

NamPower Encroacher Bush Biomass Power Project

Progress Update of the Biomass Project

De-busing Steering Committee

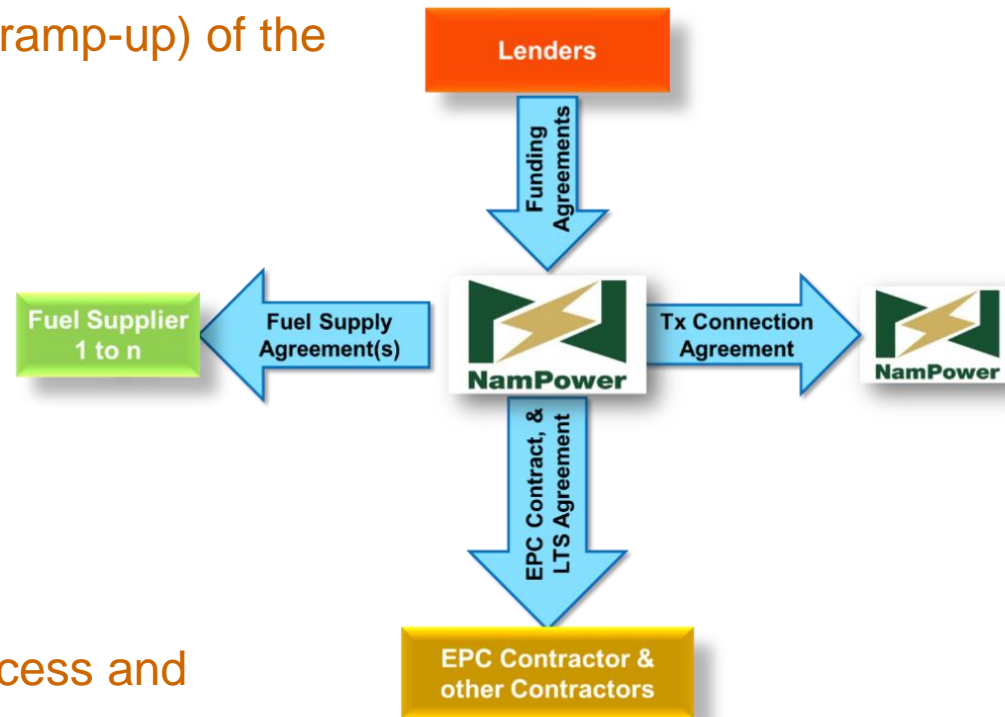
17 November 2017



- ❑ Project Execution Philosophy
- ❑ Project Technical Description
- ❑ EIA Overview
- ❑ Anticipated EIA Program
- ❑ EIA Scoping findings
- ❑ Proposed Harvesting Area
- ❑ Harvesting Supply Chain Challenges
- ❑ Key Next Steps

Project Execution Philosophy

- ❑ First Biomass power plant to be funded on NamPower's balance sheet to:
 - facilitate the establishment and (ramp-up) of the biomass fuel supply industry
 - resolve the associated teething issues with the new technology in Namibia
 - prove the bankability of the project for future plants to be tendered on an IPP basis and
 - circumvents Project Finance process and extended timelines



Project Technical Description

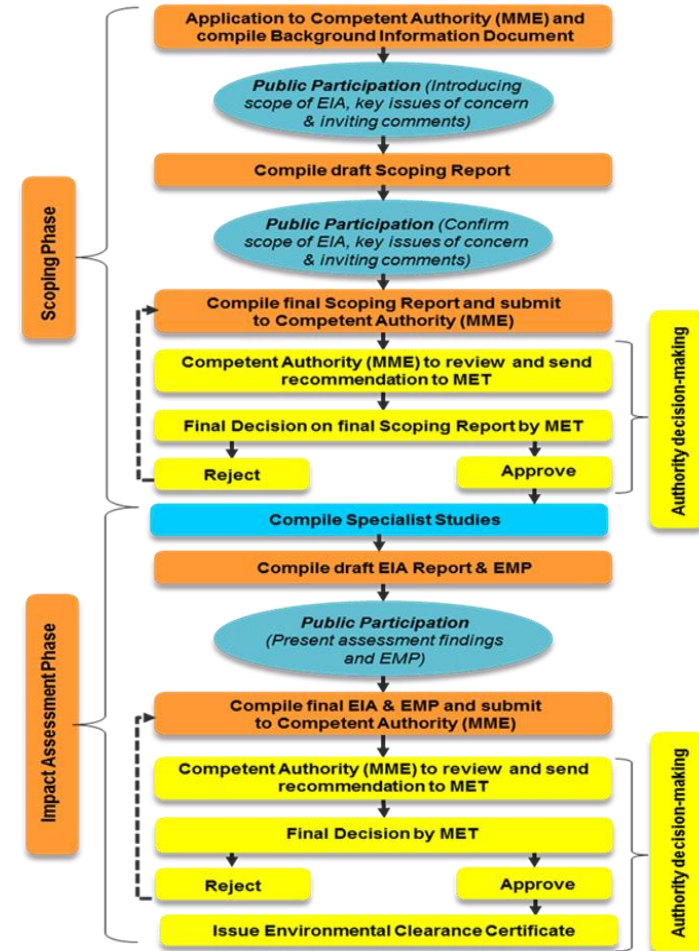


- ❑ Otjikoto as preferred site from the six sites scoped during EIA
- ❑ Grate type technology preferred over Fluidized Bed technology
- ❑ Expected fuel specification is P100 /125 vs P63
- ❑ Key plant and fuel details are:

	20 MW	40MW
Net Plant Efficiency (LHV)	28.4%	30.3%
Capacity Factor	85%	85%
Effective Biomass per hectare	10.8 tons/ha	10.8 tons/ha
Calorific Value of Fuel	±16 MJ/kg	±16 MJ/kg
Harvest Area required p.a.	±11,000 ha	±20,500 ha
Annual Fuel requirement (t.p.a.)	± 118 000 tons	± 221 000 tons

EIA Overview

- NamPower will be responsible for the construction and operation of the power plant and overhead power line and is required to comply with the requirements of:
 - Environmental Management Act and Regulations
- SLR appointed to conduct the EIA to cumulatively assess potential impacts associated with all project components i.e.:
 - Power plant and transmission
 - Harvesting and transportation



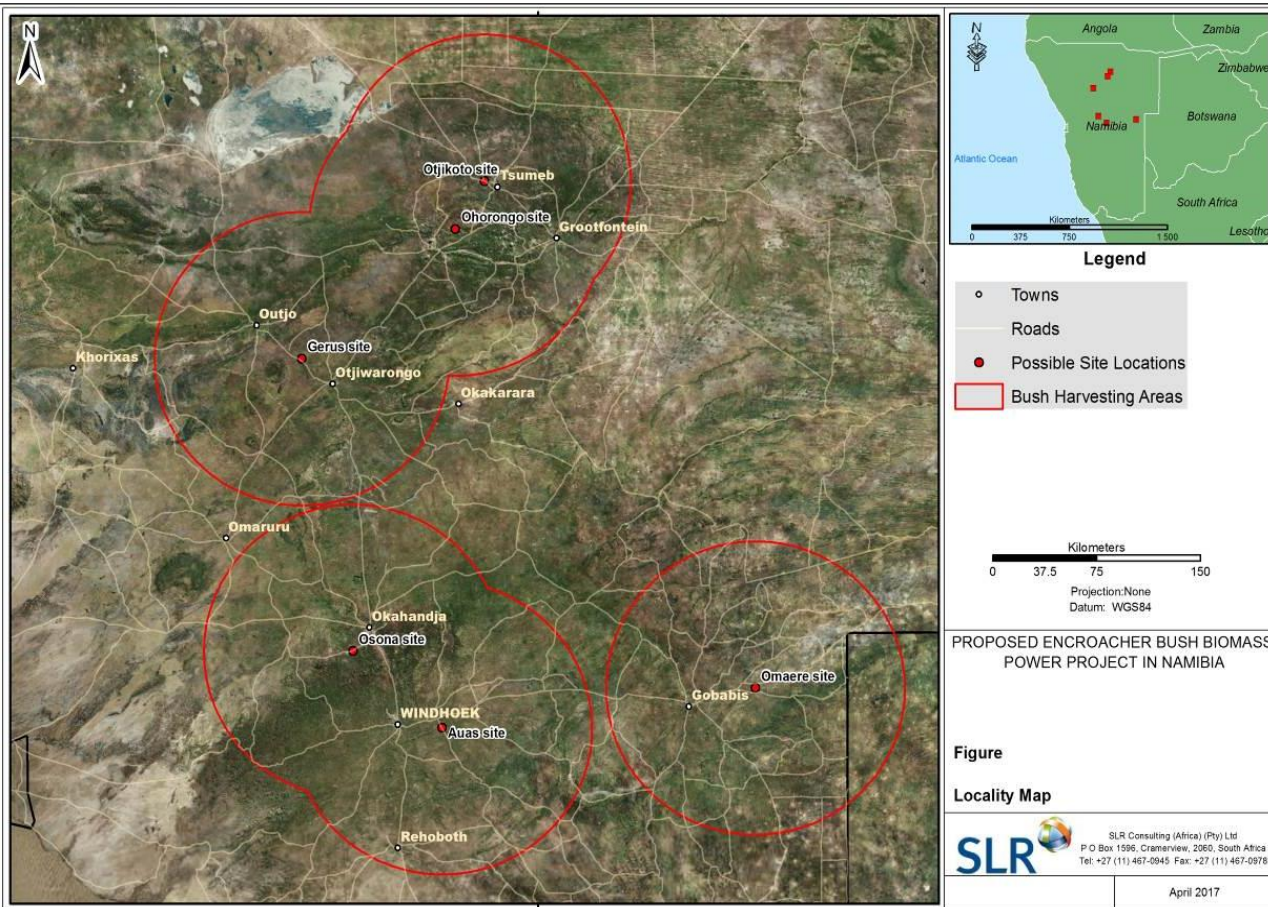
Anticipated EIA Program



Tasks	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18
Application submitted to MME	█																
Public Participation Meetings		█															
Specialist scoping on all potential Sites	█	█	█	█													
Specialists scoping reports					█												
Site selection and preliminary findings					█												
Draft Scoping Report						█											
Addition of the harvesting activities						█	█										
Application submitted to MAWF							█										
Update Draft Scoping Report							█										
Scoping Report Public Review Period								█									
Update Draft Scoping Report									█								
Submission to MME and MAWF										█							
Detailed Site Assessment											█	█	█				
Detailed Site Assessment by Specialists																	
Draft EIA report and EMP															█		
Public Participation on EIA and EMP																█	
Submission to MME and MAWF																	█
Recommendation to MET																	█

- NamPower acknowledge that the EIA needs to include the power plant and harvesting assessment. Outstanding information still required:
 - Exact equipment which will be used and exact site which will be harvested;
 - Harvesting and strategic stocking methodology.
 - Awaiting EIB approval.

The scoping of the six potential sites



Baselines:

- Climate -
- Topographical -
- Surface Water -
- Groundwater -
- Biodiversity -
- Archaeology -
- Air Quality & 3rd party health -
- Noise -
- Visual -
- Traffic -
- Socio-Economic

Multi Criteria Decision Making (MCDM) Process



❑ MCDM main criteria (x7)

- Technical;
- Infrastructure;
- Fuel supply/ Sourcing;
- Financing;
- Deliverability;
- Environmental; and
- Socio-Economic considerations.

❑ MCDM sub criteria (x35)

- land procurement,
- feedstock pre-treatment,
- harvesting area required for sufficient supply,
- carrying capacity of road network from harvest sites,
- new water sources,
- biodiversity impact,
- groundwater impact,
- Socioeconomic benefits.

Definition of Biomass to Power Project

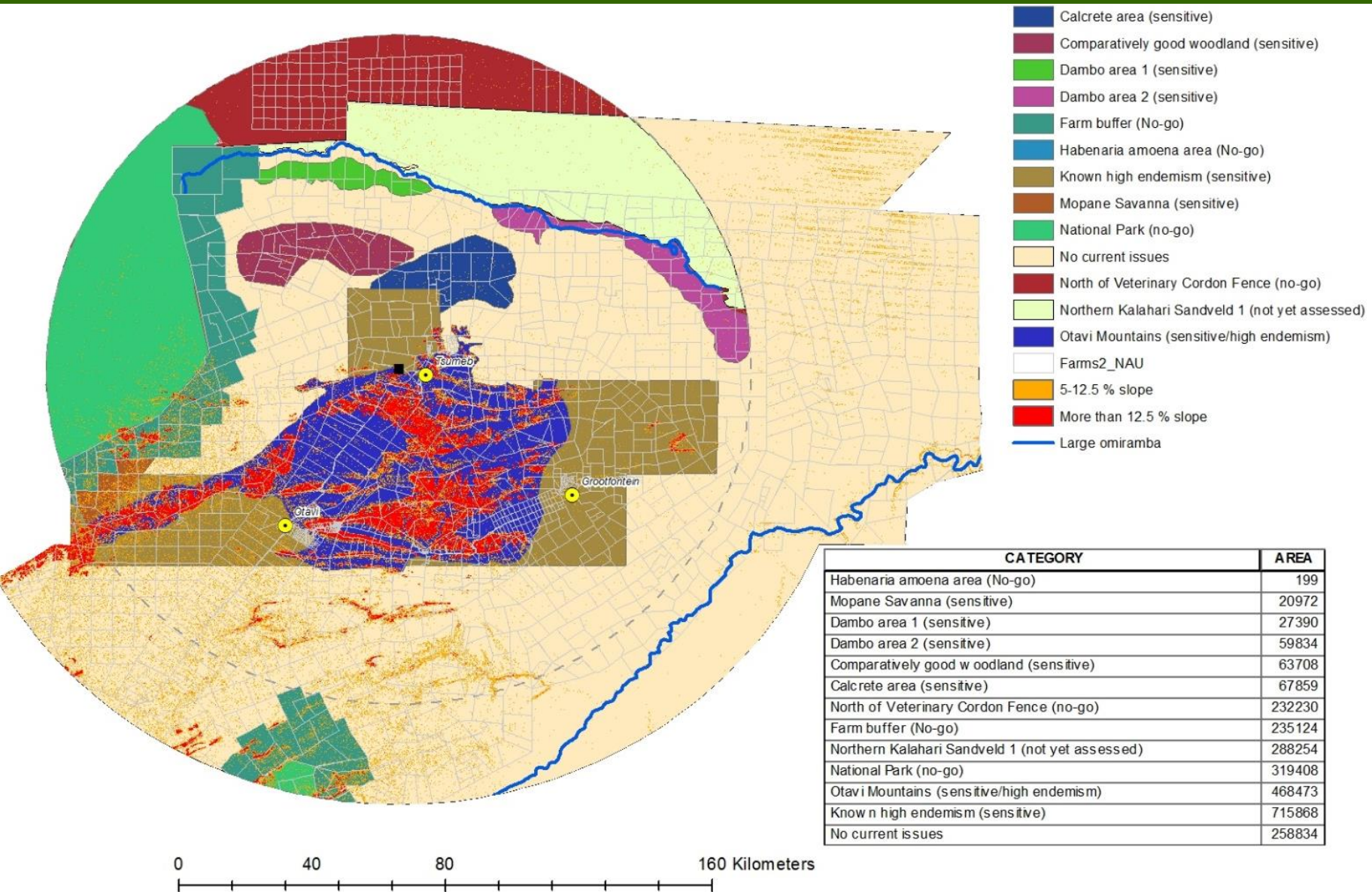


RANKING	SITE	SIZE	TECHNOLOGY
1 st	Otjikoto	20 MW	Grate Fired Boiler
2 nd	Gerus	20 MW	Grate Fired Boiler
3 rd	Otjikoto	20 MW	Fluidized Bed
4 th	Gerus	20 MW	Fluidized Bed
5 th	Otjikoto	40 MW	Grate Fired Boiler
6 th	Omaere	20 MW	Grate Fired Boiler
7 th	Gerus	40 MW	Grate Fired Boiler
8 th	Otjikoto	40 MW	Fluidized Bed
9 th	Omaere	20 MW	Fluidized Bed
10 th	Ohorongo	20 MW	Grate Fired Boiler

- For the purpose of the EIA and related assessment, a 40 MW option will be considered together with considering both technology options;
- techno-economic study (currently still in process) and pending NamPower governance structure approvals;
- worst case scenario will be catered for to provide some flexibility.

- ❑ Otjikoto site may borne a larger agricultural impact from harvesting activities and encroachment area, it was also identified as the most challenging – as per definition of the first project – will pave the way and provide ease of duplication to any other potential site

Proposed Harvesting Area



Harvesting Supply Chain Challenges



- ❑ Harvesting industry still in its infancy stage
 - x4 Upscaling of existing harvesting industry required to serve 20 MW power plant
 - Ohorongo required 2 years to ramp up to expected volume forecasted
- ❑ Currently still on the learning curve with various harvesting equipment
- ❑ Large start-up capital requirement for “bigger” harvesting operations makes for expensive trail and error runs – long downtimes for failures
- ❑ Permitting by Ministry of Water and Forestry (MAWF) is restrictive:
 - EIA and EMP required for large bush harvesting operations
- ❑ Development of a fit for purpose Fuel Supply Agreement (FSA) and accommodative pricing structure of the Biomass power plant and harvesters required

Key Next Steps



- ❑ Finalisation of procurement of project site
- ❑ Obtain Environmental Clearance Certificate for the harvesting, project site and transmission lines
- ❑ Conclude the Feasibility and related project development studies
- ❑ Secure source of financing
- ❑ Pre-qualify and procure the EPC Contractor
- ❑ Finalise the Fuel Supply Structure and Fuel Supply Agreement (FSA)
- ❑ Obtain all permits and licenses
- ❑ Final Investment Decision
- ❑ Procure the Fuel Suppliers

Thank you

