/10	M	L	• Proper scheduling of the biomass transport to ensure peak arrival do not occur at the same time.
	Impact at the TR 1/10 and DR 3007 Intersection	M	L	• Upgrade the intersection in accordance with Namibian Roads Authority Standards.
Soils	Soil compaction potentially affecting plants and animals above the soil surface, as well as soil macro-fauna and microorganisms below the soil surface – Power Station area	M	L	• Restrict vehicular movement to areas of development of the proposed Otjikoto Biomass Power Station and associated infrastructure, the power line servitude and the dedicated access road as far as possible.
	Loss of the natural functioning of the soil as growth medium – Power Station area	M	L	• Topsoil shall be utilised for landscaping within the proposed Power Station site boundaries.
	Soil contamination through deposition of ash material from the plant	H	L	• Analysis of fly ash and bottom ash once the plant is operational to compare with the samples analysed for the EIA. • Ash to be dispersed and used as fertilizer at the harvested farms or used for alternative applications or disposed of at an approved municipal landfill, in line with their approved EMP.
	Soil contamination through fuel and oil spills at the Power Station site	M	L	• Comply with Spill Prevention and Management Plan in the EMP.
Biodiversity	Loss of habitat, destruction of animals and plants and general disturbance of biodiversity	M	L	• Keep footprint as small as possible within the design brief and do not clear areas that are not within the infrastructure footprint or outside the fire safety buffer of infrastructure.
	Collisions and electrocution of birds on power line structures	L	L	• Monitoring of bird collisions (see Section 9.1.1 of EIA for more details). Should monitoring indicate that collisions are taking place on power line

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
				structures associated with the project, apply suitable mitigation measures the effectiveness of which should also be monitored.
Surface Water	**Decrease in downstream surface water runoff due to the Power Station and associated infrastructure**	**L**	**L**	• No mitigation required.
	Contamination of surface water from pollutants at the Power Station and associated activities	**H**	**L**	• Storm water Management Plan to be developed to determine the extent of contact water runoff and how to contain the polluted water on site and to divert clean water around the site.
	Contamination of surface water from ash from the Power Station ending up in the runoff	**H**	**L**	• Ash management plan to be developed for alternative use of ash other than stockpiling (refer to the EMP). Comply with storm water management plan.
Groundwater	**Impacts of groundwater due to over-abstraction on the underlying aquifer**	**L**	**L**	• Obtain abstraction permit and monitor the planned wells on site. • Process water should be recycled where possible and re-used.
	Contamination of groundwater from pollutants at the Power Station and associated activities	**H**	**L**	• Comply with Spill Prevention and Management Plan in the EMP. • Regular sampling at monitoring boreholes • No discharge of untreated sewage into the environment.
	Seepage of effluent (i.e. discharged brine) from the water treatment plant impacting the water quality in the underlying aquifer	**M**	**L**	• Waste water to be safely stored before it is disposed in the approved manner of designated disposal sites • Regular sampling at monitoring boreholes

	Leaching of ash constituents from the onsite storage/disposal piles, impacting on the underlying aquifer	**H**	**L**	• Analysis of fly ash and bottom ash
				• For ash disposal at the Power Station site the following will apply:
				  ○ Bunding and lining of the storage pile
				  ○ Regular groundwater monitoring
				• The ash should preferably be used for alternative applications.

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
Air Quality	**Air pollution impact on third parties i.e. nuisance impacts and third party health impacts.** • Construction phase – TSP, PM_{10} & $PM_{2.5}$ • Operational – PM_{10}, $PM_{2.5}$, SO_2 and NO_2	**M**	**L**	• The power station should be designed with a 75m stack height unless NamPower's Technical advisers or the appointed EPC Contractor submit an air quality study for approval based on their proposed emission control technologies and stack height. The air quality study should prove that the potential impacts relating to the Ground Level Contaminants remain similar to those assessed in the air quality specialist report conducted as part of this EIA. • The power station should be designed to meet the World Bank Group (WBG) and International Finance Corporation (IFC) and South African Minimum Emission Standards (SA MES). • Adopt good practice control measures onsite to avoid dust generating problems.
Noise	**Noise pollution – impact on third parties i.e. nuisance**	**L**	**L**	• Design the plant to comply with the IFC and WBG of 55dB LAeq for daytime and 45dB LAeq at night-time at the closest third party receptors.
Archaeology	**Damage to archaeological resources – Power Station and power line and the immediate landscape**	**M-L**	**L**	• Ensure that all archaeology and cultural heritage procedures recognised by the National Heritage Council of Namibia (NHC) are complied with for all activities related to the construction of the Otjikoto Biomass Power station and construction and reallocation of the transmission lines.
Visual	**Visual impact on third parties**	**L**	**L**	• Install light fixtures that provide precisely directed illumination to reduce light spillage beyond the immediate surrounds of the site and paint buildings and structures with colours that reflect and compliment the natural colours of the surrounding landscape.
Socio-economic	**Hazardous excavation and infrastructure that could impact on the safety of third parties**	**H**	**L**	• High security fencing and security access control will be provided around the entire site. All security staff will be trained to ensure no unauthorised third parties or animals enter operational areas or other potential construction/operations areas.
	Economic impacts associated with the Power Station	**H+**	**H+**	• Encourage the use of small and medium sized enterprises in supplying goods and services to the Project.
	Job creation and skills development	**H+**	**H+**	• Ensure that strategies and programs are in place prior to the construction phase, which will maximize the use of the local labour force during construction and operations. • Promote continuous learning programs to diversify and upgrade skills of employees and ensure that skills gained on the job are documented and accredited wherever possible.

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
	Community resilience to population in-migration	**H**	**M**	• Give employment preference to local and Oshikoto Region residents, particularly to women, members of the San communities and residents on group resettlement farms, to reduce the influx of workers and whole families into the project area. • Construction workers to live locally in Tsumeb to boost the local economy, as far as practically possible. • Close collaboration with the Governor of the Oshikoto region to assist with employment of local unskilled and semi-skilled workers.

7.2 PROJECT RELATED FUEL SUPPLY ACTIVITIES

TABLE 6: IMPACTS AND MITIGATION MEASURES OF HARVESTING ACTIVITIES

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
Traffic	**Impact at the TR 1/10 and DR 3007 Intersection**	M	L	• Upgrade the intersection. • Pave the portion of road to the Power Station entrance. • Keep grass at the intersection cut at all times to maintain intersection sight distance.
	Impact on road capacity and road condition/deterioration – gravel roads: • DR 3007 • Other gravel Roads	M	L	• The increase of traffic on the gravel roads does not merit an upgrade to bitumen standards, but Namibian Roads Authority (RA) should be actively engaged to ensure proper maintenance is done.
		L	L	• Promote basic road safety behavior for all NamPower employees and contractors through training and awareness.
Soils	**Soil compaction potentially affecting plants and animals above the soil surface, as well as soil macro-fauna and microorganisms below the soil surface**	M	L	• Harvesters to be instructed to use appropriate harvesting techniques and experienced operators (refer to EMP for harvesting guidelines, which specifically refers to the SEA of Large-Scale Bush Thinning and Value-Addition Activities in Namibia (SAIEA, 2016) and the Forestry and Environmental Authorisations Process for Bush Harvesting Projects (Pallett & Tarr, 2017).
	Wind and water erosion in the harvesting area	M	L	• Restrict off road vehicular movement as far as possible to marked routes in order to curb damage to the grass cover. • Harvesters should be encouraged to follow biomass harvesting guidelines (see the EMP in Appendix 15). It is important not to over clear: tree equivalents/ha that should remain after thinning should follow the recommended rainfall- Tree Equivalents (TE) guidelines per dominant encroacher species.
	Reduction in nutrient transfer from deep soil layers though seasonal leaf fall in the harvesting area	M	M	• Due to the nature of the impact, mitigation does not appear possible.
	Improved soil carbon cycle and soil structure	M+	M+	• Due to the nature of the impact i.e. positive, no mitigation is required. However, to ensure the positive impact is achieved aftercare of the harvested areas needs to be implemented

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
	Soil contamination through fuel and oil spills in the harvesting area and arboricide after-effects	**M**	**L-M**	• Comply with Spill Prevention and Management Plan in the EMP. • Harvesters should be encouraged to avoid very sensitive zones and no-go areas. • Harvesters and landowners should be encouraged to use stem/foliar applied chemicals instead of soil-applied arboricides if using chemical aftercare. • When using manual aftercare, plants should be uprooted to prevent regrowth. Manual aftercare is not recommended for controlling *Dichostachys cinerea*, which readily coppices from damaged roots.
Biodiversity	**Failure to achieve rangeland improvement goals in the harvesting area**	**H**	**H+**	• Clear authority and a governance structure to be established with supervision and accountability • Appointing a dedicated Environmental Manager to conduct, but not limited to, auditing, regular training, monitoring and being a champion for responsible management • Follow Adaptive Management and continuous assessment approach • Alignment with Forest Stewardship Council (FSC) standards • Promote spatial heterogeneity in harvesting intensity according to Tree Equivalents (TE) • Regular training of harvesters and landowners on the ecological principles that underlie savanna dynamics • Develop Site-Specific Harvesting Plans • No tree, bush or shrub may be cut, destroyed or removed within 100 m of a river, stream or watercourse. Bush is naturally denser along the margins of rivers. • All trees taller than 4 m, or greater than 18 cm diameter at the base, must be retained. Large dead trees should not be cut, as they provide cavities for nesting, and perches for larger birds • Ensure aftercare is executed in line with the site specific harvesting.
	Large scale loss of protected woody species, including fruit-bearing species important for humans and other fauna, as well as rare, iconic, and timber species due to indiscriminate and excessive take-off	**H**	**M**	• Avoid harvesting of the no-go areas • Develop Site Specific Harvesting Plans for harvesters and landowners • Harvesters should be encouraged to follow biomass harvesting guidelines (see the EMP). It is important not to over clear: tree equivalents/ha that should remain after thinning should follow the recommended rainfall-TE guidelines per dominant encroacher species.

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
				• Harvesters should follow biomass harvesting guidelines (SAEIA 2017), and the management and mitigation measures in the EMP • Only use harvesting methods and/or machinery that are able to selectively harvest encroacher bush while avoiding damage to desirable species • Arrange training events • Supervision to prevent cutting of non-target plants • Long-term monitoring of population trends/health of valuable species to also include the post-harvest management efficiency
	Loss of and disturbance of animals in harvesting area	**M-H**	**L-M**	• Give preference to harvesting methods that allow smaller animals to move away i.e. slow moving machinery or manual methods. • Ongoing awareness shall be promoted about the value of biodiversity and the negative impacts of poaching, especially to breeding birds. • Ensure swift law enforcement in poaching cases by reporting immediately to the police and to community anti-poaching organisations. • Restrict harvesting activities at night where possible. Transport at night shall be limited.
Surface Water	**Bush harvesting activities causing increased salinization, causing surface water quality impacts**	**H**	**L**	• Bush thinning as opposed to bush clearing shall be practiced, specifically in the groundwater sensitive areas.
	Non environmentally friendly arborocides used after bush harvesting i.e. aftercare, impacting on surface water quality	**H**	**L**	• Use FSC approved water insoluble arboricides.
	Contamination of surface water from hydrocarbon spillages and undetected leakages from harvesting equipment and trucks transporting biomass	**M**	**L**	• Comply with Spill Prevention and Management Plan in the EMP.
	Contamination of surface water from ash from the Power Station taken back to the harvested farms	**M**	**L**	• Ash to be dispersed and used as fertilizer at the harvested farms or used for alternative applications • Preferably fly ash and bottom ash composite be deposited due to the less harmful metal and salt content compared to fly ash and bottom ash alone
Groundwater	**Impact of de-bushing on the groundwater levels**	**M+**	**M+**	• Recommendation: Soil isotope studies and other recharge assessment studies like the well-established “Chloride Method” should be carried out

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
				in areas prior to de-bushing and after de-bushing, which will give a direct result of any change in recharge
	Impact of de-bushing on groundwater and soil through salinization	**M**	**L**	• Bush thinning as opposed to bush clearing shall be practiced • No harvesting in rivers and drainage lines and within a buffer of 100m away from the water source.
	Non environmentally friendly arboricides used after bush harvesting i.e. aftercare, impacting on groundwater quality	**M**	**L**	• Harvesters and landowners should be encouraged to use stem/foliar applied chemicals instead of soil-applied arboricides and shall comply with FSC pesticides standards. • Follow harvesting guidelines set by DWAF as presented in the best practice guidelines for de-bushing of 2017. • Do not use arboricides in sensitive areas with shallow water levels of 0-20m bgl. If this cannot be avoided, the use of arboricides with short half-lives, shall be promoted as potential aftercare application.
	Contamination of groundwater from hydrocarbon spillages and undetected leakages from harvesting equipment and trucks transporting biomass	**M**	**L**	• Comply with Spill Prevention and Management Plan in the EMP.
	Impact on groundwater from ash taken back to the harvested farms	**M**	**L**	• Ash to be dispersed and used as fertilizer at the harvested farms or used for alternative applications and not stockpiled for longer periods • Preferably fly ash and bottom ash composite be deposited due to the less harmful metal and salt content compared to fly ash and bottom ash alone. .
Air Quality	**Air pollution**	**M**	**L-M**	• It is recommended that sensitive areas within harvest zones are identified via field inspection prior to the commencement of felling operations and that setback distances are determined between harvest zones and sensitive populations, taking into account the topography and prevailing wind directions. Harvest intensity shall be reduced close to sensitive land uses, apply bush thinning , and vegetation buffers shall be retained between harvesting activities and sensitive receptors to reduce the potential of windblown dust from open areas (as per access agreements).
Noise	**Noise pollution**	**L**	**L**	• Noise levels, due to harvesting activities, must be designed and sited within the harvesting area to comply with the IFC and World Bank guideline of 55dB LAeq for daytime at noise sensitive receptors.

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
				• This would be achieved based on a combined sound power level of 113dB(A) from all harvesting related plant and activities, at a distance of 200m from the closest receptor. This is, however, also dependent on the landowner's requirements, should there be a request for harvesting closer to a relevant homestead.
Archaeology	**Damage to archaeological resources**	**H**	**L**	• All harvesting contractors and workers shall be made aware that under the National Heritage Act any items protected under the definition of heritage, defined as any site that is over 50 years old, found in the course of development shall be reported to the National Heritage Council. • If there are any chance finds of archaeological sites during the harvesting activities, the harvesting contractors will follow a chance find procedure. The key component of which is to ensure that the site remains undisturbed until a specialist archaeologists or cultural heritage professional has assessed the site, assessed the potential damage, advised on the necessary management steps, and advised on the requirements for authority consultation and permitting.
Visual	**Visual impact on third parties**	**L**	**L**	• A buffer zone, no-go harvesting zones established unless otherwise mutually agreed to with the landowner, shall be recognized around sensitive tourist and or residential sites.
Socio-economic	**Job creation and skills development**	**H+**	**H+**	• Ensure that strategies and programmes are in place prior to harvesting that, where possible, maximises the use of the local labour force during operations. • Encourage recruitment and training of women and support female employees to perform well in the workplace.
	Creating business opportunities	**H+**	**H+**	• NamPower to interact with financing stakeholders from any early stage to ensure the availability of capital for the timeous start-up and up-scaling of biomass producers. • Encourage semi-mechanized woodchip producers to supply biomass.
	Impact on existing wood biomass users	**H**	**M**	• It is advised that NamPower proactively engages with harvesters and processors once harvesting begins to ensure that new or expanded charcoal and / or woodchip harvesters can meet the demand for both woodchips and charcoal. FSC standards allow anyone who complies to be considered for a Fuel Supply and Harvesting Agreement.
	Bush-thinning on land productivity i.e. improvement of rangeland productivity	**M-H+**	**H+**	• NamPower should include contractual clauses in the Fuel Supply and Harvesting Agreements to ensure that aftercare is conducted. • Refer to aftercare requirements above and in the EMP.

Environmental component	Potential Impacts	Assessment Significance Rating		Key Management and mitigation Measures, Monitoring and Auditing activities
		Unmitigated	Mitigated	
	Impact on safety, security and health in the farming community	**H**	**M**	• Adhere to all the relevant Namibian legislation and the requirements of its financing partners in terms of workers' rights and employment conditions, health and safety, the rights of indigenous peoples and other vulnerable groups and community relations. • Implement a formal health and safety management plan/system. • Harvesting contractors to have a comprehensive HIV, AIDS and TB workplace policy and wellness programme which will detail HIV awareness and prevention measures in the workplace and enable easy access to AIDS treatment, care, and support for employees.
	Community resilience to population in-migration	**H**	**M**	• Refer to Table 4.
	Upholding human rights and interests of vulnerable people and labour	**M+**	**M+**	• The organisation responsible for selecting bush harvesting sites should be encouraged to consult with San traditional authorities and San living on bush encroached resettlement farms. The aim is to prioritise their farms for bush-thinning and, where possible, to prioritise San people for jobs opportunities.

8 ENVIRONMENTAL IMPACT STATEMENT AND CONCLUSIONS

The receiving environment was studied as part of the EIA process for the proposed Biomass Power Project and environmental aspects and potential impacts associated with the activities and facilities were identified as part of the Scoping Phase, for further consideration and assessment during the assessment phase of the EIA. The full suite of facilities and activities, associated with the construction, operation, and decommissioning phases of the proposed Biomass Power Station and overhead powerline; as well as the harvesting and associated activities are described in Section 4 of the EIA Report.

Potential environmental impacts were identified by SLR in consultation with I&APs, regulatory authorities, specialist consultants, and NamPower. The impacts were assessed under the identified issue headings in Section 7 of the EIA Report. Impacts were considered in a cumulative manner where possible such that the impacts of the proposed Biomass Power Project were assessed in the context of the baseline conditions.

The project with its positive impacts envisaged from the generation of renewable power and the harvesting of the fuel source has the potential to benefit the country, society, and surrounding communities both directly and indirectly. Other than the benefits associated with the electricity generation, the implementation of the proposed Encroacher Bush Biomass Power Project will have benefits such as contributing to a reduction in bush encroachment and the restoration of rangeland through bush thinning practices, increasing land productivity, increased rain water infiltration and improved business, employment and skills development opportunities.

A number of high significant negative impacts are however specifically associated with the harvesting and associated activities in the unmitigated scenario. It is possible to mitigate the potential negative impacts by committing to apply the findings of the assessment and related mitigation objectives and actions as presented in the two EMPs. The significance of the potential impacts associated with achieving the savanna ecological restoration goals in the harvesting area, or not, is assessed as high negative in the unmitigated scenario and high positive in the mitigated scenario.

There is still a clear need for intensive monitoring of savanna dynamics under various harvesting and postcare scenarios to determine the long term outcomes and to inform careful, adaptive, and pre-emptive management. An adaptive management approach is recommended to ensure the restoration outcomes are achieved.